



Vidya Bharati ShaikshanikMandal, Amravati's

Vidya Bharati Mahavidyalaya, Amravati

**Affiliated to Sant Gadge Baba Amravati University, Amravati
Maharashtra**

NAAC Re-accredited with Grade "A"(CGPA 3.26-Second Cycle)

CPE Status (Third Time) by UGC,

Mentor College under Paramarsh Scheme by UGC

'Lead College' by S.G.B. Amravati University, Amravati

ISO Certification: 9001:2015 and 14001:2015

Website: vbm.org

1.2.1.

**Number of programmes in which CBCS/Elective
course system has been implemented**




S.G.B.A.U./6D/A23/2020
22/2/2020

Certificate regarding implementation of CBCS/Elective course system

This is to certify that Vidya Bharati Mahavidyalaya, Amravati is an affiliated institution to Sant Gadge Baba Amravati University, Amravati conducting UG and PG programmes. The affiliating university has already implemented CBCS/Elective course system in the colleges in its jurisdiction. The Vidya Bharati Mahavidyalaya, Amravati is running the following programmes-

Programme Details-

Programme	Status of implementation of CBCS/Elective course system (Yes/No)	Year of implementation of CBCS/Elective course system
B. Sc.	Elective-Yes	1973
B.Sc. Industrial Chemistry	Elective-Yes	1997
B.Sc. Electronic	Elective-Yes	1985
B.Com	Elective-Yes	1985
B.Com. (Accounting & Finance)	Elective-Yes	2018
BA	Elective-Yes	1992
BCA	Elective-Yes	2000
BBA	Elective-Yes	2000
B.Sc. Computer Science	Elective-Yes	1998
B.Sc. Computer Application	Elective-Yes	2001
B.Voc.(Cosmetics)	Elective- No	2018
B.Voc. (Software Development)	Elective- No	2019
M.Sc. Chemistry	CBCS- Yes	1992
M.Sc. Physics	CBCS- Yes	1993
M.Sc. Botany	CBCS- Yes	1994
M.Sc. Zoology	CBCS- Yes	1995
M.Sc. Mathematics	CBCS- Yes	2018
M.Sc. Computer Science	CBCS- Yes	2018
M.Com.	Elective-Yes	2018
MA (English)	Elective-Yes	2018
MBA	Elective-Yes	1995
MCA	CBCS- Yes	2006
MCM	Elective-Yes	2000
MHRD	Elective-Yes	1994


Registrar

B.Sc. Final (Sem-V & VI)
Exam. 2015-16

Prospectus No. 2016123

संत गाडगेबाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका
विज्ञान स्नातक अंत्य परीक्षा
सत्र-५-हिवाळी-२०१५
सत्र-६-उन्हाळी-२०१६

PROSPECTUS
OF

The Examination for the Bachelor of Science
Semester-V, Winter-2015, and
Semester-VI, Summer-2016
& Onwards



2015

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I N D E X
B.Sc. Final (Semester-V & VI)
(Prospectus No.2016123)

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**Syllabus Prescribed for B.Sc. Final Examination
Semester- V & VI**

1. Mathematics

**5S Mathematics - Paper – IX
(Analysis)**

- Unit I** : Riemann Integral. Integrability of continuous and monotonic functions. The fundamental theorem of integral calculus. Mean value theorems of integral calculus. Improper integrals and their convergence. Comparison and limit tests .
- Unit II** : Continuity and differentiability of complex functions. Analytic functions. Cauchy-Riemann equations. Harmonic and Conjugate functions. Milne Thompson method
- Unit III** : Elementary functions Mapping by elementary functions. Mobius transformations. Fixed points. Cross ratio. Inverse points and critical points. Conformal mappings.
- Unit IV** : Metric Spaces :Countable and uncountable sets. Definition & examples of metric spaces. Neighbourhoods. Limit points. Interior points. Open and closed sets. Closure, Interior & boundary points. Sub-space of a metric space. Cauchy sequences. Completeness. Cantor's intersection theorem. Baire category theorem.
- Unit V** : Compactness. Connectedness. Limit of functions. Uniform continuous functions. Continuity and compactness. Continuity and connectedness.

Reference Books :

1. R. R. Goldberg:Methods of Real Analysis, Oxford IBH publishing Co. New Delhi, 1970.
2. T. M. Karade, J. N. Salunke, K. S. Adhav, M. S. Bendre : Lectures on Analysis, Sonu Nilu Publication, Nagpur.
3. Walter Rudin: Principles of Mathematical Analysis, International students edition (Third edition)
4. T. M. Apostol :Mathematical Analysis, Narosa Publishing House, New Delhi, 1985.,
5. S. Lang : Undergraduate Analysis, Springer-Verlag New York, 1983.
6. D. Somasundaram & B. Choudhari : A First Course in Mathemati

- cal Analysis, New Delhi. 1997.
7. Shanti Narayan : A Course of Mathematical Analysis, S. Chand & Co., New Delhi.
 8. P. K. Jain & S. K. Kaushik : An Introduction to Real Analysis, S. Chand & Co. New Delhi, 2000.
 9. R. V. Churchill and J.W.Brown, Complex Variables and Applications, 5th Edition, McGraw Hill, New York, 1990
 10. Mark J Ablowitz and : A.S. Fokas, Complex Variable Introduction and Application ,Cambridge University Press ,South Asian Edition ,1998.
 11. Shanti Narayan : Theory of functions of Complex Variable,,S.Chand and Co. New Delhi.
 12. E.T.Coption,:Metric Spaces, Cambridge University Press ,1968.
 13. P.K.Jain and K.Ahmed ,:Metric Spaces ,Narosa Publishing House, New Delhi 1996.
 14. G.F.Simmons :Introduction to Topology and Modern Analysis, McGraw Hill, New York, 1963

**Semester V
5-S Paper - X
(Modern Algebra)**

- Unit I** : **Normal Subgroups:** Definition, examples. Different characterizations of normal subgroups, Algebra of normal subgroups, Quotient group.
- Unit II : **Homomorphism and Isomorphism:** Homomorphism, Homomorphic image, Kernel of homomorphism, Isomorphism of groups, Fundamental theorem of homomorphism, Natural homomorphism.
- Unit III** : **Ring:** Definition, Examples , Properties of ring, Commutative ring, Ring with unity, Zero divisor, Without zero divisor, Boolean ring, Cancellation laws in rings, Subring.
- Unit IV** : **Integral domain and field:** Definition, examples, field, Subfield, Prime field, The field of quotients of an integral domain, Characteristics of a ring.
- Unit V** : **Polynomial rings:** Division Algorithm theorem, Unique factorization theorem for polynomials over a field,

Polynomials over rational field, Gauss Lemma, The Eisenstein Criterion.
Unique factorization domain (UFD) (only Definition).

Reference Books:

1. I.N.Herstein: Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. N.Jacobson: Basic Algebra, Vol. I and II W.H.Freeman, 1980 (Hindustan Publishing Co.)
3. Shanti Narayan : A Text Book Of Modern Abstract Algebra, S. Chand and Co., New Delhi
4. K.B.Datta: Matrix and Linear Algebra, Prentice Hall of India Pvt.Ltd. New Delhi, 2000
5. P.B.Bhattacharya, S.K.Jain and S.R.Nagpal : Basic Abstract Algebra (IInd Edition) Cambridge University Press Indian Edition, 1997
6. K.Hoffman and R.Kunze : Linear Algebra, IInd Edition Prentice Hall, Englewood Cliffs, New Jersey, 1971.
7. S.K.Jain, A Gunawardhana and P.B.Bhattacharya : Basic Linear algebra with MATLAB, Key College Publishing (Springer-Verlag) 2001
8. S. Kumaresan : Linear Algebra, A Geometric Approach, P. Prentice Hall of India Pvt.Ltd. New Delhi, 2000
9. Vivek Sahai and Vikas Bisht : Algebra, Narosa Publishing House, 1997.
10. D.s.Malik, J.N.Mordeson and M.K.Sen : Fundamentals of Abstract Algebra, McGraw Hill International Edition 1997
11. T.M.Karade, J.N.Salunke, K.S.Adhav, M.S.Bendre : Lectures on Abstract Algebra. Sonu Nilu Publication. Nagpur (IInd Publication)

Semester VI
6 S - Paper XI
(Linear Algebra)

- Unit I : Vector Space** : Definition and example of vector spaces. Subspaces. Sum and direct sum of subspaces. Linear span. Linear dependence, Independence and their basic properties. Basis, Finite dimensional vector spaces. Existence theorem for bases. Invariance of the number of elements of a basis set. Dimension.
- Unit II : Linear Transformations**: Linear transformation and their representation as matrices. The algebra of linear transformations. The rank nullity theorem. Change of basis.

Unit III : Dual Spaces : Dual space. Bidual space and natural isomorphism. Adjoint of a linear transformation. Eigen values and eigenvectors of a linear transformation.

Unit IV : Inner Product Spaces : Inner product spaces. Cauchy-Schwarz inequality. Orthogonal vectors. Orthogonal complements. Orthonormal sets and bases. Bessel's inequality for finite dimensional spaces. Gram Schmidt Orthogonalisation process.

Unit V : Modules : Modules, Submodules, Quotient modules. Homomorphism and Isomorphism theorems.

Reference Books:

1. I.N.Herstein: Topics in Algebra, Wiley Eastern Ltd., New Delhi, 1975.
2. N.Jacobson: Basic Algebra, Vol. I and II W.H.Freeman, 1980 (Hindustan Publishing Co.)
3. Shanti Narayan : A Text Book Of Modern Abstract Algebra, S. Chand and Co., New Delhi
4. K.B.Datta: Matrix and Linear Algebra, Prentice Hall of India Pvt.Ltd. New Delhi, 2000
5. P.B.Bhattacharya, S.K.Jain and S.R.Nagpal : Basic Abstract Algebra (IInd Edition) Cambridge University Press Indian Edition, 1997
6. K.Hoffman and R.Kunze, : Linear Algebra, IInd Edition Prentice Hall, Englewood Cliffs, New Jersey, 1971.
7. S.K.Jain, A Gunawardhana and P.B.Bhattacharya: Basic Linear algebra with MATLAB, Key College Publishing (Springer-Verlag), 2001
8. S. Kumaresan : Linear Algebra, A Geometric Approach, P. Prentice Hall of India Pvt. Ltd. New Delhi, 2000
9. Vivek Sahai and Vikas Bisht : Algebra, Narosa Publishing House, 1997.
10. D.S.Malik, J.N.Mordeson and M.K.Sen : Fundamentals of Abstract Algebra, McGraw Hill International Edition 1997
11. T.M.Karade, J.N.Salunke, K.S.Adhav, M.S.Bendre : Lectures on Abstract Algebra. Sonu Nilu Publication. Nagpur (IInd Publication)

Semester – VI
6 S - Paper-XII (Optional)
(Graph Theory)

- Unit I :** Graph. Application of graphs, finite and infinite graphs, incidence and degree, isolated vertex, pendent vertex and null graph, isomorphism, subgraphs, walks, path and circuits, connected graphs and components, Euler graph, operation on graphs, Hamiltonian paths and circuits, travelling salesman problem.
- Unit II :** Trees, some properties of trees, pendent vertices in a tree, distance and centres in a tree, Rooted and binary trees, On counting trees, spanning trees.
- Unit III :** Fundamental circuits, Cutsets, Some properties of cutesets, all cuteset in a graph, fundamental circuits and cutsets, connectivity and separability, planer graphs, Kurutowskiø two graphs, different representation of planer graph, detection of planarity.
- Unit IV :** Vector space associated with a graph, circuit and cuteset subspaces, Orthogonal vectors and spaces, Intersection and joint of W_r and W_s .
- Unit V :** Incidence matrix, Submatrix of A(G), Circuit matrix, Fundamental circuit matrix B, Rank of B, an application to a switching network, cuteset matrix, path matrix, adjacency matrix, the relationship among A_f , A_f and C_f .

Reference Books:

1. Narsingh Deo: Graph Theory with Application to Engineering and Computer Science, Prentice Hall Of India, New Delhi.,
2. Richard Johnson- Bough : Discrete Mathematics, Macmillan Publishing Company 886, Third Avenue New York 10022
3. Olympia Nicodemi : Discrete Mathematics, C.B.S Publ. and Distributors 485, Jain Bhavan Bholanath Nagar Shahadara New Delhi-32 India
4. Frank Harare : Graph Theory, Narosa Publishing House ,307 ,Shiv Centre D.B.C. Sector Ku Bazar New Bombay 400704,
5. S.A.Choudum: A first Course In Graph Theory, McMillan India Ltd. Mercatile House Magazine Street Bombay 10

Semester VI
6 S – Paper XII (Optional)
(Special Theory of Relativity)

6. E.L.LIU : Elements of Discrete Mathematics, McGraw Hill Book Company, New York
7. Seymour Lipschultz and Marc Lipson : Discrete Mathematics ,TMH New Delhi (Schaum Outline series) IIInd Edition.
8. J.N.Salunke : Boolean Algebra and Graph Theory Laxmi Publication Akot.

Unit I : Review of Newtonian Mechanics:

Inertial frames. Speed of light and Galilean relativity. Relative character of space and time. Postulates of Special theory of relativity. Lorentz Transformations and its geometrical interpretation. Group properties of transformation.

Unit II : Relativistic Kinematics:

Composition of parallel velocities. Length contraction. Time Dilation. Transformation equation for components of velocities and acceleration of a particle and Lorentz contraction factor.

Unit III : Geometrical representation of Space-Time:

Four dimensional Minkowskian space-time of relativity. Time like, Light Like and space like intervals. Proper time. World line of a particle. Four vector and tensors in Minkowskian space-time.

Unit IV : Relativistic Mechanics:

Variation of mass with velocity. Equivalence of mass and energy. Transformation equations for mass, momentum and energy. Relativistic force and transformation equations for its components. Relativistic Lagrangian and Hamiltonian.

Unit V : Electromagnetism:

Maxwellø equation in vacuum. Propagation of electric and magnetic field strengths. Transformation equations for electromagnetic four potential vector. Transformation

equations for electric and magnetic field strengths. Gauge transformation. Lorentz invariance of Maxwell's equations. Lorentz force on a charged particle.

Reference Books:

1. T.M.Karade, K.S.Adhav and M.S.Bendre: Lectures on Spacial Theory of Relativity ,Sonu Nilu Publication, Nagpur
2. C.Molar : The Theory of Relativity, Oxford Clarendon Press, 1952
3. P.G.Bergman : Introduction to The Theory of Relativity, Prentice Hall of India,Pvt.Ltd.1969
4. J.L.Anderson :Principles of Relativity Physics, Academic Press, 1967
5. V.A.Ugarov : Special Theory of Relativity, Mir Publishers, 1979
6. R.Resnick :Introduction to Special Relativity Wiley Eastern,Pvt.Ltd.1972

Semester – VI 6 S – Paper XII (Optional) (Mathematical Modelling)

- Unit I** : The Process of applied mathematics. Setting of First-order differential equations ó Qualitative solutions Sketching.
- Unit II** : Difference and Differential Equation growth models. Singled species population models. Population growth ó An age structure model. The spread of Technological innovation.
- Unit III** : Higher order linear models : A model for the detection of diabetes. Combat modes. Traffic models-Car-following models. Equilibrium speed distributions.
- Unit IV** : Non-linear population growth models. Prey-Predator models. Epidemic growth models. Models from political Science Proportional representation ó cumulative voting, comparison voting.

Unit V : Applications in Ecological and Enviornmental subject areas. Urban waste water management planning.

Reference Books :

1. Vol. 1 Differential equation models, Eds. Martin Barun, C. S. Coleman D. A. Drew.
2. Vol. 2 Political and Related Models. Steven J. Brams, W. F. Lucas, P. D. Straffin (Eds.)
3. Vol.3 Discrete and System models. W. F. Lucas, F. S. Roberts, R. M. Thrall.
4. Vol. 4 Life Science Models. H. M. Roberts & M. Thompson.
5. All Volumes published as modules in Applied Mathematics, Springer-Verlag, 1982.

2 : PHYSICS Semester-V 5S PHYSICS

Unit I : Origin of Quantum Mechanics (12 L)

1. Historical Background: Failure of classical wave theory in explaining Black body radiation and Photoelectric Effect; Compton Effect Qualitative explanation only
2. Assumptions of Planck's Quantum Theory
3. Wave Particle Duality
4. Matter Waves: De Broglie Hypothesis, Davisson Germer experiment
5. Concept of Wave Packet, Phase velocity, group velocity and relation between them.
6. Heisenberg's uncertainty principle: Different forms of uncertainty principle; Thought experiments: single slit diffraction and Gamma ray microscope

Unit II : The Schrodinger equation and its applications (12 L)

- 1) Wave function and its physical significance
- 2) Schrodinger time dependent equation
- 3) Separation in time dependent and time independent parts

- 4) Operators in quantum Mechanics
- 5) Eigen functions and Eigen values
- 6) Particle in one dimensional and three dimensional box (Energy eigen values)
- 7) Qualitative analysis of potential barrier Tunneling effect)
- 8) Simple Harmonic Oscillator (Qualitative analysis of Zero point energy)

Unit III : Atomic and Molecular Spectroscopy (12 L)

Vector Atom Model: Quantum Numbers, Stern Gerlach experiment; selection rules, l-s and j-j coupling, Types of spectra ó Emission & absorption spectra.

X-rays: Continuous X-ray spectrum, Duane and Hunt's law, characteristic X-ray spectra, Mosley's law.

Raman Effect: Stokes and anti-Stokes lines, Quantum theory of Raman effect, Experimental arrangement for Raman Spectroscopy.

Unit IV : Nuclear Physics (12 L)

Detection of charged particles; G. M. counter, Binding energy and Mass defect, stability of nuclei

Alpha Decay: Range of Alpha particles, Geiger - Nuttall law and Gamow's explanation of alpha decay (qualitative)

Beta decay: Types and Pauli's Neutrino Hypothesis

Nuclear Fission, Nuclear fusion (concepts only), Nuclear reactors.

Unit V : Hybrid parameters- low frequency equivalent of CE amplifier & its analysis., Bias stability & thermal runaway (qualitative). General principles of amplifier classification, RC coupled amplifier, equivalent circuits & gain at low, medium & high frequency (qualitative), gain-frequency response. Noise & distortion in electronic circuits.

Unit VI : Feedback in amplifiers- negative feedback, advantages of negative feedback, positive feedback. Phase shift, Wein bridge, Hartley & Colpits Oscillators. Multi-vibrators ó astable, monostable & bistable.

Practical : The distribution of marks for practical examination will be as follows:

Record Book	10 marks
Viva-voce	10 marks
Experiment	20 marks
Assignment	10 marks

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Total	50 marks
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- a) A student will have to perform at least ten experiments per semester.
- b) The semester examination will be of Four Hour duration and student will have to perform one experiment in the semester examination.
- c) In assignment, every student should be asked to submit the detailed report on one of experiments he or she has performed. The detailed report should include the theoretical background of the experiment.
 1. To study RC coupled amplifier- variation of gain with load.
 2. To study phase shift oscillator.
 3. To study Wein bridge oscillator.
 4. To study Hartley oscillator.
 5. To study Colpits oscillator.
 6. To determine e/m by Millikan's oil drop experiment.
 7. To determine e/m by Thomson's method.
 8. Determination of Rydberg's constant.
 9. To study absorption spectrum of Iodine vapors.
 10. To study Raman spectrum.
 11. To identify elements in optical line spectrum.
 12. To determine absorption coefficient of material for gamma rays.
 13. Determination of Hybrid parameters.
 14. Study of monostable multivibrator.
 15. Study of astable multivibrator.
 16. Study of an amplifier - with & without feedback.
 17. Determination of Plank's Constant by using LED.

18. To study characteristics of Zener diode.
19. Study of LED characteristics.
20. Study of characteristics of Laser.
21. Study of Emitter follower.

6S PHYSICS

STATISTICAL MECHANICS AND SOLID STATE PHYSICS

UNIT-I : Statistical Mechanics

Phase space, unit cell, microstates, macrostates, energy states, density of energy states, probability & thermodynamic probability, principle of equal a priori probabilities, most probable distribution, Boltzman entropy relation.

Maxwell Boltzman statistics, and its application to molecular speed distribution, Average speed, rms speed & most probable velocity.

UNIT-II: Distinguishable & indistinguishable particles, concepts of boson & fermions.

Bose & Einstein statistics : Thermodynamic probability, most probable distribution, application of BE statistics to black body radiation.

Fermi- Dirac distribution : Thermodynamic probability, Most probable distribution, Fermi function, Fermi energy & Fermi temperature.

UNIT-III : Crystallography

Solids: - Amorphous and Crystalline Materials; Unit Cell. Miller Indices, Reciprocal Lattice, Coordination Number. Types of Lattices: Diffraction of x-rays by Crystals. Bragg's Law: Determination of lattice parameters of NaCl crystal.

Defects in solids & points, line & plane defects.

UNIT -IV :Electrical Properties of Materials

Motion of electron:- Free electrons; conduction electrons, electron collision; mean free path, conductivity & Ohm's law; density of states; concept of Fermi energy.

Band structure : Electron in periodic potential, nearly free electron model (qualitative), energy band, energy gap, metals, insulators and semiconductors.

UNIT-V : Magnetic Properties of Materials

Atomic magnetic moment; magnetization vector; magnetic susceptibility; Dia -, Para-, and Ferromagnetic Materials; Classical Langevin Theory of dia and Paramagnetic Domains; Quantum Mechanical Treatment of Paramagnetism; Curie's law, Weiss's law; Hysteresis and Energy Loss.

UNIT-VI: Superconductivity & Nano Technology

Superconductivity: Introduction to Superconductors; Critical Temperature; Critical magnetic field; Meissner's effect; Type I and type II Superconductors, Idea of BCS theory (No derivation), Cooper pair; Applications of superconductors.

Nano Technology: Introduction to nano size materials, brief History of Nano materials, Effect of reduction of dimensions on physical properties; quantum size effect; Applications of nano materials in different fields.

Practical : The distribution of marks for practical examination will be as follows:

Record Book	10 marks
Viva-voce	10 marks
Experiment	20 marks
Assignment	10 marks

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Total	50 marks
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⊖ ⊖

- a) A student will have to perform at least ten experiments per semester.
- b) The semester examination will be of Four Hour duration and student will have to perform one experiment in the semester examination.
- c) In assignment, every student should be asked to submit the

detailed report on one of experiments he or she has performed. The detailed report should include the theoretical background of the experiment.

LIST OF EXPERIMENTS:

- 1 To study crystal models and identification of crystal planes.
- 2 To study Characteristics of Photocell
- 3 To determine Planck's constant using photocell
- 4 To determine energy gap of semiconductor using four probe method.
- 5 To determine activation energy of Thermister.
- 6 To determine energy gap of semiconductor using reverse bias method
- 7 To study hysteresis losses in transformer core and plot B-H curve.
- 8 To measure magnetic susceptibility of solids.
- 9 To study thermo emf using thermocouple.
- 10 To Determination of temperature coefficient of resistance of platinum using platinum resistance thermometer.
- 11 To determine lattice parameter using X-ray diffraction pattern.
- 12 To determine half life period of radioactive substance by GM counter
- 13 Determination of dislocation density in alkali halide crystals.
- 14 Demonstrations- Any 4 demonstrations equivalent to 2 experiments
- 15 Mini project equivalent to 2 experiments.
- 16 Computer aided demonstrations (Using computer simulations or animations) (Any 2 demonstrations equivalent to 2 experiments)
- 17 To study characteristics of Photo diode.
- 18 To study Zener regulated power supply.
- 19 Study of transistorized regulated power supply, series pass transistor.
20. Determination of velocity of sound by using sonometer wire.
21. Determination of velocity of ultrasonic wave in liquids.
22. Determination of Band gap energy of a pn junction / zener diode.

REFERENCE BOOKS:

1. Thermodynamics and statistical mechanics-Brijlal Subramaniam
2. Statistical Mechanics ó An Elementary Outline ó Avijit Lahiri ó Universities Press
3. Statistical and Thermal physics - By Lokanathan, R.S. Gambhir,
4. Fundamentals of statistical and thermal physics - By F.Reif
5. Perspectives of modern physics - By A. Beiser
6. Fundamental of Statistical Mechanics - By B.B. Laud
7. A primer of Statistical Mechanics - By R.B. Singh
8. Statistical Mechanics - By Gupta, Kumar
9. Solid State Physics, S.O.Pillai, 3rd Edition, New Age International (P) Ltd, Publisher, (1999).
10. Solid State Physics ó By Kakani and Hemrajani, S. Chand Publication.
11. Solid State Physics - By Saxena, Gupta and Saxena, Pragati Prakation.
12. Introduction to Solid State Physics, Charles Kittel, John Wiley and Sons, 7th Edition.
13. Solid State Physics, A.J.Dekker, Macmillan India Ltd, (1998).
14. Solid State Physics, R.K. Puri, V.K. Babbar, S. Chand Publication.
15. Problems in Solid State Physics, S.O. Pillai, New Age International (P) Ltd.
16. Solid State Physics, Palanyswamy.
17. Solid State Physics, David, Snoko, Pearson Publication.
18. Introduction to Nanoscience & Nanotechnology by K. K. Chattopadhyay and A. N.Banerjee, Publisher: PHI Learning and Private Limited
19. Nanotechnology, Rakesh Rathi, S Chand & Company, New Delhi
20. Nanotechnology: Principles and Practices by Sulbha K Kulkarni, Capital Publishing Co. New Delhi.

References :

1. IGNOU : Practical Physics Manual
2. Saraf : Experiment in Physics
3. S.P. Singh : Advanced Practical Physics
4. Melissons : Experiments in Modern Physics

3 : CHEMISTRY
Semester-V
5S Chemistry
(Effective from session 2015-16)

The examination in Chemistry of Fifth semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-V (8 marks).

5S Chemistry

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit I

14L

A] Coordination Compounds: Important terms namely molecular or addition compounds, double salts, complex salts, complex ion, ligand, coordination number, central metal ion, etc. Werner's theory of coordination and its experimental verification on the basis of conductance data and formation of AgCl precipitate in case of cobaltammines. Sidgwick's electronic interpretation and its drawbacks, effective atomic number. IUPAC rules for nomenclature of coordination compounds. Structural isomerism-ionization, linkage and coordination in complexes. Geometrical isomerism in octahedral complexes of the type Ma_4b_2 , Ma_3b_3 , $Ma_2b_2c_2$, Ma_4bc , $M(AA)_2b_2$. Square planar complexes of the type Ma_2b_2 and Ma_2bc . Optical isomerism in octahedral complexes of type $Ma_2b_2c_2$, $Mabcdef$, $M(AA)_3$, $M(AA)_2b_2$ and tetrahedral complexes of the type $Mabcd$ and $M(AA)_2$. Optical isomerism in square planar complexes. Valence bond theory as applied to structure and bonding in complexes of 3d-series elements (Only 4 and 6 coordinates complexes). Inner and outer orbital complexes. Magnetic properties of complexes of 3d series elements. Limitations of VB theory. [11]

B] Chelates : Definition, classification and applications of chelates in analytical chemistry. Stability of chelate with special reference to chelate effect. [3]

Unit II

14L

A] Crystal Field Theory (CFT): Postulates of CFT, Crystal field splitting in octahedral, distorted octahedral, square planar tetrahedral complexes, concept of CFSE, high spin and low spin complexes on the basis of Δ_0 and pairing energy, distribution of electrons in t_{2g} and e_g orbitals in high spin and low spin octahedral complexes. Factor affecting magnitude of crystal field splitting in octahedral complexes. [8]

B] Electronic Spectra of Transition Metal Complexes : Introduction to spectra, selection rules for d-d transitions, spectroscopic terms-determination of ground term symbols for d^1 to d^{10} , spectra of d^1 and d^9 octahedral complexes, Orgel diagram for d^1 and d^9 states, electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion. Spectrochemical series. [6]

Unit III

14L

A] Heterocyclic compounds: Nomenclature, Pyrrole: Synthesis from acetylene, succinimide and furan, Basicity, Electrophilic substitution reactions (orientation) δ nitration, sulphonation, acetylation and halogenation, Molecular orbital structure. [4]
 Pyridine: Synthesis from acetylene and pentamethylene diamine hydrochloride, Basicity, Electrophilic substitution reactions (orientation) δ nitration, sulphonation, Nucleophilic substitution reactions (orientation)- with $NaNH_2$, C_6H_5Li and KOH . [3]

B] Organometallic compounds: Grignard reagents: Methyl magnesium bromide- Synthesis from methyl bromide (only reaction) Synthetic applications: Electrophilic substitution reactions-formation of alkanes, alkenes, higher alkynes and other organometallic compounds, Nucleophilic substitution reactions- Reaction with aldehydes and ketones, ethylene oxide, acetyl chloride, methyl cyanide and CO_2 . [4]
 Methyl lithium-Synthesis and reaction with water, formaldehyde, acetaldehyde, acetone, ethylene oxide and CO_2 . [3]

- Unit IV 14L**
- A] **Dyes:** Classification on the basis of structure and mode of application, Preparation and uses of Methyl orange, Crystal violet, Phenolphthalein, Alizarin and Indigo. [5]
- B] **Drugs:** Analgesic and antipyretics: Synthesis and uses of phenylbutazone. Sulpha drugs: Synthesis and uses of sulphanimide and sulphadiazine. Antimalarials: Synthesis of chloroquine from 4,7-dichloroquinoline and its uses. [5]
- C] **Pesticides:** Insecticides: Synthesis and uses of malathion. Herbicides: Synthesis and uses of 2,4-dichloro phenoxy acetic acid (2,4-D). Fungicides: Synthesis and uses of thiram (tetramethyl thiuram disulphide). [4]
- Unit V- Photochemistry 14L**
- (i) Photochemical and thermal reactions. (ii) Lambert's law - Statement and derivation. Beer's law - Statement and derivation. Reasons for deviation from Beer's law. (iii) Laws of photochemistry. (iv) Quantum yield of photochemical reaction. Reasons for high and low quantum yield. Experimental determination of quantum yield. Photosensitized reaction. (v) Kinetics of photochemical decomposition of HI. (vi) Fluorescence and Phosphorescence. Selection rule for electronic transition. Internal conversion and inter-system crossing. Explanation of fluorescence and phosphorescence on the basis of Jablonski diagram. (vii) Chemiluminescence and Bioluminescence with examples. (viii) Numericals. [14]
- Unit VI- Molecular Spectroscopy 14L**
- (i) Electromagnetic radiation, characteristics of electromagnetic radiation in terms of wavelength, wave number, frequency and energy of photon. Spectrum of electromagnetic radiation. (ii) Types of spectra - Emission and absorption spectra, atomic and molecular spectra, line and band spectra (iii) Translational, vibrational, rotational and electronic motion. The degree of freedom in each motion. (iv) Energy level diagram of a molecule indicating electronic, vibrational and rotational transitions. (v) Condition for pure rotational spectrum (i.e. microwave active molecules), selection rule for rotational transition. Derivation of expression for moment of inertia of a diatomic rigid rotor. Isotope effect. Applications of microwave spectroscopy for the determination of moment of inertia and bonding. (vi) Condition for exhibiting vibrational spectra (i.e. IR active molecule), selection

rule for vibrational transition. Vibrational energy levels of a simple harmonic oscillator. Zero point energy, position of a spectral line. Determination of force constant of a covalent bond. (v) Raman effect - Raman's spectrum of a molecule. Condition for exhibiting Raman spectrum (i.e. Raman active molecule), selection rule for rotational transitions. Pure rotational spectrum of diatomic molecule, vibrational Raman spectrum of a diatomic molecule. (vii) Numericals. [14]

Semester- V
5S Chemistry Practicals

Total Laboratory sessions: 26 **Marks: 50**

Exercise I: Inorganic Preparations 12 Laboratory sessions

1. Preparation of tetraamminecopper(II)sulphate.
 2. Preparation of hexaamminenickel(II)chloride.
 3. Preparation of potassiumtrioxalate aluminate(III).
 4. Preparation of Prussian blue.
 5. Preparation of chrome alum.
 6. Preparation of sodium thiosulphate and dithionite.
- (Comment on VB structure, magnetic properties and color of 1, 2 and 3 complexes)

Exercise II: Physical Chemistry experiments 14 Laboratory sessions

- (Standard oxalic acid solution should be prepared by the students)
1. To determine strength of given HCl solution conductometrically.
 2. To determine strength of given CH₃COOH solution conductometrically.
 3. To determine strength of given HCl solution potentiometrically.
 4. To determine strength of HCl and CH₃COOH in a given mixture conductometrically.
 5. To determine redox potential of Fe⁺²/Fe⁺³ system potentiometrically.
 6. To determine molecular weight by Rast's method.
 7. To determine specific rotation of optically active compound by Polarimeter.

Distribution of Marks for Practical Examination

Time: 6 hours (One Day Examination) Marks: 50

Exercise-I	í í í	18
Exercise-II	í í í	18
Viva-Voce	í í í	07
Record	í í í	07
		ô ô ô ô ô
		Total: 50

Semester- VI 6S Chemistry

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit I 14L

A) Kinetic Aspects of Metal Complexes : [6]

Thermodynamic and kinetic stability of the complexes, factors affecting stability of complexes. Brief idea about substitution reactions, SN¹-dissociative and SN²-associative mechanism. Labile and inert complexes. Factors affecting lability of complexes namely arrangement of d-electrons (on the basis of VB theory), size of central metal ion, charge of central metal ion, geometry of complexes. Substitution reactions in square planar complexes mechanism.

B) Analytical Chemistry :

1) Spectrophotometry and Colorimetry :- [4]

Concept of ϵ_{\max} , Beer-Lambert's law (Only statement and final equation, no derivation). Calibration curve and its importance. Validity and limitations of Beer-Lambert's law. Verification of Beer's law. Block diagram of colorimeter and spectrophotometer with brief description of each component and its function. Difference between colorimetric and spectrophotometric technique for determination of concentration of metal ion (Example of determination of Cu(II)).

2) Paper Chromatography :- [4]

Definition and classification of chromatographic techniques. Principle of differential migration. Principle and technique of paper chromatography -ascending, descending and circular, R_f value and factors affecting R_f value.

Unit II 14L

A) Organometallic Chemistry : [5]

Definition, nomenclature and classification of organometallic compounds. Metal carbonyls- definition and classification. Preparation, properties, structure and bonding in Ni(CO)₄, Fe(CO)₅, Cr(CO)₆. Nature of M-C bond in metal carbonyls.

B) Inorganic Polymers: [5]

Definition and classification. Silicones: preparation, properties structure and bonding and applications. Phosphonitrilic halides polymers- preparation, properties, structure and bonding in cyclic polymers.

C) Bio-inorganic Chemistry: [4]

Essential and trace elements in biological processes. Biological role of Na⁺, K⁺, Ca²⁺ and Mg²⁺ ions. Metalloporphyrins-Haemoglobin and Myoglobin and their role in oxygen transport.

Unit III 14L

A) Electronic spectroscopy:

Introduction, theory, instrumentation, types of electronic transitions, presentation of electronic spectrum, terms used- chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic effect and hypochromic effect, Applications in the structure determination of dienes, α,β -unsaturated aldehydes and ketones, aromatic compounds. [7]

B) Infrared spectroscopy:

Introduction, Types of molecular vibrations- stretching and bending, Calculation of vibrational modes, force constant, instrumentation, interpretation of IR, H-stretching, triple bond, double bond and Finger print regions, IR spectra of H₂O, CO₂, C₂H₅OH, CH₃CHO, CH₃COOH and CH₃CONH₂. [7]

Unit IV 14L

A) NMR spectroscopy: Introduction, spin quantum number, instrumentation, Aspects of NMR- number of signals(equivalent and non-equivalent protons), positions of signals(chemical shift), intensities of signals, splitting of signals(spin-spin coupling), coupling constant, applications. [8]

B) Mass spectroscopy:

Introduction, theory, instrumentation-(ion sources), Mass spectra of neopentane and methanol, molecular ion peak, base peak, metastable peak, Rules of fragmentation, applications. [6]

Unit V- Elementary Quantum Mechanics 14L

(i) Limitations of classical mechanics. Planck's quantum theory (postulates only). Photoelectric effect - Experiments, observation and Einstein's explanation. Compton effect and its explanation. (ii) de Broglie hypothesis of matter waves. de Broglie's equation. Heisenberg's uncertainty principle. (iii) Classical wave equation, derivation of time independent Schrodinger's wave equation in one-dimension and its extension to a three-dimensional space. Well behaved wave function, physical significance of wave function (Born interpretation). (iv) Application of Schrodinger wave equation to a particle in one-

dimensional box and its extension to a three-dimensional box. Concept of atomic orbital. (v) Numericals. [14]

Unit VI**14L**

A] Electrochemistry: (i) Types of electrode - Standard hydrogen electrode, Calomel electrode, Quinhydrone electrode and Glass electrode. Principle of Potentiometric titration. Study of acid-base, redox and precipitation titration. (ii) pH of a solution and pH scale. Determination of pH of a solution using hydrogen, quinhydrone and glass electrodes. Advantage and disadvantage of these electrodes. pH-metric titrations. Determination of pka of a weak acid by pH-metric measurement. (iii) Concentration cells - Types of concentration cells, concentration cell without transfer and determination of its emf. (iv) Numericals [6]

B] Nuclear Chemistry: (i) Shell model of a nucleus - Assumptions, evidences for existence of magic numbers, advantages and limitations. (ii) Liquid drop model of a nucleus - Assumptions, similarities between nucleus and liquid drop, advantages and limitations, explanation of nuclear fission reaction on the basis of liquid drop model. (iii) Nuclear force and its explanation on the basis of Meson theory. (iv) Characteristics of nuclear reaction, difference between nuclear and chemical reactions. Calculation of Q value of a nuclear reaction. (v) Characteristics of nuclear fission reaction, fission yield. Fission reaction as an alternative source of energy. (vi) Nuclear fusion reaction - Characteristic of a nuclear fusion reaction. Thermonuclear reactions as a source of energy of sun and other stars. Fusion reactions as a potential future source of energy. (vii) Applications of radio isotopes in industry, agriculture, medicines and bio-sciences with two examples each. (viii) Numericals.

[8]**Semester- VI****6S Chemistry Practicals****Total Laboratory sessions: 26****Marks: 50****Exercise I: Organic Chemistry Experiments: 16 Laboratory sessions**

1. Estimation of formaldehyde.
2. Estimation of glycine.
3. Estimation of ascorbic acid (vitamine C).
4. Estimation of phenol by bromination method.
5. Estimation of aniline by bromination method.
6. Estimation of urea by hypobromite method.
7. Estimation of unsaturation by bromination method.
8. Determination of iodine value of oil.
9. Determination of equivalent weight of an ester by saponification.
10. Separation of a mixture of methyl orange and methylene blue by thin layer chromatography (using benzene).

11. Separation of a mixture of 2,4-dinitro phenyls of acetaldehyde and benzaldehyde by thin layer chromatography(using benzene : petroleum ether = 3:1).
12. Separation of a mixture of dyes by thin layer chromatography (using cyclohexane:ethyl acetate = 8.5:1.5).
13. Separation of a mixture of 2,4-dinitro phenyls of acetaldehyde and benzaldehyde by thin layer chromatography (using toluene: petroleum ether).

Exercise II: Physical Chemistry experiments 10 Laboratory sessions

1. To determine dissociation constant of weak acid by conductometry.
2. To determine dissociation constant of weak acid by potentiometry.
3. To study potentiometric titration of KCl and AgNO₃.
4. To determine dissociation constant of dibasic acid by pH-metry.
5. To verify Beer's Law using KMnO₄/K₂Cr₂O₇.
6. To determine pH of a soil sample by pH-meter.
7. To determine solubility and solubility product of sparingly soluble salts conductometrically.
8. To study strong acid and strong base titration by pH-metry.

Distribution of Marks for Practical Examination**Time: 6 hours (One Day Examination)****Marks: 50****Exercise-I**1 1 1 .. **18****Exercise-II**1 1 1 .. **18****Viva-Voce**1 1 1 . **07****Record**1 1 1 . **07**

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Total: 50**Books Recommended: (Common for Semester V and Semester VI)**

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia- S. Naginchand & Co., Delhi.
2. Text book of Inorganic Chemistry by A.K. De, Wiley East Ltd.
3. Selected Topics in Inorganic Chemistry by Malik, Tuli and Madan- S. Chand & Co.
4. Modern Inorganic Chemistry by R.C. Agrawal, Kitab Mahal.
5. Instrumental Methods of analysis by Chatwal and Anand, Himalaya Publishing House.
6. Concise Inorganic Chemistry by J.D. Lee, ELBS.
7. Inorganic Chemistry by J.E. Huheey- Harper & Row.
8. Fundamental concepts of Inorganic Chemistry by E.S. Gilreath, McGraw Hill book Co.
9. Modern Inorganic Chemistry by W.L. Jolly, McGraw Hill Int.
10. Chemistry Facts, Patterns & Principles by Kneen, Rogers and Simpson, ELBS.

11. Theoretical Principles of Inorganic Chemistry by G.S. Manku, Tata McGraw Hill.
12. Inorganic complex compounds by Murmann, Chapman & Hall.
13. Text book of Inorganic Chemistry by K.N. Upadhyaya, Vikas Publishing House, Delhi.
14. Advanced Practical Inorganic Chemistry by Gurdeep Raj, Goel Publishing House, Meerut.
15. Co-ordination Chemistry by D. Banerjee, TMH Publication.
16. Text book of Inorganic Chemistry by B.J. Joshi, P.J. Bahad, P.R. Mandlik, R.M. Kedar, C.B. Deshpande, V.V. Parhate published by Amravati University Chemistry Teachers Association with Bokey Prakashan, Amravati.
17. Text book of Inorganic Chemistry by Bhadange, Pagariya, Deshmukh, Joshi, Bombatkar, Mandlik, Bokey Prakashan, Amravati.
18. Organic Chemistry by R.T. Morrison & R.T. Boyd, 6th edition, PHI.
19. Organic Chemistry by Pine, 5th edition.
20. Organic Chemistry Vol. I, II and III by Mukharjee, Singh and Kapoor-Wiley Eastern.
21. Organic Chemistry by S.K. Ghosh.
22. Reaction Mechanism in Organic Chemistry by S.M. Mukharjee and S.P. Singh.
23. Spectroscopy of Organic Compounds by P.S. Kalsi.
24. Stereochemistry and mechanism through solved problems by P.S. Kalsi.
25. Organic Chemistry by TWG Solomons, 4th edition, John Wiley.
26. Hand Book of Organic Analysis by H.J. Clarke, Arnold Heinmen.
27. Text book of Practical Organic Chemistry by A. I. Vogel.
28. Text book of Organic Chemistry by P.R. Rajput, S.N. Bhosale, Y.K. Meshram, V.G. Thakre, Dr. S.P. Deshmukh, A.R. Mankar, published by Amravati University Chemistry Teachers Association with Bokey Prakashan, Amravati.
29. Text book of Organic Chemistry by P.S. Kalsi published by Macmillan India Ltd., 1999, Delhi.
30. Practical Organic Chemistry by F.G. Mann, B.C. Saunders, Orient Longman.
31. Comparative Practical Organic Chemistry (Qualitative Analysis) by V.K. Ahluwalia and Sunita Dhingra, Orient Longman.
32. Comprehensive Practical Organic Chemistry (Preparation and Qualitative Analysis) by V.K. Ahluwalia and Renu Agrawal, Orient Longman.
33. Physical Chemistry: Walter, J. Moore, 5th edn., New Delhi.
34. Physical Chemistry: G.M. Barrow, McGraw Hill, Indian Edn.
35. Principles of Physical Chemistry: Maron and Prutton.
36. Principles of Physical Chemistry: Puri, Sharma and Pathaniya.
37. Physical Chemistry: P.W. Atkins, 4th Edn.
38. Text book of Physical Chemistry: P.L. Sony, O.P. Dharma.

39. Physical Chemistry: Levine.
40. Practical Physical Chemistry: Palit and De.
41. Practical Physical Chemistry: Yadao.
42. Practical Physical Chemistry: Khosla.
43. Laboratory Manual of Physical Chemistry: W.J. Popiel.
44. Practical Chemistry: Dr. S.B. Lohiya, Bajaj publication, Amravati.
45. Text book of Physical Chemistry by S.B. Phadke, G.N. Chaudhari, S.S. Kabra, R.G. Bhangale, A.B. Patil, S.K. Rithe published by Amravati University Chemistry Teachers Association with Bokey Prakashan, Amravati.

List of equipments/apparatus required for the Chemistry Practicals for B.Sc.

1. Abbe's Refractometer		02 nos./batch
2. Viscometer		10 nos./batch
3. Stalagmometer		10 nos./batch
4. Melting Point Apparatus		10 nos./batch
5. Thermometer 0-360°C		20 nos./batch
6. Thermometer 0-110°C		20 nos./batch
7. Analytical balance		15 nos./batch
8. Weight box		15 nos./batch
9. Density Bottles		20 nos./batch
10. Kipp's Apparatus		02 nos./batch
11. Quick fit Distillation Assembly/Multipurpose assembly		10 nos./batch
12. Sintered Glass Crucible		20 nos./batch
13. Silica Crucible		20 nos./batch
14. Vacuum Suction Pump		02 nos./lab.
15. Potentiometer		02 nos./batch
16. Metzer Electronic one pan balance		01 nos./lab.
17. Filtration flask with Buckner Funnes	100ml	10 nos./batch
	250ml	05 nos./batch
	500ml	02 nos./batch
18. Desiccators		10 nos./batch
19. Magnetic Stirrer		10 nos./batch
20. Water Suction		10 nos./batch
21. Conductometer with Conductivity Cell		04 nos./batch
22. Colorimeter		02 nos./batch
23. pH Meter		02 nos./batch
24. Chromatographic Jar		05 nos./batch
25. Separating funnels 250ml, 500ml		05 nos./batch
26. Hot Air Oven		02 nos./lab.
27. Hot-Cold Air Blower		01 no./lab.
28. Centrifuge machine (Electrically Operated)		02 nos./lab.
29. Deioniser/ Water Still (Electrically Operated)		01 no./lab.

30. Hot Plate/ Heating Mantle	05 nos./batch
31. Models of Elements (Seven Crystal types and their symmetry)	01 no./batch
32. Flame Photometer	02 nos./batch
33. Spectrophotometer	02 nos./batch
34. Shaking Machine	01 no./batch
35. Polarimeter	02 nos./batch

4. INDUSTRIAL CHEMISTRY (REGULAR/VOCATIONAL)

The examination in Industrial Chemistry (Regular/ Vocational) of Fifth semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 to 8 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-V (8 marks).

B.Sc. Part- III (Semester- V)

5S Industrial Chemistry (Regular/ Vocational)

Chemical Process Economics, Heavy and Fine Chemicals

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit-I : [14]

Manufacturing of the following:- Ammonia, nitric acid, ammonium sulphate, ammonium nitrate, caustic soda, chlorine, ammonium phosphate, superphosphate, triple superphosphate with reference to following considerations:

- i) Consumption pattern
- ii) Raw materials
- iii) Major engineering problems.

Unit-II : [14]

Manufacturing of the following:- Lime, calcium carbide, silicon carbide, fluorine, sodium carbonate, sulphuric acid, hydrochloric acid, soda ash by Solvay process, urea with reference to following considerations:-

- i) Consumption pattern
- ii) Raw materials

iii) Major engineering problems.

Unit-III : [14]

A) Essential Oils – Introduction, extraction methods of essential oils -: Steam distillation, solvent extraction, and expression.

Uses of following essential oils- menthol, citral, camphor, turpentine.

B) Edible Oil – Manufacturing of Soyabean oil by solvent extraction process, refining of crude vegetable oil. Hydrogenation of vegetable oil (Dry and wet processes), saponification value, iodine value, acid value and ester value.

C) Manufacturing of soap, recovery of glycerin, cleansing action of soap.

Unit-IV : [14]

Fischer Tropsch synthesis with examples, chlorination of methane and its major engineering problems, manufacturing of mono, di, triethanolamines and its uses. Manufacturing of acetylene, ethylene, vinyl acetate, isopropanol, vinyl chloride with reference to following considerations:-

- i) Raw materials
- ii) Major engineering problems
- iii) Uses.

Unit-V : [14]

A) Industrial gases- Introduction, Manufacturing and uses of following industrial gases - Oxygen and nitrogen, carbon dioxide liquification of CO₂ (Dry Ice).

B) Safety- Introduction, concern for chemical safety, hazards and their control in petrochemical industries, hazards in storage, handling and uses of chemicals.

Unit-VI : Process Economics [14]

A) Cost Estimation- Cash flow for industrial operations, cumulative cash position, factors affecting investment and production cost.

B) Interest- Simple and compound interest, nominal and effective interest

C) **Depreciation**- Introduction, service life, salvage value. Methods for depreciation- straight line method, declining balance method, sum of years digits method.

D) **Profitability, profitability evaluation**: Rate of return on investment and discounted cash flow method. Break even point.

5S Industrial Chemistry Practical List of Experiments

Unit I

- 1) Determination of acid value of edible oil.
- 2) Determination of saponification value of edible oil.
- 3) Determination of iodine value of edible oil.
- 4) To determine the strength of hydrogen peroxide solution.
- 5) To determine the strength of aniline solution.
- 6) To determine the strength of formalin solution.

Unit II

- 1) Preparation of 3- nitroaniline.
- 2) Preparation of 4- bromoaniline.
- 3) Preparation of 4- nitrobenzoic acid.
- 4) Preparation of soap.
- 5) Preparation of phthalamide.
- 6) Extraction of oil from oil seeds.

Distribution of Marks for Practical Examination

Time: 6 – 8 hours (One Day Examination)

Marks: 50

Unit I : (Exercise No. 1)	í í í ..	15
Unit II: (Exercise No. 2)	í í í ..	15
Viva-Voce	.í í	10
Record	.í í í .	10
	ô ô ô ô ô ô ô ô	
Total:		50
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Books Recommended

- 1) Handbook of industrial chemistry ó K.H. Davis and F.S. Berner Vol. I and II. CBS publishers and distributors New Delhi.
- 2) Shreves chemical process industries ó George T. Austin. Mc GRAW HILL International Edition.
- 3) Industrial Chemistry- B.K. Sharma. Goyal publishing house.

- 4) Heavy organic chemicals- A.J. Gartc. Pargmon Process U.K.
- 5) A Text book of Engineering chemistry- S.S. Dara.
- 6) Chemical process industries- S.C. Bhatiya. CBS publishers and distributors New Delhi.
- 7) Plant design and economics for chemical engineers. Max S. Peters, K.D. Timmerhaus. Mc GRAW HILL International Edition.

List of equipments/ Apparatus/ glassware's required for the B.Sc. Industrial Chemistry practical for a batch.

1. Melting point apparatus	02 nos.
2. Thermometer 0 to 360 ^o C	10 nos.
3. Thermometer 0 to 110 ^o C	10 nos.
4. Analytical balance	02 nos.
5. Weight box	02 nos.
6. Silica crucible	20 nos.
7. Sintered glass crucible	20 nos.
8. Measuring cylinder 100 ml	05 nos.
9. Separating funnels 250 ml	05 nos.
10. Burette 25 ml	20 nos.
11. Burette 50 ml	20 nos.
12. Volumetric flask 100 ml	10 nos.
13. Volumetric flask 250 ml	10 nos.
14. Round bottom flask with reflux Condenser	10 nos.
15. Beaker 100 ml	20 nos.
16. Beaker 250 ml	20 nos.
17. Beaker 500 ml	05 nos.
18. Burette Stand	20 nos.
19. Pipette 10 ml and 25 ml	20 nos.
20. Conical Flask 100 ml and 250 ml	20 nos.

Semester-VI

6S Industrial Chemistry (Regular/ Vocational)

Instrumental Methods of Chemical Analysis, Green chemistry

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit-I : [14]

A) Sampling procedures, sampling of bulk materials,

techniques of sampling solids, liquids, gases. Collecting and processing of data.

- B) Errors-** Types of errors, nature and origin of error. Accuracy, precision, mean deviation, standard deviation, relative standard deviation and confidence limits.

Unit-II : [14]

Chromatography - Theories of chromatography- plate and rate theory, classification of chromatographic techniques.

Paper chromatography and TLC- Introduction, principles, types of migration parameter (R_f value). Experimental details, applications.

GLC and HPLC- Introduction, principles, instrumentation, apparatus and materials, column efficiency and selectivity, applications.

Liquid-Liquid partition chromatography and adsorption chromatography

Unit-III : [14]

- A) Column chromatography-** Principle, experimental details, column efficiency, factors affecting column efficiency, applications.
- B) Ion Exchange-** Classification of ion exchangers, ion exchange equilibria, ion exchange capacity, chelating ion exchanger, factors affecting the separation of ions and applications in analytical chemistry.
- C) Solvent Extraction-** Classification of solvent extraction systems, basic principles involved in extraction. Factors affecting extraction, techniques of extraction, applications of solvent extraction in industries.

Unit-IV : [14]

- A) Flame Photometry-** Elementary theory, instrumentation and experimental techniques, combustion flames and applications.
- B) I.R. Spectroscopy-** Principles, techniques,

instrumentation and applications in chemical analysis of industrial materials.

- C) X-ray fluorescence-** Principles, techniques, flow sheet, applications for determination of heavy metals in environmental sample.

Unit-V : [14]

Dye- Introduction, classification of dyes- on the basis of mode of applications and on chemical constitutions. Acid dyes, basic dyes, sulphur dyes, pigment dyes. Dye intermediates. Preparation and uses of methyl orange dye, picric acid and aurine dye, indigo dye, congo red, crystal violet and alizarin dye. Non textile use of dye stuffs.

Unit-VI : [14]

Green Chemistry- Introduction, Goals of green chemistry, principles of green chemistry. Basic components of green chemistry research- Alternative starting materials or feed stock, alternative reagents or transformations, alternative reaction conditions and alternative final products or target molecules. Optimization of framework for the design of greener synthetic pathway. Green solvents, ionic liquids green fuels and E- green propellants, biocatalysis.

6S Industrial Chemistry Practical

List of Experiments :

Unit I

- 1) Separation of Cu^{+2} - Ni^{+2} ions by paper chromatography.
- 2) Separation of plant pigments xanthophylls, chlorophyll by paper chromatography.
- 3) Separation of dyes by T.L.C.
- 4) Estimation of sodium and potassium by flame photometry.
- 5) Separation of amino acids by paper chromatography.
- 6) To detect the impurities in organic compounds by T.L.C.

Unit II

- 1) Removal of hardness by ion exchange resins.
- 2) Separation of Cu^{+2} - Ni^{+2} ions by solvent extraction.

- 3) Separation of Co^{+2} - Ni^{+2} ions by ion exchange.
- 4) Preparation of picric acid dye.
- 5) To determine the capacity of an anion exchange and cation exchange resin by column method.
- 6) Separation of Fe^{3+} and Mg^{2+} by solvent extraction.

Distribution of Marks for Practical Examination**Time:****6 – 8 hours (One Day Examination)****Marks: 50**

Unit ó I : (Exercise No. 1)	í í í ..15
Unit ó II : (Exercise No. 2)	í í í ..15
Viva-Voce	.í í10
Record	.í í í .10
	ô ô ô ô ô ô ô ô
Total:	50
	ô ô ô ô ô ô ô ô

Books Recommended

- 1) Instrumental methods of Chemical Analysis ó Gurudeep Chatwal and Anand
- 2) Quantitative Inorganic Analysis ó A.I. Vogel
- 3) Handbook of Industrial Chemistry ó K.H. Davis and F.S. Berner Vol. I and II. CBS publishers and distributors New Delhi.
- 4) A Text book of Engineering Chemistry- S.S. Dara.
- 5) A Text book of Synthetic Dyes- O.D. Tyagi, M. Yadav. Anmol publications Pvt. Ltd.
- 6) Chromatography- Shrivastava and Shrivastava.
- 7) Experiments in Chemistry ó D.V. Jahagirdar.
- 8) A text book on experiments and calculations in Engineering Chemistry ó S. S. Dara.

List of equipments/ Apparatus/ glassware's required for the B.Sc. Industrial Chemistry practical for a batch.

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5. Weight box	05 nos.
6. Silica crucible	20 nos.
7. Sintered glass crucible	20 nos.
8. Chromatographic jar	05 nos.
9. Separating funnels 250 ml	05 nos.
10. Burette 25 ml	20 nos.

11. Burette 50 ml	20 nos.
12. Volumetric flask 100 ml	10 nos.
13. Volumetric flask 250 ml	10 nos.
14. Round bottom flask with reflux Condenser	10 nos.
15. Beaker 100 ml	20 nos.
16. Beaker 250 ml	20 nos.
17. Beaker 500 ml	05 nos.
18. Burette Stand	20 nos.
19. Pipette 10 ml and 25 ml	20 nos.
20. Conical Flask 100 ml and 250 ml	20 nos.
21. Ion exchange column	01 no.
22. Flame photometer	01 no.

5. PETROCHEMICAL SCIENCE

The examination in Petrochemical Science of Fifth semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 to 8 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-V (8 marks).

Semester- V
5S Petrochemical Science

Total Lectures: 84**Marks: 80****Note:** Figures to the right hand side indicate number of lectures.**Unit-I : Basic concepts in polymerization [14]**

- What are polymers
- How are polymers made
- Classification of polymers
 - o Thermosetting and Thermoplastic
 - o Homo and Co-polymers
- Methods of polymerization
 - o Cationic
 - o Anionic
 - o Radical

- Polymerization techniques
 - Bulk
 - Solution
 - Suspension
 - Emulsion
- Examples of polymerization catalysts, Introduction to cross linking and agents

Unit-II: Ethylene (C₂) and propylene (C₃) polymers [14]

- Chemistry (reaction mechanism, catalysts), properties, manufacture (Flow scheme, and operating variables) and applications of
 - High Density Poly-Ethylene (HDPE)
 - Low Density Poly-Ethylene (LDPE)
 - Poly propylene
- Introduction to Ethylene- Propylene co-polymers (EPM rubber)

Unit-III: C₄ based polymers [14]

- Chemistry (reaction mechanism, catalysts), properties, manufacture (Flow scheme, and operating variables) and applications of:
 - Poly butylenes (Butyl rubber)
 - Di-iso butylenes
 - Poly butadiene
 - Poly isoprene
 - Poly chloroprene (Neoprene)
- Introduction to
 - Butadiene- Styrene co-polymers (SBR)
 - Butadiene- Acrylonitrile co-polymer (ABN)

Unit-IV : Vinyl and styrene polymers [14]

- Chemistry (reaction mechanism, catalysts), properties, manufacture (Flow scheme, and operating variables) and applications of:
 - Poly vinyl chloride (PVC)
 - Poly vinyl acetate (PVA)
 - Polystyrene
- Introduction to co-polymers of styrene
 - Acrylonitrile Butadiene-Styrene co-polymer (ABS)

- Styrene-Acrylonitrile co-polymer (SAN)

Unit-V : Condensation polymers [14]

- Chemistry (reaction mechanism, catalysts), properties, manufacture (Flow scheme, and operating variables) and applications of:
 - Nylon- 6
 - Nylon- 6,6
 - Phenol-Formaldehyde resin
 - Urea-Formaldehyde resin
- Introduction to
 - Nylon- 6, 10
 - Nylon-12
 - Nylon-11
 - Saturated polyesters
 - Unsaturated polyesters

Unit-VI : Waxes/Bitumen/Greases [14]

- Petroleum Waxes
 - Types and Sources of waxes
- Paraffin waxes
- Microcrystalline waxes
 - Important properties of petroleum waxes
 - Manufacture of petroleum waxes
- Chilling and pressing process
- De-waxing with solvents
- MEK de-waxing process
 - Uses of petroleum waxes
 - Petroleum Jellies
- Bitumen
 - Bitumen
 - Asphalts
 - Chemical Structure of asphalt
 - Classes of Bitumen
 - Quality specification of bitumen
 - Uses of Bitumen
- Greases
 - Type of greases
 - Manufacture various type of grease
 - Properties, testing and uses of grease

5S Petrochemical Science Practical**List of Experiments**

1. Preparation and melting point determination of Nylon-6
2. Preparation and melting point determination of Nylon-6,6
3. Preparation and melting point determination of polystyrene
4. Preparation and melting point determination of Phenol-formaldehyde resin
5. Preparation and melting point determination of urea-formaldehyde resin
6. Molecular weight determination of plastic material
7. Determination of drop point and dropping point of grease
8. Oil in wax determination in given oil sample
9. Determination of saponification value of plastic material
10. Determination of acid value of plastic material
11. Determination of bromine number of plastic material
12. Study of vulcanization of rubber using sulfur powder
13. Preparation and melting point determination of some rubber materials

Distribution of marks for practical examination**Time: 6 hours (One Day Examination) Marks : 50**

Exercise No. I : (Practical Expt.) í í 15 Marks

Exercise No. II: (Practical Expt.)í í 15 Marks

Viva-Voce:í í í í í í í í í ..í í í í 10 marks

Recordí í í í í ..í í í í ...í .í 10 Marks

Total ... 50 Marks**Semester- VI****6S Petrochemical Science****Total Lectures: 84****Marks: 80****Note:** Figures to the right hand side indicate number of lectures.**Unit-I : Advanced Instrumental Techniques for Petroleum and Petrochemical Product Characterization****SPECTROSCOPY-I****[14]**

- Introduction to
 - Electromagnetic radiations
 - UV-Visible, Infra-red region
 - Electronic spectrum and absorption radiations

- Definition of spectroscopy
- Difference between absorption and emission spectroscopy
- Principle, Theory, working (Instrumentation) and application (Hydrocarbon Compound)of following spectroscopic techniques
 - UV-Visible (Calculation of λ_{max} value of ethanol)
 - IR(study of model spectra of : Benzene, Phenol, Aniline)

Unit-II : Advanced Instrumental Techniques for Petroleum and Petrochemical Product Characterization-**SPECTROSCOPY-II****[14]**

- Principle, Theory, working (Instrumentation) and application (Hydrocarbon Compound)of following spectroscopic techniques
 - NMR(study of model spectra of : Benzene, Phenol, Aniline)
 - Mass (study of model spectra of: Dodecane, cyclohexene, ethyl benzene)

Unit-III : Advanced Instrumental Techniques for Petroleum and Petrochemical Product Characterization-**CHROMATOGRAPHY****[14]**

- Basic principles involved in chromatography
 - Definition of chromatography
 - Stationary phase
 - Mobile phase
 - Concept of Polarity
 - Polarity of different liquid samples
 - Role of detectors
 - Various detectors
- Principle, Theory, working (Instrumentation) and application (Hydrocarbon Compound)of following chromatographic techniques
 - GLC
 - HPLC

Unit-IV : Catalysts in petroleum refining and petrochemical processes**[14]**

- Introduction
- Homogeneous and heterogeneous catalysts
- Catalysts morphology and activity
- Catalysts for petroleum refining
 - Cracking catalysts
 - Reforming catalysts
 - Hydro-treating catalysts
- Catalysts for petrochemical Industry
 - Catalysts for synthesis gas
 - Hydrogenation catalysts
 - Hydrocarbon oxidation catalysts
 - Polymerization catalysts
- Recent advances in industrial catalysis
- Role of polymers in catalysis

Unit-V : Future of petrochemicals**[14]**

- Integrated petrochemical complexes
- Energy crises and the petrochemical industry
 - Natural gas as petrochemical feedstock
 - Impact of heavy feedstocks on petrochemicals
 - Ecology and energy crisis
 - Coal as an alternative to oil
- Energy crisis and the industrial fuels
 - Natural fuels
 - Synthetic fuels
 - Hydrogen: Fuel of tomorrow
 - Bio-Fuels
- Trends in petrochemical industries

Unit-VI : Pollution control in petroleum refineries and petrochemical processing units**[14]**

- Definition of pollution
- Kinds of pollution
- Air pollution
 - Sources of air pollution in refineries and petrochemicals manufacturing units
 - Air pollution control techniques and options
- Water pollution
 - Sources of water pollution in refineries and

petrochemicals manufacturing units

- Control of Water pollution
- Indian standards for liquid effluents and In-land surface water (Most considerable characters like TSS, pH, TDS, BOD, COD, DO, Temperature, sulphates, chlorides, sodium.)
- Soil pollution
 - Sources of soil pollution in refineries and petrochemicals manufacturing units
 - Soil pollution control techniques

6S . Petrochemical Science Practical**List of Experiments**

1. Determination of purity of a chemical compound using TLC
2. Separation of a chemical compound using column chromatography
3. Determination of pH of soil (Soil near any chemical laboratory waste outlet).
4. Determination of B.O.D. of given sample
5. Determination of C.O.D. of given sample
6. Determination of D. O. of given sample
7. Use of UV-Visible spectrophotometer for determination of % transmission, O.D. Concentration and adsorption
8. Determination of hardness of given water sample
9. Extraction of oils from oil bearing seeds
10. Determination of given specific refraction and molar refraction of given sample using Abbe's refractometer
11. Determination of Calorific value of given sample

Distribution of marks for practical examination**Time: 6 hours (One Day Examination) Marks : 50**

Exercise No. I : (Practical Expt.) í í í 15 Marks

Exercise No. II: (Practical Expt.) í í í 15 Marks

Viva-Voce: í í í í í í í í í ..í í í í 10 marks

Record í í í í ..í í í íí í í10 Marks

Total 50 Marks**List of books**

1. Petroleum refining and petrochemicals, N.K. Sinha, Umesh Publications, Delhi

2. Advanced petrochemicals , Dr. G. N. Sarkar, Khanna Publications, Delhi
3. A text on petrochemicals , B.K. B Rao, Khanna Publications, Delhi
4. Introduction to petrochemicals, S. K. Maiti, Oxford-IBH Publications
5. Fuels and Combustions, Sameer Sarkar, Orient- Longman Ltd. Hyderabad
6. Catalysis and chemical processes , Ronald Pearce and William Patterson, Leonard-Hill Publication, Glasgow
7. Systematic experimental physical chemistry, S.W. Rajabhoj, Dr. T. K. Chondhekar, Anjali publications Aurangabad
8. Advanced Petroleum refining , G. N. Sarkar, Khanna Publications, Delhi
9. Petroleum refining technology, Dr. Ram Prasad, Khanna Publications, Delhi
10. Unit operations II , K.A. Gavane, Nirali prakashan, Pune
11. Modern petroleum refining processes, Dr. B. K. Bhaskarrao, Oxford-IBH publication New Delhi
12. Chemicals from petroleum, A.L. Waddams, Murray, London
13. An Introduction to industrial organic chemistry, P. Wiseman, Applied Science, London
14. Modern Petroleum Technology, J.D. Hobson, Jon-Wiley Chester
15. Chemicals form synthesis gas, R.A. Sheldon, B. Reidel Publishing Company. Dordrecht
- 19-
16. Text book of polymer, volume I, II, III , M.S. Bhatnagar, S.Chand Publi., Delhi
17. Dryden's outline of chemical technology, M. Gopalrao, Marshall Stings, East-west Publications
18. Shreve's Chemical process industries, J. Austin, Mc.GrowHill, New Delhi.
19. Petroleum processing handbook , edited by John J. Meketta-Marcel Dekker, Inc.-1992
20. Handbook of petroleum refining process, Robert A. Mayers, Mc.Graw-Hill, second edition-1996
21. Modern petroleum technology, Volume I Upstream by Richard A. Dawe, 6th Edition IP-2002
22. Modern petroleum technology, Volume II downstream by Richard A. Dawe, 6th Edition IP-2002
23. The chemistry and technology of petroleum, 2nd edition by James

- G. Speight-1991 vol. I & II
24. Petroleum refining technology and economics by J.H. Gary, G.E.Handwert, Marcel Dekker inc. 1987
 25. Standard method for analysis and testing of petroleum and related product, IP-Volume II, Institute of Petroleum , London 1993 Vol. I, II
 26. Environmental chemistry by S.S. Dara, S.Chand and Company pub., New Delhi
 27. Pollution monitoring and control, Dr. Priya Rajan Trivedi,
 28. Air pollution Vol. I-IV, A.C. Stern
 29. NEERI manuals
 30. Chemical Methods for Environmental Analysis, R. Rameth
 31. Instrumental method of chemical analysis, Willard Merit and Dean.
 32. Chromatography, Shrivastav and Shrivastav.

**LIST OF APPARATUS AND EQUIPMENTS FOR A BATCH OF
20 STUDENTS FOR
B.SC. 5th and 6th semester
PETROCHEMICAL SCIENCE**

Sr No.	Item	Quantity
1.	Burette	20 Nos.
2.	Pipette 10ml, 25ml	20 Nos. each
3.	Mohr pipette 2ml, 5ml	10Nos. each
4.	Conical flask with stopper	50 Nos.
5.	Standard volumetric flask	20 Nos.
6.	Density Bottle	20 Nos.
7.	Balance (Electronic/Digital)	02 Nos.
8.	Aniline Point Apparatus	01 No
9.	U-tube viscometer of different capillary size	02 Nos.
10.	Thermometer (0 to 110oC I P Grade)	10 Nos.
11.	Thermometer (0 to 360oC I P Grade)	10 Nos.
12.	Test tube (20 and 50 ml with rubber cork)	50 Nos.
13.	Smoke Point Apparatus (I P Grade)	01 No.
14.	Abel Flash Point apparatus (I P Grade)	01 No.
15.	Pensky Marten's Flash Point apparatus	01 No.

16. Cleveland Open Cup Flash point Apparatus	01 No.
17. Porceline dish	10 Nos.
18. Constant Temperature bath	02 Nos.
19. Hot Plate	01 No.
20. Air condenser	20 Nos.
21. Glass tubing 6mm, 10mm	20ft. Each
22. Glass rod 4mm, 8mm	20 ft. Each
23. Stop watches	04 Nos.
24. LPG Cylinder with regulator	01 No.
25. Refractometer	01 No.
26. Refrigerator	01 No.
27. Water Distillation Plant	01 No.
28. Beaker 250 ml	20 Nos.
29. Beaker 50, 100, 500, 1000 ml	07 Nos.
30. Hot Air Oven	01 No.
31. Heating Furnace	01 No.
32. Karl Fisher Auto Titrator	01 No.
33. Dean and Stark Apparatus	01 No.
34. Flame Photometer	01 No.
35. Colorimeter	01 No.
36. Bomb Calorimeter	01 No.
37. Spectrophotometer	01 No.
38. Oxygen Cylinder with pressure regulating valve	01 No.
39. Vacuum Pump	01 No.
40. Air source	01 No.
41. Air Flow meter	01 No.
42. Dessicators	06 Nos.
43. Water Suction	04 Nos.
44. Filtration Flask with Buckner Funnel 100, 250ml, 500ml Heating Mental	20 Nos.
45. ASTM Distillation apparatus	06 no.
46. Viscometer and Constant temperature bath	01 No.
47. Apparatus for oil determination in given sample as per I P norm	01 Set of viscometer
48. Reid Vapor Pressure Apparatus with const. temp. Bath	01 No.

49. Ductility measuring meter	01 No.
50. Penetrometer	01 No.
51. Copper Corrosion Test Apparatus	01 No.
52. Crankcase Oil Dilution Apparatus	01 No.
53. Redwood Viscometer No. I & II	01 No. each

6. GEOLOGY
Semester-V
5S- Geology

- UNIT I :** Attitude of bed. Clinometer and Brunton Compass and its use, Outcrop- its true and apparent thickness, width of outcrop, Outcrop in relation to topography and structure. Erosional structures ó Unconformity: Formation, Types and Recognition. Outlier-Inlier, Onlap, Offlap, windows and Klippe.
- UNIT II:** Fold: Nomenclature or Parts, Classification ó Genetic and Geometric, recognition of fold in field and map. Causes of folding. Joints: Classification ó Genetic and Geometric, Significance of Joints.
- UNIT III:** Interior of the earth as revealed by Seismic waves. Isostasy – Airyø Hypothesis, Prattø Hypothesis and Heisskinnanø Hypothesis. Geosyncline ó Definition, Classification and evolution.
- UNIT IV:** Continental Drift ó Evidences of drift. Plate Tectonics ó Types of plate margins, Causes of Plate Movement and Evidences- Sea Floor Spreading and Palaeomagnetism.
- UNIT V :** Hydrologic Cycle and its Components, Occurrence and distribution of Ground water, Water Table. Aquifer and its types ó Confined, Unconfined and Semi-confined. Properties of Aquifer:- Porosity, Permeability, Storage Coefficient and Conductivity.
- UNIT VI:** Recharge and Discharge, Darcyø Law and its validity, Cone of Depression, Influent and Affluent Seepages, Ground

water Provinces of India

PRACTICALS:

1. Use of Clinometer and Brunton Compass.
2. Problems on Dip, Strike, Thickness of Beds and width of outcrop maps.
3. Completion of outcrop problems for conformable series and unconformity.
4. Elementary problems on determination of Aquifer Parameters,
5. Plotting of Ground water provinces on outline map of India.
6. Water table contour maps and its interpretation for groundwater structure.
7. Morphometric Analysis from topographic maps.
8. Field Work.

PRACTICAL EXAMINATION:

The Practical Examination will be four hour duration and carries 50 marks. The distribution of marks will be as follows-

I. Problems on Dip, Strike, Thickness of Beds and width of outcrop maps.	6 Marks
II. Completion of outcrop maps	8 Marks
III. Problems on determination of Aquifer Parameters	6 Marks
IV. Plotting of Ground water provinces on outline map of India.	4 Marks
V. Water table contour maps and its interpretation for groundwater structure.	6 Marks
VI. Morphometric Analysis from topographic maps.	6 Marks
VII. Field Work.	4 Marks
VIII. Practical Record and Viva Voce	10 Marks
	50 Marks.

Semester-VI
6S- Geology

UNIT I : Stress ó Strain and deformation, Interrelationship of Stress-Strain and Time, Mohr's Circle, Determination of strain by using Initial Spherical Objects, Deformed Conglomerate and Bilateral symmetrical fossils.

UNIT II: Faults: Nomenclature or Parts, Classification ó Genetic & Geometric, recognition of fault in field and map. Causes of faulting. Foliation and Lineation ó kinds and origin.

UNIT III: Photo geology and Remote Sensing, Aerial Photographs and its types, Satellite Imageries. Methods of studying aerial photographs in the form of Stereo-pairs and Mosaic. Pocket and Mirror stereoscope, Overlap and Sidelap, Drift and Crab.

UNIT IV: Elements of Photorecognition:- Tone, Texture, Shape, Size, Pattern, Scale of Photograph and Vertical exaggeration. Guidelines for Lithological, Structural and geomorphic interpretation. Applications of Photo geology and Remote Sensing.

UNIT V : Prospecting and Exploration-Criteria and guides to ore search, Structural control of ore localization.

Sampling methods- Channel, Chip, Muck, Car and Drill hole sampling. Coning and quartering. Calculation of grade and ore reserves.

UNIT VI: Surface geophysical methods- Gravity, Magnetic, Electrical and Seismic. Geochemical and Geo-botanical Method-Geochemical cycles and dispersion.

PRACTICALS:

1. Drawing of Sections and interpretation.
2. Interpretation of Aerial Photographs and Satellite Imageries.
3. Laboratory exercises in solving exploration related problems.
4. Exercises on calculation of grade and ore Reserves.
5. Field Work.

PRACTICAL EXAMINATION:

The Practical Examination will be four hour duration and carries 50 marks. The distribution of marks will be as follows-

I. Completion of Section maps (2 Nos.)	10 Marks
II. Interpretation of Aerial Photographs and Satellite Imageries.	10 Marks
III. Laboratory exercises in solving exploration related problems.	10 Marks
IV. Exercises on calculation of grade and ore Reserves	06 Marks
V. Field Work.	04 Marks
VI. Practical Record and Viva Voce	10 Marks
	50 Marks

Text Books for Sem V & VI :

1. Bilings, M.P. (1997) Structural Geology. Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Park, R.G. (1989) Foundations of Structural Geology. Blackie, New York.
3. Gokhale, N.W.(2001) Theory of Structural Geology. Blackie, New York.
4. Gokhale, N.W.(1991) A Manual of Problems of Structural Geology. CBS Publishers.
5. Lahi, F.H. (1987) Field Geology, CBS Publishers.
6. Gokhale, N.W. (2001) A Guide to Field Geology. CBS Publishers.
7. Chiplonkar G.W.: Geological Maps, Dastane Ramchandra Publication, Pune
8. Valdiya, K.S. (1987) Environmental Geology - Indian Context, Tata McGraw Hill.
9. McKinstry, H.E. (1972) Mining Geology. Prentice- Hall Inc.
10. Arogyaswamy, R.N.P. (1995) Courses in Mining Geology. Oxford and IBH Publishing Co., New Delhi.
11. Bagchi, T.C., Sen Gupta, D.K. and Rao, S.V.L.N. (1979) Elements of Prospecting and Exploration. Kalyani Publishers, New Delhi.
12. Dobrin, M.B. (1952) Introduction to Geophysical Prospecting. McGraw Hill.
13. Pande, S.N. (1987) Principles and Applications of Photogeology . Wiley Eastern Limited.
14. Sabins, F.F. (2000) Remote Sensing Principles and Interpretations. W.H. Freeman and Company, USA.
15. Lilesand, T.M. and Kiefer, R.W.(2000) Remote Sensing and Image Interpretation. John Wiley and Sons Inc., New York.
16. Drury, S.A. (1997) Image Interpretation in Geology. Chapman and Hall, London.
17. Todd, D.K. (1980) Ground Water Hydrology. John Wiley and Sons Inc. New York.
18. Karanth, K.R. (1989) Hydrogeology. Tata McGraw Hill Pub.Co.Ltd., New Delhi.
19. Nagabhushaniah, H.S. (2001) Groundwater in Hydrosphere (Groundwater Hydrology) CBS Publisher, New Delhi.
20. Karanth K.R. Groundwater, Assessment, Development and Management. Tata McGraw Hill Pub. Co. Ltd., New Delhi.
21. Raghunath : Ground Water Hydrology, New Age Publication, Pune

22. Dynamic Earth - Skinner Potter - Pub.John, Wiley.
23. Text Book of Physical Geology - G.B.Mahaptra- Pub. C.B.S., New Delhi.
24. Dynamic Earth ó Patwardhan A.M., E E.E Publications, New Delhi.
25. Physical Geology ó A. Holmes, Orient Longman Publications.
26. Concepts in Geology - Chakranarya, Kulkarni, Pub. Scientific Publication, Pune.
27. Dynamic Earth- Whiley, John Wiley and Sons, New York.
28. Radhakrishnan N. General Geology, V.V.P Pub, Vellore.
29. Text Book of Engineering Geology - Parbin Singh, Katson Publishing, Ludhina.

**B.Sc. Final Year, Semester-V
7: BOTANY**

The examination in Botany of fifth Semester shall comprise of one theory paper, internal assessment and practical examination. Theory Paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lecturers per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-V (8 marks).

5S - BOTANY

PLANT PHYSIOLOGY AND ECOLOGY

Unit - I: Plant Water Relations

- 1.1 Importance of water to plant life.
Imbibition , Diffusion, Osmosis, Plasmolysis.
- 1.2 Active and passive Absorption of water.
- 1.3 Ascent of sap - Root Pressure and Transpiration Pull Theory.
- 1.4 Transpiration - Types of transpiration, Stomatal movements, Mechanism of transpiration (Starch) sugar hypothesis), Significance. Antitranspirant, Guttation.
- 1.5 Mineral uptake - Active uptake - Career Concept, Passive up take - Ion Exchange.

Unit - II: Metabolism-

- 2.1 Photosynthesis - Introduction, Role of Light, Photosynthetic Apparatus and Pigments, Two Pigment Systems, Photophosphorylation, C3 and C4 cycle, CAM Pathway.
- 2.2 Respiration - Introduction, Mitochondria as a Respiratory centre, Types of Respiration - Aerobic and Anaerobic, Mechanism of aerobic respiration- Glycolysis, Krebs cycle, Electron transport system and Chemiosmotic ATP generation, Respiratory Quotient.

Unit - III: Metabolism and growth

- 3.1 Nitrogen Metabolism- Sources of nitrogen, Symbiotic nitrogen fixation, Role of Nitrate reductase.
- 3.2 Growth - Phases of growth, Growth curve, Physiological role of growth hormones (Auxins, Gibberellins, Cytokinins, Absciscic acid, and Ethylene).
- 3.3 Physiology of Senescence and Abscission.

Unit – IV: Plant responses

- 4.1 Photoperiodism - Concept of Florigen, Role of Phytochrome,
- 4.2 Vernalization- Concept and Significance.
- 4.3 Plant movement- Tropic (Phototropic and Geotropic) and Nastic (Epinasty, Hyponasty and Seismonasty)
- 4.4 Stress physiology- Concept, Types of stress, Water and Salinity stress.

Unit – V: Ecology and Environment:

- 5.1 Concept of environment, Concept and scope of ecology.
- 5.2 Ecological factors- Climatic- Light, Temperature and Water.
- 5.3 Atmosphere and its composition.
- 5.4 Edaphic factor- Process of soil formation, soil profile, soil biota and their role.
- 5.5 Ecological Adaptations - Morphological and Anatomical adaptation in Hydrophytes, and Xerophytes.

Unit – VI: Ecosystem:

- 6.1 Population Ecology- Natality and Mortality, Community characteristics ó Frequency, Density and Abundance
- 6.2 Ecological Succession - Hydrosere and Xerosere
- 6.3 Ecosystem ó Definition, Structure and Function,

Food chain, Food web, Energy flow model (Single channel model)

- 6.4 Types of Ecosystem- Pond ecosystem, Desert ecosystem.

LABORATORY EXERCISE :**Plant Physiology: Major experiment (Any Seven)**

1. To study the effect of temperature and organic solvent on permeability of plasma membrane.
2. To study osmotic pressure of cell sap by plasmolytic method.
3. To determine water potential of plant tissue.
4. To determine the path of water (ascent of sap)
5. To determine the rate of transpiration by Ganongs photometer.
6. To determine rate of photosynthesis under varying quality of light and CO₂ concentration.
7. To study the rate of photosynthesis in terrestrial plants with the help of Ganongs Photosynthometer.
8. Separation of chloroplast pigments by paper chromatography/solvent extraction method.
9. Separation of amino acids by paper chromatography method.
10. To determine R.Q. using different substrates.
11. To determine the rate of respiration by Ganongs respirometer.
12. To study antagonism of salts.
13. To study phenomenon of adsorption.
14. To study effect of IAA and Gibberellins on seed germination.
15. Test for secondary metabolites- Alkaloid, Phenolics, Tannin, Flavonoids and Lignin
16. To study Endo and Exo-osmosis by egg membrane osmoscope

Plant Physiology: Minor experiment- (Any Three)

1. To demonstrate fermentation.
2. To demonstrate exo and endosmosis
3. To demonstrate transpiration by Bell jar.
4. To demonstrate light is necessary for photosynthesis
5. To demonstrate anaerobic respiration in germinating seeds.
6. To demonstrate the evolution of CO₂ in respiration.
7. To demonstrate the phenomenon of nastic movement with help of *Mimosa pudica* / or *Biophytum sensitivum*.

Ecology: Major experiment (Any Three)

1. Study of morphological and anatomical adaptations in hydrophytes ó *Hydrilla*, *Eichhornia*, *Typha*, *Vallisneria* and *Nymphaea* (any two)

Study of morphological and anatomical adaptations in xerophytes -*Asparagus, Nerium, Casuarina, Euphorbia, Cycas, Opuntia* (any two)

3. Study of community characteristics by quadrat method.
4. Determination of water holding capacity of different soils.
5. To determine the texture of different soils by sieve method.

Ecology: Minor experiment (Any Two)

1. To determine the porosity of soil.
2. To determine the transparency and temperature of water bodies.
3. Estimation of salinity of different water samples
4. Determination of pH of different soils and water samples by pH papers/ pH meter.
5. Study of meteorological instruments -Rain gauge, Hygrometer, Barometer

PRACTICAL EXAMINATION

Time: 4 Hours Marks: 50

Q. 1 - Physiology- major experiment-	15
Q. 2 - Comment one Minor Physiology experiment-	5
Q. 3 - Ecology major experiment.	10
Q. 4 - Ecology minor experiment.	5
Q. 5 - Viva ó voce	5
Q.6 - Class record.	5
Q. 7 - Co-curricular Activity Report	5

Co-curricular Activity Reportö which mean the report on the activity

Such as Study Tour, Industrial visit to Research Institute, Excursion Tour to be submitted by the students at the time of practical examination.

Books Recommended:

Plant Physiology and Ecology:

1. Curtis & Clark. : Introduction of Plant Physiology.
2. H.N.Shrivastav. : Plant Physiology
3. Devlin R.M. : Plant Physiology
4. Salisbury F.B and Ross C.W. (1992).: Plant physiology (Fourth Edition) Wadsworth Publishing Company, California,USA.
5. William G. Hopkins. (1995): Introduction to Plant Physiology, Published by ó John Wiley and Sons, Inc.
6. V.Verma : Plant Physiology Verlag, New York. Vol. II.

7. Mayer & Anderson.: Plant Physiology.
8. Lincoln Taiz and Eduardo Zeiger (2003). Plant Physiology (3rd edition), Published by Panima Publishing Corporation
9. Galston, A. W. 1989: Life processes in plants. Scientific American Library, Springer
10. Jain V.K.: Fundamental of plant Physiology. S. Chand Publication New Delhi.
11. Kocchar P.C.: Text Book of Plant Physiology.
12. Mohr, H. and Schopfer, P. 1995 : Plant Physiology 4th : Edition, Wordsworth
13. Moore, T.C. 1974: Research Experiences in Plant Physiology. A Laboratory Manual.
14. Mr./Mrs.Pillei : Plant Physiology New York, U.S.A.
15. P.S.Gill: Plant Physiology, S.Chand & Co. New Delhi, Edition - Pradipö, Botany
16. Purekar and Singh: Plant Physiology,
17. R. G. S. Bidwell (revised edn.)-Plant Physiology
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23. Verma S.K. and Mohit Verma 2007. A.T.B of Plant Physiology, Biochemistry and Biotechnology, S. Chand Publications.
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28. Cunningham.W.P. and Saifo S.W. 1997. Environmental Science: A Global Concern WCB. McGraw Hill.
29. Dash M.C. 1993. Fundamentals of Ecology. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
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31. Kumar.H.D. 1997. General Ecology. Vikas Publishing Pvt. Ltd., Delhi.
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36. Smith.L.R. 1996. Ecology and Field Biology (5th edition). Harper Collins
37. Tyler. M.G. Jr. 1997. Environmental Science: Working with Earth (6th edition). Wordsworth Publishing Co.
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40. Bendre: Practical Botany for B.Sc.III year. Rastogi Publications, Meerut.

Semester-VI

6S Botany

The examination in Botany of sixth Semester shall comprise of one theory paper, internal assessment and practical examination. Theory Paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lecturers

per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-VI (8 marks).

SEMESTER VI – MOLECULAR BIOLOGY AND BIOTECHNOLOGY

Unit-I : DNA the genetic material :

- 1.1 Historical account of Griffith's Expt, Hershey and Chase Expt.
- 1.2 DNA's Chemical composition and Double Helical model,
- 1.3 DNA replication in Eukaryotes;
- 1.4 DNA Packaging - Nucleosome and Solenoid
- 1.5 Satellite, Repetitive DNA and Transposable element in plants (AC-DS system)

Unit-II : Gene Structure and Expression -

- 2.1 Concept of gene, Fine structure of Gene
- 2.2 Gene Expression of Central Dogma, Types of RNA, Genetic code, Ribosome as a translation machine
- 2.3 Transcription in Eukaryotes of Mechanism of Transcription and RNA Processing
- 2.4 Translation in Eukaryotes.
- 2.5 Endomembrane system (Flow of Peptide)

Unit – III : Regulation of Gene Expression

- 3.1 Regulation of Gene Expression in Prokaryotes of Operon concept with special reference to Lac Operon
- 3.2 Regulation of gene expression of Eukaryotes of Britton Davidson Model
- 3.3 Protein Folding Mechanism and Structure (Primary, Secondary, Tertiary and Quaternary)
- 3.4 Protein Sorting of Targeting to proteins to organelles
- 3.5 Protein Trafficking

Unit-IV : Genetic Engineering -

- 4.1 Tools and techniques of recombinant DNA technology,
- 4.2 Restriction Enzymes of Nomenclature and Types
- 4.3 Cloning vectors of Plasmids, Phages, Cosmids
- 4.4 Gene Source- Genomic and c-DNA library

- 4.5 Gene Transfer Techniques ó
Direct - (1) Chemical method, (2) Electroporation, (3) Gene gun method
Indirect ó Agrobacterium mediated gene transfer
- 4.6 Gene Amplification - Polymerase Chain Reaction (PCR)

Unit-V : Plant Tissue Culture -

- 5.1 Basic aspects of plant tissue culture
- 5.2 Laboratory Requirement ó
Infrastructure,
Instruments (laminar air flow, autoclave, growth chamber),
Culture Media (MS Media),
Growth Hormone (Auxin, Cytokinin and Gibberellins)
Sterilization Techniques
- 5.3 Tissue Culture Technique - Cellular totipotency, differentiation and morphogenesis; Callus Culture; Micro propagation

Unit-VI : Applications of Biotechnology -

- 6.1 Agriculture ó Haploid plant production (Anther and Pollen Culture); Protoplast Culture and Somatic Hybridization; Transgenic Plant - BT Cotton, Synthetic seed. Salient achievements of crop biotechnology
- 6.2 Industry ó Fermentation Technology- Bakery Products and Alcohol Productions.
- 6.3 Health Care ó Edible Vaccines
- 6.4 Conservation ó Cryopreservation, Genetically Modified Organisms: - Pros and Cons

LABORATORY EXERCISE

1) Molecular biology (Major) (Any One)

1. Isolation of DNA by crude method
2. Estimation of DNA by Diphenylamine method
3. Estimation of RNA by Orcinol method

2) Molecular biology (Minor) (Any One)

1. Demonstration of DNA Electrophoresis,
2. Demonstration of double helical model of DNA
3. Demonstration of AC-DS System in Maize kernel
4. Demonstration of Centrifugation

3) Biotechnology (Any Six)

1. Working Principle and application of Autoclave

2. Working Principle and application of Laminar Air Flow
3. Cleaning and Sterilization of Glassware
4. Sterilization of Explant
5. Inoculation of Explant
6. Demonstration of in vitro culture techniques ó anther and pollen culture
7. Isolation of Protoplast by Mechanical Method
8. Isolation of Protoplast by Enzymatic Method
9. Demonstration of technique of Micropropagation
10. Preparation of Artificial Seed
11. Demonstration of hardening of tissue culture plant
12. Preparation of Tissue culture media
13. Pollen viability test.

Note: Visit to molecular biology, biotechnological research institute/ industry

PRACTICAL EXAMINATION

Time : 4 hours.

Marks : 50

- Que.1 : To perform given Molecular Biology experiment 15 Marks
Que.2 : Comment on minor molecular Biology Experiment 05 Marks
Que.3 : To perform given Biotechnology experiment 15 Marks
Que.4 : Comment on any one Biotechnology Experiment 05 Marks
Que.5 : Visit report 05 Marks
Que.6 : Class record/ and viva-voce 05 Marks

1. Pradipø Botany Vol. V, Biochemistry and Biotechnology- New Millenium Edition
2. Alberts, B.Bray, D.Lewis, J.Raff, M.Roberts, K. and Watson, I.D. 1999. Molecular Biology of Cell - Garland Publishing Co. Inc New York, U.S.A.
3. Gupta, P.K. 1999 : A Text book of Cell and Molecular Biology, Rastogi Publication, Meerut, India.
4. Wolfe, S.L. 1993. Molecular and Cell Biology. Wordsworth Publishing Co., California, U.S.A.
5. Faku, K. and Nakayama S. 1996. Plant Chromosomes. Laboratory Methods. CRC Press, Boca Raton, Florida.
6. Sharma, A.K. and Sharma, A. 1999. Plant Chromosomes : Analysis; Manipulation and Engineering. Harwood Academic Publishers, Australia.
7. Bhojwani, S.S. 1990. Plant Tissue Culture : Applications and Limi-

- tations, Elsevier Science Publishers, New York. U.S.A.
8. P.K.Gupta Biotechnology.
 9. Lea, P.J. and Leegood, R.C. 1999. Plant Biochemistry and Molecular Biology. John Wiley & Sons, Chichester, England.
 10. Old, R.W. and Primrose, S.B. 1989 : Principles of Gene Manipulation. Blackwell Scientific Publications, Oxford, U.K.
 11. Vasil, I.K. and Thorpe, T.A. 1994. Plant Cell and Tissue culture, Kluwer Academic Publications, the Netherlands.
 12. Devi, P. 2000. Principles and Methods of Plant Molecular Biology, Biochemistry and Genetics, Agrobios, Jodhpur, India.
 13. Smith, R.H. 2000. Plant Tissue Culture; Techniques and Experiments. Academic Press, New York.
 14. Satyanarayan- Biotechnology.
 15. An introduction to industrial Microbiology- Dr. P.K. Sivakumaar & Dr. M.M. Joe & Dr. K. Sukesh- S. Chand publication.
 16. Practical Biotechnology and plant tissue culture- Prof. Santosh Nagar & Dr. Madhavi Adhav- S. Chand Publication.
 17. Modern practical Botany (Volume-III)- Dr. B.P.Pandey- S. Chand publication.
 18. Molecular Biology and Biotechnology- K.G. Ramawat & Dr. Shaily Goyal- S. Chand publication.
 19. Comprehensive Biotechnology- K.G. Ramawat & Shaily Goyal- S. Chand publication.
 20. Botany for degree students - B.P. Pandey- S. Chand publication.
 21. A Textbook of Biotechnology- R.C. Dubey- S. Chand publication

Semester-V

8 : Environmental Science

5S : Environmental Science

(Pollution control technology)

UNIT-I : General approaches of air pollution.

- A. Sampling- Ambient and indoor, techniques. Analysis - Cox, Nox, Sox, Spm. Air quality standards, emission standards.
- B. Integrated approach of air pollution control: City planning, zoning, source correction methods. National and International steps to control green house gases.

UNIT-II: Air Pollution control Techniques.

- A. Control devices : Gravitational settling chambers; cyclone separators; fabric filters; electrostatic precipitators; wet collectors and scrubbers. Combustion-flaring, thermal incineration, catalytic oxidation. Control of other gaseous pollutants-odour, VOCs, oxides of sulphur and nitrogen emissions.
- B. Auto Gaseous Emission Control - Control of auto-exhausts emissions. Use of after burners, catalytic converters, engine modifications; tuning, importance of good maintenance and driving habits. Alternative fuels.

Unit-III : Physico-chemical Waste Water Treatment Processes :

- A. (i) Physical Process - Screening, grit chamber, aeration, oil and grease removal, sedimentation, coagulation, flocculation.
(ii) Chemical Process - Neutralization, chemical precipitation, adsorption, demineralization.
(iii) Biological Process - Activated sludge process, trickling filter, UASB (upflow anaerobic sludge blanket).
- B. Sludge - Origin, nature, type, characteristics, treatment and disposal.

Unit-IV : Solid Waste Disposal

- A. Management of municipal solid wastes (MSW): Sources, physical composition and characteristics.
- B. Disposal methods; Open-dumping and sanitary landfills. Reduction, reuse and recycling of materials. Optional technologies for processing of MSW: Incineration, gasification, pyrolysis
- C. Hazardous wastes: Sources and characteristics. Safe storage, transport. Treatment of hazardous waste- Stabilization. Disposal of hazardous wastes. Introduction to Biomedical waste-Concept & classification.
- D. Radioactive waste: sources, classification, health and safety aspects. Management of radioactive wastes.

UNIT-V: Biomedical and Radioactive Waste Treatment

- A. Biomedical - Introduction, concept, classification, treatment and disposal (Pit, composting and Incineration).
- B. Radioactive waste - Handling, storage and disposal.
- C. Case Studies

UNIT-VI : Indoor Safety

- A. Definition and concepts: Precautions in the processes and operations involving explosives, flammables, toxic substances.
- B. Health Safety : Respiratory personal protective equipment (RPPE) & non respiratory personal protective equipment (NRPPE). Selection, use care and maintenance of non respiratory protective equipment. NRPPE: head protection , ear protection , face and eye protection , hand protection, foot protection and body protection.

Practical – 5

1. Preparation of windrose diagram of an area.
2. Determination of NO_x, SO₂ in an ambient air .
3. Measurement of Smoke Density.
4. Elemental analysis of sludge.
5. Estimation of organic matter from soil/sludge.
6. Determination of CO₂ in the atmosphere by volumetric method.
7. Determination of energy content of plants by Bomb Calorimeter.
8. Determination of physical parameters of
 - i) well water ii) Industrial or given type of effluent
 - iii) River Water iv) Sea wa
9. Determination of heavy metals (Fe/ Cr /Cu) by spectrophotometric methods from waste water.
10. Detection/ estimation of Cr (VI) in presence of Cr III
11. Determination of hydrocarbon from fuel gas using Orsatø apparatus
12. Determination of Chemical Oxygen Demand value for industrial waste effluent.
13. Determination of NO₂ from the atmosphere by colorimetric method using high volume sampler
14. Estimation of mixed liquor suspended solids (MLSS) in activated

- sludge.
15. Reduction of hardness by ion exchange method.
 16. Estimation of fluoride in waste water.
 17. Determination of energy content in biomass (Bomb Calorimetry).
 18. Estimation of Na⁺ and K⁺ in water / effluent samples using flame photometer
 19. Calibration of air sampling equipments.
 20. Noise, illumination, ventilation and heat stress measurements - Industry.
 21. Preparation of Material Safety Data Sheet for laboratory chemicals.

Note:

1. Visit to Drinking / effluent treatment plant.
2. Industrial visit

Distribution of practical Marks (Duration 6 hours)

1. Long Experiments (Water & air)-	20
2. Short Experiment-	10
3. Study visit-	10
4. Practical record-	05
5. Viva-voce-	05

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Total 50

Equipments :-

- 1) Flame photometer
- 2) Orsat Apparatus
- 3) COD Reflux assembly
- 4) High volume sampler
- 5) Bomb Calorimeter
- 6) Noise level meter
- 7) Lux meter.

Reference Books:

1. Environmental Sciences - Jackson and Jackson
2. Environmental Sciences - Tuckeer (1990)
3. Introduction to Environmental Chemistry ó A.K.De
4. Pollution control in process industries ó S.P.Mahajan. Tata McGraw Hill pub. New Delhi
5. Water and Waste water technology ó M.J.Hammer, John Wiley A & sons, New York 1986.
6. Introduction to wastewater treatment process ó R.S.Ramalho.

7. Current practices in Environmental Engineering. (Vol. I & II) Alam Singh and U.S. Sharma. International Book Traders, Delhi-1997.
8. Basic environmental technology : Jerry ;A. Nathanson.
9. Handbook of environmental management and technology : Gwendolyn Holmes, Ben Ramnarine Singh, Louis Theodore.
9. Environment and Health ó Anthony I. Rowland & Paul Cooper, 3rd edition -1989.
10. Air quality management by Stern, A.C. (Ed) 1974.
11. Air pollution theory by Crawford.
12. Land pollution , causes and control by Harrusson and Laxon.
13. Soil and water conservation engineering by Schwab, S.D. Frevert, R.K. Edminster, T.W. and Barns, John Willey and sons.
14. Standard Methods for the Examination of water and waste water (1984) APHA,

**Semester-VI
Environmental Science**

**6S : Environmental Science
(ENVIRONMENTAL CONSERVATION & MANAGEMENT)**

- Unit-I :** **A) Environmental Education:** Definition, need, principles and objectives of environmental education, Types of environment education (Formal & Non Formal), stages of environment education, current status of environment education in India.
- B) Environmental Education & Awareness:** Concept of environmental awareness, methods of environmental awareness, role of environmental education in awareness programmes, Role of NGOø in environmental education; environmental awareness thorough mass media.
- Unit-II :** **A) Mining Environment :** A)Types of mining, issues related with mining management, strategies for conservation of minerals. Land Use Pattern, land degradation and land management.
- B) Conservation of wetland, wastelands and mangroves**
- Unit-III :** **A) Wild Life Management -** Wild life as a resource. Threats to wild life. Indian board for wild life (IBWL).

WWF, Wild life institutes in India. Wildlife poaching. Wild Life Protection Act, 1972, Environmental Protection Act, 1986.

B) Biodiversity Conservation :

Need of conservation; National policy and goals; methods of biodiversity conservation - in situ conservation(sanctuaries, national parks and biosphere reserve); ex situ conservation(zoo, botanical gardens) convention on biological diversity (CBD) ,Biodiversity Act 2002.

Unit-IV : Role of National and International Organization in Environmental Protection :

A) IUCN, UNEP, Man and Biosphere Programme (M.B.P.), State Pollution Control Board . Ministry of Environment and Forest (MOEF) .

B) Environmental Impact Assessment - Concept, scope and objectives, EIS, Public participation in EIA, advantages and disadvantages of Public participation.

Unit-V : **A) Environmental Audit :** Definition, purpose, advantages, general approach to environmental audit.

B) Introduction to Remote Sensing : Study of Arial Photographs and Satellite Images. Geographical Information System (Concept and Advantages).

Unit-VI : **A) Sustainable Development:** Concepts and principles of sustainable development.

B) Statistical Methods : Mean, mode, media, standard deviation, tabulation of data, types of data, diagrammatic representation and graphical representation of data, regression analysis.

Practicals based on Papers :

A) Experiments on Biodiversity:

- 1) Determination of Shannon Weiner Species diversity index to terrestrial animal communities.
- 2) Determination of Margalef diversity index to terrestrial animal communities.
- 3) Determination of Kotheø Species Deficit index to aquatic organisms.
- 4) Photographic submission of flora and fauna.

B) Experiments on Environmental Management :

- 1) Characterization of wasteland soil.
- 2) Characterization of wetland water.
- 3) Characterization of wetland sediments.
- 4) Visit to nearby mine / quarry
- 5) Survey of Environmental literacy in nearby community.

C) Experiments on GIS & Remote Sensing:

- 1) Study of Satellite Images or Aerial Photographs.
- 2) Study and Applications of GPS
- 3) Marginal information of Topo sheet.
- 4) Indexing of Topo sheet.
- 5) To study the conventional signs and symbols from Topo sheet.
- 6) Interpretation of Topo sheet.
- 7) To study of conventional signs and symbols from weather map.
- 8) Interpretation of weather map.
- 9) Scale determination of aerial photograph.
- 10) Mapping of the land use patterns with the help of aerial photographs.
- 11) To study the change in land use pattern of an area with help of aerial photographs and survey if India Topo sheet.

D) EXPERIMENTS ON EIA:

- 1) Evaluation of impact of refuses on soil quality.
- 2) Impact of air pollutants on plants leaves.
- 3) To examine the effects biofertilizers versus chemical fertilizers on root ramification and plant growth.
- 4) To evaluate the impact of traffic density on environment.

Reference Books:

- 1) Environmental economics for sustainable development ó Kumar
- 2) Ecology and economics: an approach to sustainable development ó Sengupta
- 3) Environment, Development and sustainability ó Bhaskar nath
- 4) Water technology management challenges and choices ó A.K. Barua. Biodiversity and environment ó S. K. Agarwal
- 5) The Biological Diversity Act. 2002 and Biological Diversity rules 2004 ó National Biodiversity Authority India. 475, 9th South cross street, Kalpalocwar Nagar, Neelangarai, Chennai ó 600041.
- 6) Biodiversity measurement and estimation ó D. L. Hawks

- 7) Biodiversity conservation ó Global agreements and national concerns. RAMSAR sites CBD, Quarantine, Regulation, National Forestry policy, Biodiversity Act, Wild life protection Act.
- 8) Environmental Problems and Solutions by Asthana D.K.
- 9) Environmental Management by G.N.Pande
- 10) Pollution Management in Industries by R.K.Trivedi.
- 11) Indian Economy in International Perspective, 1994: Gaur K. D, Meshram P. J. Shashidharan K.L. ed. Sarup and Sons publishers Ansari Road, Darya Ganj New Delhi.
12. Environmental Economics, 2001: Madhu Raj ; Sarup and sons publishers, New Delhi.
13. Environment & Social Issues, 2000: Sunit, Gupta Sarup and Sons Publishers, New Delhi.
14. Global Environment: Current Status, 2000: Sunit, Gupta Sarup and Sons Publishers, New Delhi.
15. Environmental economics for sustainable development accounting and valuation 2001: Some issue in modeling Kumar (Pushpam).
16. Environmental Crisis and Management: Sunit, Gupta Sarup and Sons Publishers, New Delhi.
17. Ecology & economics: An approach to sustainable development and sustainability: Bhaskar Naath, Luc Hens, David Pimental.
18. Environmental Remote sending By: Saumitra Mukharajee.
- 19 Hand Book of Env. Laws, Acts, Rules, Guidelines, Compliance and Standard Vol. 1 & 2: R. K. Trivedy Environmental Edition: 1st 1996.
20. Pollution control Acts, Rules and notifications issued there under: Central Pollution Control Board April. 1995.
21. Environmental Protection and the Laws: C. N. Mehta, 1991.
22. Legal aspects of Environmental Pollution and its Management: Ed. S. M. Ali, 1992.
23. International Environmental Policy Emergence and Dimensions: by L. K. Caldwel 1990.
24. Lalø Commentevis on water, Air pollution laws along with the environmental (Protection) Act and rules 1986, 3rd Rd. 1992: Law Publisher India.
- 25 Environmental Problems, protection and control Vol I & Vol II Ed: Arun Kumar.
- 26 Remote Sensing and Image Interpretation:-Tomas M.Lillesand and

- Ralph W. Keifer John Wiley and Sons Inc. New York.
27. Introduction to Remote sensing:-James B. Campbell, Tylor and Francis Ltd. London.
 28. Fundamentals of GIS:-Michael N. Demers..
 29. Remote Sensing application in applied geosciences:-Sumitra Mukherjee, Milton Book Company.
 30. Environmental Geography:-H.M Saxena, Milton Book Company.
 31. Principles of Photogeology:-Singh.
 32. Principles of Remote Sensing:-Currain.
 33. Fundamentals of Photogeology:-S.N.Pandey.
 34. Environmental Impact Assessment, L. W. Canter, McGraw Hill publication, New Delhi.
 35. Proceedings Indo-US workshop on environment impact analysis and assessment (1980) NEERI, Nagpur.
 36. Environment & Social impact assessment, Vlcany, F., Bronsetin DA (1995), John Wiley & Sons, New York.
 37. EIA ó A Biography. B. D. Clark, B. D. Bissel, P. Watheam

DISTRIBUTION OF PRACTICAL MARKS: MAX.MARKS :50

Duration : 6 Hrs

Q.1 Any one Experiment on Biodiversity conservation.	-10 Marks
Q.2 Any one Experiment on GIS OR Remote sensing.	-10 Marks
Q.3 Any one experiment on EIA / Environmental Management	10 Marks.
Q.4 Class Record + Viva-Voce	10 Marks
Q.5 *Co-Curricular Activity Report	10Marks.
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Total	50 Marks

Note: Visit to - 1) Wild life Sanctuary, 2) Industries, 3) National Park, 4) Meteorological Station.

*öCo-curricular Activity Reportö which mean the report on the activity such as Seminar, Study Tour, Industrial visit to Research Institute, Group Discussion, Excursion Tour to be submitted by the students at the time of practical examination.

Required Instruments or Equipments for Practical Work :

1. Spectrophotometer
2. COD reflux assembly

3. BOD bottles.
4. Incubator
5. Kjeldhal Nitrogen Assembly
6. Paper Chromatograph
7. Flame Photometer
8. Dust Fall Jar
9. Sound Level Meter
10. Water Sampler
11. Lovered Box
12. Air Sampler - Tilak
13. Zincondroff Apparatus
14. Stereo Scope
15. Aerial Photograph.

Instructions for Project Work :

The objective of assigning of project work to student is to provide an opportunity to understand and appreciate environmental problems and explore probable solutions based on Empirical Studies. With a view to achieve these objectives. It is Expected that students in consultation with the concerned member of teaching faculty identifies an environmental problem and under take studies during specific period. While defining aim and the scope of the project, feasibility in terms of available time should be duly considered. It would be desirable that the initiation of project work begins in first session by under taking library work under the guidance of concerned teacher. The theme of project should be finalize in all respects at a convenient.

A student is expected to carry out studies as preplanned by going on periodic field visits and carry experimental studies. It is visualize that continuous to the teacher and consultations with him is the essence of successful work on completion of the field work and laboratory work, the

Semester-V

9 : SEED TECHNOLOGY

5S : Seed Technology(Vocational)

There shall be one theory paper of 80 marks and practical examination of 50 Marks for each semester. Duration of theory paper shall be 3 hours and practical examination shall be of 4 hours.

The syllabus in based on 6 lectures and 6 practical periods

perweek.

Seed Pathology and Seed Entomology.

- Unit-I** : History of seed pathology
Economic significance of seed borne diseases.
Seed-borne fungi ,bacteria, viruses and nematodes
Storage fungi and its impact on animal and human health
Mechanisms of seed transmission
Entry point of seed infection
- Unit-II** : Influence of environmental factors on seed borne diseases
seed crop management
Seed treatment, procedures and equipments
Quarantines of seed health testings
Procedures of sampling for seed health testing
- Unit-III** : Methods of seed health testing
Inspection of plants beyond the seedling stage
seed certification and tolerance limits of seed borne pathogens
Seed act in relation to Seed borne diseases
National and international cooperation in seed pathology
- Unit-IV** : Introduction
Methods of insect classification
Orders of insects of economic importance
Insect body & appendages
Life-cycle of insect
Economic entomology Important insect-pests of seed crops, their nature of damage and management
1. Cereal-paddy, maize and sorghum
2. Pulses-Kharif pulses-pigeonpeas, mung, Rabbipulses-chickpea, fieldpea linseed
3. Oil seeds-mustard, castor, linseed groundnut
4. Vegetables and dry fruits
- Unit-V** : Beneficial Insects
Type of beneficial insects and their role in seed production
Type of insect pollinators, their usage in crop pollination

Honey bees, their social structure and management (bee Keeping)
Insect control
Definition and methods of insect control
Cultural, mechanical, physical, quarantine
Chemical control/pre harvest sanitations spray
Insecticide formulation and preparation of Spray Solution.
Safe application of pesticide

Unit VI : Storage Entomology

Types of insect pests and mites in storage - Nature of damage and losses caused and factors influencing them Sources and development of infestation, Detection of infestation.
Fumigants and methods of fumigation Seed protectants and their impact on seed viability etc.
IPM strategies for important pests Plant Protection Equipments
Type of equipments & their principles Safe handling, maintenance and use of machines Rodents and their control in field and seed godowns

Practical : Seed Pathology

1. Demonstration and handling of stereobinocular microscope
2. Symptoms of important seed borne pathogens
3. Visual examination of dry seeds for disease symptoms
4. Examination of suspensions obtained from washings of seeds
5. Viability test-space germination test and tetrazolium test.
6. Detection of important seed-borne bacteria-various methods.
7. Detection of important seed borne viruses various-methods.

Seed Entomology

1. External morphology of insect, type of mouth parts, antenna and legs.
2. Identification of important storage pests, stages of insects.

3. Detection of seed borne insects and estimation of infestation
4. Plant protection equipments, their safe handling and use.
5. Handling of bees for pollination.
6. Collection and submission of stored product pests visit to warehouses and godowns.

Practical Examination :

Distribution of Marks	Marks 50
1. Diagnosis of Symptoms of seed-borne pathogens	10
2. To Calculate the viability of seed by tetrazolium test	10
3. Study of mouth parts, antena and legs of given insect	05
4. Identify and describe the seed specimen & equipments A, B, C,D, E,	10
5. Submission of field report	05
6. Submission of seed specimen and viva-voce	05
7. Record book	05

Books Recommended :

1. Seed Pathology Vol-I & II P. Naergaard
2. Principles of Seed Pathology Vol-I & II V.K. Agarwal & J.B.Sinclair
3. Seed Treatment K.L. Jeffs.
4. Seed Technology - R.L. Agrawal
5. Introductory Mycology C.J.Alexopoulos
6. An introduction to fungi J.P. Srivastava
7. Systemic Fungicides R.W. Marsh
8. Fungicides in plant diseases control Y.L.Nene and P.N.Thapliyal
9. Destructive and useful insects by Metcalf and Flint
10. Insect Pollination of field crops by J.B.Free
11. Agricultural Entomology by A.S. Atwal
12. Plant Protection Equipments by O.S. Bindra

B.Sc. Part - III

Semester-VI

6S : Seed Technology(Vocational)

Seed Processing, Farm Management and marketing

Unit-I : Seed drying : Importance and advantage of seed drainage, moisture content recalcitrant orthodox-and methods of seed moisture measurement, theory of seed moisture measurement, theory of seed drying, specific gravity separators , adjustment of intended disc and intended

cylinder separators.

Unit-II : Surface texture separation : The roll mill, parts of the machine, Separating action and the adjustments, cleaning roll mills. Seed treatment : Seed treatment equipment, slurry treater, mist-o-matic seed treater, parts of the machine, construction and operation, Labeling of treated seeds and related precautions, storage of treated seeds, machine operation, and seed users safety. Site selection for seed processing plant on a seed production farm, Layout of machines in a seed processing plant for efficient production and main movement, mechanical inquiry of seeds in post harvest phase, conservation of energy and production in seed processing, maintenance and repair of seed processing equipment. Seed conveyors and elevators, bucket elevators belt conveyors screen conveyors. oscillation conveyors, pneumatic conveyors, difference between a specific gravity separators and oscillating conveyors installation of bucket elevator, computing the required height of bucket elevators capacity determination of bucket elevators.

Unit-III : Packaging of seeds. bager weigher, bag closing, labelling and main taining lot identity, lot numbers, seed pellets, handling and stacking, maintenance of seed processing records. seed storage structures : construction, operation and maintenance, insulation storage aeration air conditioning, dehumidification and stacking, moisture and heat proofing of seed storage structures, seed storage management.

Unit-IV : Field of farm management, scope basic principles in farm management, decision making operation and control Decision making approaches ,Decision making based on production, cost and capital investment, cost analysis law of diminishing return, opportunity cost, most profitable combination of input and output.

Unit -V : Planning and management of crops, Building and machinery Important crops of India, concepts pertaining to various crop production operations viz tillage, irrigation, sowing plant protection, harvesting and threshing maintenance of

soil fertility, weeds and their control, mixed cropping, multiple cropping and dry land farming Machinery selection and their management determination of field capacity and field efficiency, machinery adjustments. Consideration in farm buildings implement shed, storage structures.

Unit -VI: Farm Business : Farm business analysis, Farm size, factors affecting profit and economic size of farm, Budget and Record Keeping : Farm budgeting, procedure and use, Farm efficiency measures, farm records and their use. Acquisition and Management of Land Labour and Capital Farm Surveys-Data Collection analysis Marketing Basic concepts, supply and demand price equilibrium, seed transportation and storage cost and returns, cost of processing and packaging, marketing organization for seed marketing, seed markets in India, Structure and working. Seed market surveys, Projections of supply and demand for different kinds of seed in India-Seed pricing of Breeder/Foundation/Certified Seeds.

Practicals :

Seed Processing.

1. Visit to a seed processing and storage complex and familiarization with different machines.
2. Study of physical characteristics of different crop seeds and their shapes.
3. Determination of physical properties of seeds of different crops
4. Measurement of seed moisture content by direct and indirect methods of Dring.
5. Study of air screen cleaner cum grader
6. Study of specific gravity separator
7. Study of seed treatment machines
8. Study of seed packaging equipments.
9. Study of bucket elevator, screw conveyors and pneumatic elevators.

Seed farm management and marketing.

1. Identification of farm machines and their use
2. Determination of field capacity and field efficiency

3. Soil sampling fertility and moisture content
4. Calibration and adjustment of various farm machines
5. Cost analysis.
6. Farm planning and Budgeting
7. Record Keeping

Practical Examination :

Distribution of Marks :	Marks 50
1. Determination of physical properties of seeds of different crops	10
2. Identification of farm machine and their use	10
3. Study of operations of seed treatment equipment	05
4. Identify and describe equipments A,B,C,D,E,	10
5. Submission of field Report	05
6. Submission of seed specimen & Viva -voce	05
7. Record book	05

Books Recommended :

1. Hand book of Agriculture, Indian Council of Agricultural Research, Krishi Bhavan, New Delhi
2. Farm Power and Machinery Management, Vth edition, 10WA State, U.S.A. Hunt, D, 1968
3. Farm Management Decision, Operation Control. John E Kadlec, Prentice Hall, Inc Englewood, Cliffs, New jersey, U.S.A.
4. Fundamentals of farm Management S.S. Joshi and T.R. Kapur, Kalyani Publishers, India, Ludhiana.
5. Fundamentals of farm Management A.S.Kahlon and Karam Singh, Kalyani Awed Publishers PVT.Ltd. 13/14 Asaf Ali Road New delhi/ Madras/Bombay/Calcutta/Bangalore.
6. Economics of farm Production and Management, V.T. Raju and DVS Rao, IBH Publishing Co Pvt.Ltd. New Delhi.
7. Agricultural Marketing in India, S.S.Achary Oxford and I.B.H., New Delhi.
8. Seed Technology - R.L.Agrawal

**B.SC. FINAL, SEMESTER-V
10 : ZOOLOGY**

There shall be the following paper and practical for B.Sc. Part-III Semester V examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory sessions and 25 practical sessions during the complete semester). There shall a compulsory theory paper of 3 hours duration, as stated below and a practical examination extending for five hours. Every examinee shall offer the following paper of 100 marks (80 for written examination and 20 marks for internal assessment) and a practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

**Theory -5 S-ZOOLOGY:
(ANIMAL PHYSIOLOGY AND ECONOMIC ZOOLOGY)**

	Marks Allotted
1) Written examination	80
Internal assessment	20
2) Practical:	50
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Total:	150 Marks

**Paper 5 S-ZOOLOGY
(ANIMAL PHYSIOLOGY AND ECONOMIC ZOOLOGY)**

Max. Marks - 100 Total

Period - 75

UNIT I : Respiration:

Structure of respiratory organs: Gills and Lungs

Mechanism of respiration: regulation of ventilation in lungs, exchange of gases at respiratory surface, Respiratory pigments in animals: Haemoglobin, Haemocyanin, Haemerythrin, chlorocruorin. Transport of gases: O₂ and CO₂ transport, Neurophysiologic control of respiration,

Circulation:

Blood : Definition and its constituents, functions of blood.
Heart: Structure of human heart, pace maker, Cardiac cycle.
Blood coagulation factors, blood groups A, B, O system and Rh-factor.

UNIT II: Muscle Physiology:

Types of Muscles: striated, non-striated and cardiac muscles

E.M. Structure and **Chemical** Composition of striated muscle, Neuromuscular junction.

Mechanism of muscle contraction by Sliding filament theory

Physical and Chemical changes during muscle contraction: muscle twitch, tetanus, isometric and isotonic contraction, summation of Stimuli, all or none law, fatigue, rigor mortis.

UNIT III : Nerve Physiology: Neuron: E.M. Structure of neuron and Types : Myelinated and non-Myelinated nerve fibres.

Conduction of Nerve impulse, Resting potential, initiation and propagation of action potential, Saltatory transmission, Neurotransmitters (Acetylcholine, dopamine, GABA, Serotonin, Epinephrine, Nor-Epinephrine), Synapse and synaptic transmission

Chemical co-ordination: Endocrine system: Hormones and their physiological roles of-

Pituitary, Thyroid, Parathyroid, Adrenal, Islets of Langerhanø,

Hormonal disorders: Dwarfism, Gigantism, Acromegaly, Goiter, Myxoedema, Cretinism, Osteoporosis ,

UNIT IV : Reproductive Physiology: Estrous and menstrual cycle, hormonal control of reproduction in males and female, Structure and physiology of mammalian Placenta.

Homeostasis and conservative regulation: Osmoregulation and ionic regulation in aquatic animals. Osmoregulation in terrestrial animals Ammonotelism, ureotelism and uricotelism.

Thermoregulation in Poikilotherms and Homeotherms.

UNIT V : Agricultural Zoology: Economic importance of Insects

Beneficial insects ô Spider, Mantis, Ladybugs, Damsel bug, Mealybug destroyer, Soldier beetle,

Green lacewing, Syrphid fly, Tachinid fly, Ichneumon wasp

and Trichogramma wasp.

Harmful Insects – Stored food grain pests, their injuries and control

Pests of, Cotton, Sugarcane and Jowar. Damage and Control
Economic importance of Rodents, Snakes, Owls and Bats.
Apiculture - Sericulture -

Unit VI : Aquaculture

Aquaculture: definition, scope, importance and present status in India.

Fresh water fish culture: types of fish ponds: Nursery, rearing and stocking, design and construction of fish pond, fertilizers used for fish development.

Hatching Hapas, Chinese Circular Hatchery, CIFE, Mumbai, hatching model, Induced breeding and hypophysation, Modern drugs used in fish breeding.

Freshwater system: monoculture, polyculture, integrated aquaculture, cage culture, pen culture. Fish products and byproducts: Fish liver Oil, Fish body oil, Fish manure, Fish leather

Special Note : (Common for B.Sc.Sem-I & VI)

- (i) Use of animals for practical purpose in this curriculum is subject to the conditions, under the Wild Life (Protection) Act 1972 and should abide by the prevention of cruelty to animals Act 1960. No any scheduled animal species should be used in the laboratory.
- ii) The research based project on animals should strictly abide by the rule as mentioned in para-6 of U.G.C. Notification No.F.14-6/2014 (CPP-II), dated 1st August, 2014, which state that
 - 6.1 All institutions of Higher Education shall constitute Dissection Monitoring Committees (DMC) to ensure strict compliance of instructions relating to the use of animals for research purposes only;
 - 6.2 The Head of the concerned department shall be the Convener and Chairperson of DMC. Two Senior faculty members of the concerned department, one faculty member

of a related department from the same institution and one or two Faculty members of the concerned department from the neighboring institution(s) shall be members of DMC.

- 6.3 The tenure of DMC shall be two years and on expiry of a term, the DMC should be reconstituted wherein only the Convener and Chairperson (The Head of the Department) may continue for two or more terms if he/she happens to continue to be the Head of the Department. A vacancy arising during the tenure of DMC shall be filled with a faculty belonging to the respective category. The quorum for the meeting shall be 3 out of 6, where in at least one member from the neighboring institution must be present. The DMC shall meet at least once each semester/ half year and approve/review alternative experimentation of animals for laboratory exercises.
- 6.4 It shall be the responsibility of the DMC to ensure that animals that are permitted to be used for dissections / experiments in the instructions herein are procured from ethical sources, and not removed from the wild, transported to the laboratory without stress or strain to the animals, if live, and anaesthetized appropriately if they are to be used in dissections.
- 6.5 The DMC shall ensure that the institution maintains appropriate records of procurement of animals, their transport, number of animals used, use of anesthesia/ euthanasia etc.
- 6.6 The DMC shall be different from the Institutional Animal Ethics Committee (IAEC), under the purview of Committee for purpose of care and supervision of experimental animals (CPCSEA), Department of Environment and Forest, Govt. of India. However, the DMC shall not have powers to overriding the powers of IAEC. For animals covered by the IAEC, with standard operating procedures (SOPS) for IAECs prescribed by CPCSEA will apply.

- iii) Those Institutions which are already having Zoology museums should not procure museum specimens now onwards and should use charts / slides / models / photographs and digital alternatives in case of need. Those new institutions which are not having Zoology museum in their department should provide learning related to zoological specimens with the help of charts / slides / models / photographs and digital alternatives / and arrange visit of students to already established museums.

Practicals:

- Detection of blood groups in human being.
- Differential counts of blood.
- Estimation of hemoglobin percentage with the help of haemometer.
- R.B.C. count.
- W.B.C. count.
- Preparation of haemin crystals
- Measurement of blood pressure.
- Action of salivary amylase on starch.
- Qualitative detection of nitrogenous waste products (Ammonia, urea, uric acid) in given sample.
- Demonstration of kymograph unit, Respirometer through available resources.
- Observation and identification of Insect Pests of local crops, and predator insects.
- Life Cycles of Honey bee, Lac insect, Silk Moth.
- Histological Slides of major organs of Respiratory systems, circulatory system, Nervous system, Different types of Muscles, Endocrine glands, testis, ovary.
- Study of locally available fishes, Indian major carps, Exotic carps, Common carp.

Distribution of marks for practical examination :

Time: 5 Hrs. Marks

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|----------------------------------|----|
| 01. Physiological Expt. | |
| a) Major | 10 |
| b) Minor | 05 |
| 02. Economic Zoology & Histology | |

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| a) Spotting (A-F) | 12 |
| b) Description and Comments on Topic from Unit V and VI | 08 |
| 04. Class record duly signed by teacher in charge and certified by H.O.D. | 05 |
| 05. Study tour report. | 05 |
| 06. Viva - voce | 05 |

Total Marks 50

REFERENCES

- Prosser and Brown : Comparative Animal Physiology
- Hisotlogical Slides of Respirator systems, circulatory system, Muscles, Nervous system Endocrine glands, Gonads, placentae
- Guyton : Physiology
- Best and Taylor : Physiological basis of Medical practice
- C Hoar, W.S.. General and comparative Physiology. Prentice Hall of India.
- Lehninger. L.. Biochemistry. W.H. Freeman & co.
- Nagabushnam, R.. Animal physiology. S.Chand & co.
- Martin, D.W. P.A. Mayes and W.W. Rodwell., Harper & Review of Biochemistry lange Medical Publications.
- Prosser, C.L. and F.A.Brown Comparative Animal physiology. W.B. Saunders.
- Rama Rao, A.V.S.S.. Biochemistry. UBSPD.
- Stryer. L. Biochemistry Wiley International
- Verma, P.S. and V.K. Agarwal.. Animal physiology. S.Chand & co.
- Wilson, J.A., Principles of Animal Physiology, Macmillan
- Chatterjee, C.J; Human Physiology(Vol-I and II)
- Economic Zoology, G.S. Shukla, V.B. Upadhyay (2006)
- Text Book of Applied Zoology, Pradip. V Jabde (2005).
- Mac E. Hadley: Endocrinology, Prentice Hall, International Edition, 2000

B.SC. FINAL, SEMESTER-VI ZOOLOGY

There shall be the following paper and practical for B.Sc. Part-III Semester VI examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory sessions and 25 practical sessions during the complete semester). There shall a compulsory

theory paper of 3 hours duration, as stated below and a practical examination extending for five hours. Every examinee shall offer the following paper of 100 marks (80 for written examination and 20 marks for internal assessment) and a practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

Theory -6 S-ZOOLOGY

(MOLECULAR BIOLOGY AND BIOTECHNOLOGY)

	Marks Allotted
1) Written examination	80
Internal assessment	20
2) Practical:	50
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Total:	150 Marks

Paper- 6 S-ZOOLOGY

(MOLECULAR BIOLOGY AND BIOTECHNOLOGY)

Max. Marks - 100

Total Period - 75

UNIT – I : Genetic material-definition, Experiments to prove DNA as genetic material:Griffiths transformation experiments with bacteriophage infections, Avery and co-workers experiments, and Hershey and Chase experiment. Chemistry and types DNA(A,B,Z)Mitochondrial DNA; Chemistry, types and function of RNA: mRNA, tRNA and rRNA and Non Genetic RNA.

UNIT - II : DNA replication: semi conservative method; experiment by Messelson and Stahl.

Concept of genes, one gene one enzyme hypothesis, one gene one Polypeptide theory.; A brief account of Concept and action of cistron, split genes, overlapping genes, jumping genes, Genetic diseases: Spinocerebellar ataxia.

UNIT–III : Genetic code and its features, Protein synthesis-transcription and processing of mRNA, translation-different steps, Gene regulation: (promoter and operator), Operon models, and Lac-operon model of E.Coli. Genetic regulation in Eukaryotes-Britten Davidson Model.

UNIT–IV : Mutation: Definition-mutation theory of DeVries-different types of mutations, - molecular basis of mutation:

substitution and frameshift mutations, chromosomal aberrations-structural(deletion, addition, inversion and translocation),numerical (euploidy and aneuploidy). Natural and induced mutations-significance of mutations.

DNA repair process.

Polymerase chain reaction (PCR). Southern, Northern and Western blotting techniques, DNA finger printing.

UNIT – V : Biotechnology:. Genetic Engineering: Recombinant DNA technology and gene cloning-enzymes in recombinant DNA technology, Splicing and cloning of genes, vectors (plasmid and phage vectors), gene Transfer. Somatic cell hybridization, hybridoma technology, and monoclonal antibodies. Practical applications and suspected hazards of biotechnology and genetic engineering in animals.

UNIT-VI : Immunology: Introduction to immune system: Innate and adaptive immunity, Types and production of immune cells ; Complement system.

Humoral Immunity: Antigen and haptens, Antibody: types function, and production.

Cell mediated immunity: T-cell receptors, T helper cell and lymphocyte activation

Role of cytotoxic T-cell..ELIZA Technique RIA.

Practicals:

1. Microtechnique scope and importance.
2. Preparation of fixatives - Alcohol, Acetone, Formalin, Bouin's fluid, Cornoy fluid, Formal sublimate.
3. Collection of various tissues/organs from slaughter house for micro-technique
4. Preparation of Alcoholic grades, dehydration and clearing of tissues
5. Use and care of Oven
6. Embedding and block making, trimming of block.
7. Use and Care of different types of Microtome.
8. Honing and stropping Knives
9. Section cutting and spreading,

10. Preparation of various stains -Borax carmine Acetocarmin, Aceto-orcein, Haematoxyline, eosin.
11. Staining of the sections, (Double Staining), mounting.
12. Camera Lucida. Use and Drawings
13. Oculomicrometer scale/ similar micro-measurements use
14. Introduction to models of PCR, Southern blotting through available resources.
15. Vital Staining of mitochondria by using Janus, Green B stain.
16. Extraction of DNA by using salt, detergent and enzymes from natural sources from any animal tissue / plant material
17. Study of Operon models through available resources.
18. Application of DNA finger printing through available resources.

Distribution of marks for practical examination:

Time: 5 Hrs.	Marks
01 Microtechnique.	
a) Trimming and Section cutting of the Paraffin blocks	05
b) Spreading of ribbons.	05
c) Staining of the given slide	10
c) Use of camera Lucida/ Ocular micrometer scales	05
02. Any one practical based on Sr.14 to 18 of the practical list	10
03. Permanent slides submitted by the examinee (5 Slides)	05
04. Class record duly signed by teacher incharge and certified By H.O.D.	05
05. Viva - voce	05

Total Marks 50

REFERENCES

1. Friefelder. D. Microbial Genetics; Narosa Publishing, New Delhi.
2. Goodenough, U. Genetics. Saunders Coolege Publishing International, New York.
3. Klug, W.S. and M.R.Cummings. Concepts in Genetics; Charles E.Merrill Publishing Co. London.
4. Kumar, H.D. Molecular biology and biotechnology. Vikas Publishing House, New Delhi.
5. Lewin, B.. Gene VI. Wiley Eastern Ltd., New Delhi.
6. Rothwell, N.V. Human Genetics. Prentice Hall of India, New Delhi.
7. Sinnott, E. W.L.C.Dunn, and L.C.Dobzhansky, T. 1985. Principles

- of Genetics. Tata McGraw Hill. New Delhi.
8. Stern, C. Principles of Human genetics. S.Chand & Co. New Delhi.
9. Verma, P.S. and V.K. Agarwal.. Genetics. S.Chand & Co. New Delhi.
10. Balasubramania, D., Concepts in Biotechnology. Unversity Press (India) Ltd., Hyderabad.
11. Chopra, V.L and A.Nasim,. Genetic Engineering and Biotechnology. Oxford & I BH, New Delhi.
12. Dharmarajan, M. Genetic Engineering S.viswanathan & Co.
13. Dubey, R.C.1995. Text book of Biotechnology. S.Chand & Co.
14. Glick, B.R. J.J. and Pastermak. 1998. Molecular Biotechnology. SSM Press, Washington.
15. Gupta, P.K. Elements of Biotechnology. Rastogi Publications, Meerut.
16. Jogdand, S.N. Advances in Biotechnology. Himalaya Publishing, New Delhi.
17. Kumar, H.D.. A text book on Biotechnology. East West Affiliated Press Ltd.
18. Proter, D.G. Ethical scores for animal experiments. Nature 356: 101-102.
19. Primrose, S.M. Modern Biotechnology. Blackwell Scientific Publishers, Oxford.
20. Trevan, M.D. Biotechnology: The Biological principles. Tata McGraw Hill Publishing Co., New Delhi.
21. Trehan, K. Biotechnology. Wiley eastern ltd., New Delhi.
22. Vijayaraman, K.S.Chellammal and P.Manikili. 1998. Uyiriyathozhilnutpam. Chimeeraa, Tiruchy.
23. AM. Pearson & TA Gillett (1996) Processed Meats,
24. W.J. Stadelman, V.M. Olson, GA. Shemwell & S. Pasch S.
25. Egg and poultry meat processing,
26. Bremner (2002) Fish as Food, Vol 1 & 2, HA
27. Ivan Roitt: Essential Immunology (6th Ed.) Oxford, Backwill, Science publication London.
28. Elgert: Immunology understanding the immune system, John Willy & Sons, Inc. publication, New York.

B.Sc. Final year (Semester V)

11 : STATISTICS

The examination in Statistics of fifth semester will comprise of one theory paper each, internal assessment and practical examination.

Theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The distribution of marks for practical will be as follows:

1. Practical Record	08 Marks
2. Practical Viva voce	12 Marks
3. Practical Problems	30 Marks

The following syllabi is prescribed on the basis of six lectures per week and six practical periods per batch per week. Each theory paper has been divided into six units. There shall be one question in every unit with internal choice (either or type) for each of 12 marks and one compulsory question covering entire syllabus of fifth semester of 8 marks.

5S-STATISTICS

Unit I : Statistical Quality Control

- 1.1: Importance of statistical methods in industrial research and practice.
- 1.2: Determination of tolerance limits.
- 1.3: General theory of control charts, causes of variation in quality, control limits, summary of out of control criteria.
- 1.4: Control charts for variables - X bar and R Chart.
- 1.5: Control charts for attributes- np charts, p-chart and c-chart.

Unit II : Acceptance Sampling Plan

- 2.1: Problem of lot acceptance, stipulation of good and bad lots, producer's risk and consumer's risk.
- 2.2: Single sampling plans and their OC functions.
- 2.3: Double sampling plans and their OC functions.
- 2.4: Concept of AQL, LTPD, AOQL, average amount of inspection and ASN function.

Unit III : Basic Econometrics

- 3.1: Theory of consumer behaviour.

- 3.2: Utility functions.
- 3.3: Indifference curves.
 - 3.3.1 Cardinal approach
 - 3.3.2 Ordinal approach
- 3.4: Partial elasticities of demand.
- 3.5: Income distribution Pareto Curve
- 3.6: Concept of Auto regressive models.

Unit IV : Sample Surveys

- 4.1: Sample surveys-Concept of population and sample, need for sampling, sampling unit and sampling frame.
- 4.2: Principal steps in sample surveys, census survey, advantages of sample survey over census survey.
- 4.3: Sampling and non sampling errors.
- 4.4: Types of sampling and limitations of sampling.
- 4.5: Simple random sampling, properties of SRS, methods of selecting a random sample, merits and limitations of SRS.
- 4.6: Concept of srswor and srswr, theorems on sample mean, sample variance and sample mean square, comparison of srswor and srswr.

Unit V : Stratified Random Sampling

- 5.1: Concept of stratified random sampling and its advantages.
- 5.2: Mean and variance of stratified sample mean.
- 5.3: Various allocations in stratified sampling and their corresponding sample sizes.
- 5.4: Comparison of various allocations with SRSWOR.

Unit VI : Systematic sampling and Cluster Sampling

- 6.1: Concept of systematic sampling with examples.
- 6.2: Mean and variance of systematic sample mean.
- 6.3: Comparison of systematic sampling with srswor and stratified random sampling.

- 6.4: Comparison of systematic sampling with srsor and stratified random sampling for a population with linear trend.
- 6.5: Concept of cluster sampling.
- 6.6: Mean and variance of cluster sample mean with equal cluster size.

References:

1. Brownlee K.A.(1960): Statistical Theory and Methodology in Science and Engineering, John Wiley and Sons.
2. Grant E.L.(1964):Statistical Quality Control, Mc Graw Hill.
3. Duncan A.J.(1974): Statistical Quality Control and Industrial Statistics, Taraporewala and Sons.
4. Damodar Gujrathi : Basic Econometrics
5. J.M.Henderson & R.E. Quandt : Microeconomics.
6. A. A.Walter : An Introduction to Econometrics
7. Gupta S.C. and Kapoor V.K.: Fundamentals of Applied Statistics, Sultan Chand and Sons.
8. Murthy M.N.(1967): Sampling Theory and Methods, Statistical Publishing Society, Calcutta.
9. Sampath S. (2000): Sampling Theory and Methods, Narosa Publishing House.
10. Sukhatme B.V. (1984) : Sample Survey Methods and its Applications, Indian Society of Agricultural Statistics.
11. Des Raj (2000): Sample Survey Theory, Narosa Publishing House.
12. Singh D. Chaudhary F.S.: Theory and Analysis of Sample Survey Designs.
13. Primal Mukhopadhyaya: Theory and Methods of Survey Sampling, Prentice Hall.
14. Sukhatme P.V. and Sukhatme B.V. : Sampling Theory of Surveys with Applications.

List of Practicals: (5S Statistics)

1. Construction of control charts for variables.
2. Construction of control charts for attributes.
3. Drawing of OC curve for single sampling plan.
4. Drawing of OC curve for double sampling plan.
5. Drawing a random samples by Random number method.
6. Estimation of population mean and variance using simple random sampling.

7. Estimation of population mean and variance using various allocations of stratified random sampling.
8. Estimation of population mean and variance using systematic sampling.
9. Estimation of mean and variance using cluster sampling.
10. Calculation of various elasticities of demand.
11. Utility functions.
12. Estimation of single equation linear regression model.

Note : The above practicals may be performed by using various statistical softwares.

List of equipments and instruments required for a batch of students in U.G. statistics laboratory.

1. Twelve digit desk model electronic calculators.	20
2. Biometrika tables Vol.I and Vol. II	02
3. Seven figure logarithmic tables	10
4. Statistical tables (compiled)	10
5. Personal computer with printer	05
6. Random number tables	10
7. Statistical poster and chart	02
8. Statistical softwares like SPSS, SAS, MS Excel and R	

B.Sc. Final year (Semester VI) 6S : STATISTICS

The examination in Statistics of sixth semester will comprise of one theory paper each, internal assessment and practical examination. Theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The distribution of marks for practical will be as follows:

1. Practical Record	08 Marks
2. Practical Viva voce	12 Marks
3. Practical Problems	30 Marks

The following syllabi is prescribed on the basis of six lectures per week and six practical periods per batch per week. Each theory paper has been divided into six units. There shall be one question in every unit with internal choice (either or type) for each of 12 marks and one compulsory question covering entire syllabus of fifth semester of 8 marks.

6S-STATISTICS**Unit-I : Linear Programming**

- 1.1: Convex sets and their properties.
- 1.2: Definition of general LPP, mathematical formulation of LPP with examples.
- 1.3: Examples of LPP, problems occurring in various fields.
- 1.4: Slack, surplus and artificial variables.
- 1.5: Graphical and simplex method of solving LPP.
- 1.6: Concept of duality of LPP with examples.

Unit-II : Transportation Problem (T.P.)

- 2.1: Definition and example of a T.P., mathematical formulation of a T.P.
- 2.2: Existence of feasible solution to a T.P., matrix form of a T.P., the transportation table, loops in a T.P.
- 2.3: The initial basic feasible solution, transportation problems with non degenerate and balanced cases only.
- 2.4: Methods to find initial basic feasible solution to a T.P.
 - 2.4.1: The North-West corner rule
 - 2.4.2: The Row Minima method
 - 2.4.3: The Column Minima method
 - 2.4.4: Matrix Minima method
 - 2.4.5: Vogel's Approximation method.

Unit III : Assignment Problem (A.P.) and Sequencing Problem and theory of games.

- 3.1: Definition and example of a A.P., mathematical formulation of a A.P.
- 3.2: Hungarian assignment algorithm.
- 3.3: Sequencing problem with n jobs and 2 machines.
- 3.4: Introduction to theory of games, two person zero sum games, the maximin - minimax principle.

- 3.5: Definition of a saddle point, games with saddle points.

Unit-IV : Analysis of Variance (ANOVA)

- 4.1 Introduction to ANOVA.
- 4.2: One way classification and its analysis.
- 4.3: Two way classification with one observation per cell.
- 4.4: Two way classification with multiple but equal number of entries per cell.

Unit –V : Design of Experiments

- 5.1: Introduction to design of experiments, need for design of experiments.
- 5.2: Fundamental principles of design of experiments:
 - 5.2.1: Replication
 - 5.2.2: Randomisation
 - 5.2.3: Local Control
- 5.3: Uniformity trials.
- 5.4: Analysis of Completely Randomised Design (C.R.D.).
- 5.5: Analysis of a Randomised Block Design (R.B.D.).
- 5.6: Comparison of C.R.D. with R.B.D. in terms of efficiency.

Unit –VI: Latin Square Design (L.S.D.) and Factorial Experiments

- 6.1: Concept and complete analysis of L.S.D.
- 6.2: Efficiency of LSD as compared with CRD and RBD.
- 6.3: Introduction of Factorial Experiments, its purpose, need and advantage.
- 6.4: Definition of contrast and orthogonal contrast .
- 6.5: Analysis of 2^2 and 2^3 factorial experiments, computation of main effects and interaction effects, Yates's method (up to three factors).

References:

1. Gauss S.L. (1975): Linear Programming Methods and Applications, Mc Graw Hill.
2. Taha H.A.(1989): Operations Research: An Introduction, Macmillan Publishing Company.
3. Kantiswaroop, Manmohan, Gupta: Operations Research.
4. Goyal and Mittal: Operations research.

5. S.C.Gupta, V.K. Kapoor: Fundamentals of Applied Statistics, Sul-tan Chand and sons.
6. Cochran W.G and Cox G.M.(1957): Experimental Designs, John Wiley and Sons.
7. Das M.N. and Giri (1986):Design and Analysis of Experiments, Springer Verlag.
8. Goon A.N., Gupta M.K. , DasGupta B.(1986): Fundamentals of Statistics, Vol.II, World Press Calcutta.
9. Kempthorne O. (1965):The Design and Analysis f Experiments, Wiley Eastern.
10. Clark: Statistics and Experimental Designs.

List of Practicals : (6S Statistics)

1. Solution of LPP by graphical method.
2. Solution of LPP by simplex method.
3. Computation of initial basic feasible solution to transportation problem by various methods.
4. Problems on assignment problem.
5. Problems on sequencing problem with n jobs with two machines.
6. Problems on two-person zero sum games with saddle points.
7. ANOVA: One way classification.
8. ANOVA: Two way classification with one observation per cell.
9. ANOVA: Two way classification with multiple but equal number of observations per cell.
10. Analysis of completely randomised design.
11. Analysis of randomised block design.
12. Analysis of Latin square design.
13. Analysis of 2^2 and 2^3 factorial experiments arranged in RBD.

Note : The above practicals may be performed by using various statistical softwares.

List of equipments and instruments required for a batch of students in U.G. statistics laboratory.

- | | |
|--|----|
| 1. Twelve digit desk model electronic calculators. | 20 |
| 2. Biometrika tables Vol.I and Vol. II | 02 |
| 3. Seven figure logarithmic tables | 10 |
| 4. Statistical tables (compiled) | 10 |
| 5. Personal computer with printer | 05 |
| 6. Random number tables | 10 |

7. Statistical poster and chart 02
8. Statistical softwares like SPSS, SAS, MS Excel and R

12 : COMPUTER SCIENCE

5S-COMPUTER SCIENCE RDBMS AND VISUAL BASIC

UNIT-I : Fundamental of DBMS : Architecture of a database system,, data independence, database models; Relational Hierarchical, network; data dictionary.

UNIT-II: Relational Model : Relations, Domains and Attributes keys, E-R diagrams, Reducing E-R diagrams to tables, function dependency, Normalization Process, Normal forms : 1NF, 2NF, 3NF, 4NF, BCNF.

UNIT-III : Introduction to SQL : Components of SQL, data types, operators, DDL Commands : CREATE, ALTER, DROP, for tables & views. DML Commands : SELECT, INSERT, DELETE & UPDATE; Clauses : ORDER BY, GROUP BY and HAVING;

UNIT-IV : Introduction to Visual Basic : Visual programming, event driven programming, VB Environment : New Project window, property window, Form layout window, toolbar, menu bar, tool box, form window;
Managing Control : Form properties, pointer tool, label control, text box, command button, picture box, image control, event procedure.

UNIT-V : Creating Menus : Application wizard for menu, menu editor, creating menu, adding code to menus, data types & variables.

Operators : Conditional operators, logical operators, control structures : If-else, Nested If else, select case, goto, do loop, for loop, nested for loop.

UNIT-VI : Introduction to Internal Functions : MsgBox(), named constant, default buttons, specifying icons.

Input box(), title, caption; using check box and option button in form.

VB Programmes : Private and public procedure, passing data by reference and value, passing control as arguments.

Internal Functions : Numeric functions, data type functions, string functions, special functions.

Books Recommended :

1. An introduction to database system, C.J.Date - Narosa Publication.
2. Database Management System : Mujumdar and Bhattacharya-TMH.
3. Essential of Oracle - Tom Lewis.
4. Oracle the Complete Reference - Koch & Loney.
5. Visual Basic 6.0 in 21 days - Greg Perry, Techmedia.
6. VB Guide 6.0, Black Book, Peter Norton, Techmedia.
7. Mastering VB 6.0 , Evangelous Petroustos, BPB.

Practicals :

Group A - Minimum 8 Practical based on RDBMS.

AND

Group B - Minimum 8 Practical based on VB.

Study Tour : Study tour may be arranged to Computer Industry or Software development, Organisation or Software Technology Park or IT Park.

Software : Software's legal version based on syllabus.

Hardware : (1) A minimum 10 (Ten) Computer system per batch and with latest specification.

(2) Minimum 2 laser printer.

(3) Internet facility with Broad Band connections.

B.SC. FINAL COMPUTER SCIENCE

SEMESTER-VI

6S-COMPUTER SCIENCE

PL/SQL AND ADVANCED VISUAL BASIC

UNIT-I : Data Integrity, types of integrity constants.

Functions : Number Functions - AVG, MAX, MIN, SUM, COUNT, TO-NUMBER, GREATEST, LEAST, ABS, MOD, FLOOR, CEIL, TRUNC, SQRT, SIGN, SIN, COS, LOG, EXP.

Character Function : INITCAP, LOWER, UPPER, INSTR,

LENGTH, LTRIM, RTRIM, LPAD, RPAD, SOUNDDEX, DECODE.

Joins and Unions : Self, equi and outer join, unions and intersection.

UNIT-II: PL/SQL : Features and block structure, variables and constant, data types, control structure.

Cursor : Concepts of cursor, types, declaring, opening, using cursors, fetching data, closing a cursor, cursor attributes.

Transaction : Rollback, commit and autocommit, save point, rollback segment.

UNIT-III : Securities of Database : Users, creating users, roles, creating roles, types of privileges, GRANT and REVOKE command, data locks.

UNIT-IV : Dialog Box Control : Need for dialog box control, adding the dialog box control, producing the color dialog box control, handling the cancel button, producing the font dialog box, producing the open dialog boxes, producing file save dialog boxes, producing the print dialog boxes.

Mouse and Control : Mouse response, list box controls, combo box control, timer control, working with arrays, declaring arrays, multiple list boxes.

UNIT-V: Working with Forms : Form collections, accessing the form collection using the subscripts, the count property, uploading forms, placing text on forms, format with print, positioning the print method, multiple forms, placing tool bars on forms.

UNIT-VI : Working with Files : Open statement, file modes, locking the file, close statement, working with sequential access file, print# statement, input# statement, write# statement, working with random access file, put statement, get statement, defining user defined data types, file control, file related commands.

Books Recommended :

1. Database Management System, Mujumdar & Bhattacharya, TMH.

2. Oracle the Complete Reference, Koch & Loney, TMH.
3. Understanding Oracle, Perry and Latic, BPB.
4. Essential of Oracle 8, Tom Lewis.
5. Visual Basic 6.0, The Complete Reference, Noel Jerke, TMH.
6. Guide VB 6.0 Black Book, Peter Nortan Techmedia.
7. Mastering VB 6.0, Evangelos Petroutsos, BPB.
8. Visual Basic 6.0 in 21 days, Greg Perry, Techmedia.

Practicals :

Group A - Minimum 8 Practical based on Unit-I, II, III.

AND

Group B - Minimum 8 Practical based on Unit-IV, V, VI.

B.Sc. Final Year

13 : COMPUTER APPLICATION/ INFORMATION TECHNOLOGY

Semester –V

Paper : 5S: Programming in C#

UNIT-I : Introduction to C # : Evaluation of C#, characteristics of C#, application of C#, difference between C++ and C#, Introduction to C# environment : The .NET strategy, the origins of the .NET technology, the .NET framework, .NET, .NET languages, benefits of the .NET approach, C# and .NET.

UNIT-II: Overview of C#: Programming structure of C#, editing, compiling and executing C# programs, namespace, comments, using aliases for namespace classes, using command line argument, maths function.

Literals, variables and data types : literals, variables, data types, value types, reference type, declaration of variables, initialization of variables, default values, constant variables, scope of variables, boxing and unboxing.

UNIT-III: Operators and expression : arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, Bitwise operators, special operators, arithmetic expressions, evaluation of expression, precedence of arithmetic operators,

type conversions, operator precedence and associativity, mathematical functions.

Decision making and branching : if statement, if...else statement, nesting of if...else statement, the else if ladder, switch statement, the ?: operator, Decision making and looping : while statement, do statement, for statement, for each statement, jumps in loops.

UNIT-IV : Methods in C# : declaring methods, the main method, invoking methods, nesting of methods, methods parameters, pass by value, pass by reference, the output parameters, variable arguments list, method overloading, Arrays : 1-D array, creating an array, 2-D array, variable size arrays, the system, array class, array list class, String handling : creating strings, strings method, inserting strings using systems, comparing strings, finding substrings.

UNIT-V : Structures and enumeration: structures, structs with methods, nested structs, difference between classes and structs, enumerations, enumerator initialization, enumerator type conversion, common program errors, Classes and Objects : Basic principles of OOP, class, objects, constructors, static members, static constructors, private constructors, copy constructors, destructors, member initialization, the this reference, nesting of classes, constant members, read only members, properties, indexers.

UNIT-VI : Interfaces : Multiple Inheritance : defining an interface, extending an interface, implementing interface, interface & inheritance, explicit interface implementation, abstract class and interface, Operator overloading : overloadable operators, need for operator overloading, defining Operator overloading, overloading unary operators, overloading binary operators, overloading comparison operator. Delegates and Events : Delegate, delegate declaration, delegate methods, delegates instantiation, delegate invocation, using delegates, multicast delegates, events, Managing Console I/O operations : console class, console input, console output, formatted output, numeric formatting, standard numeric format, custom numeric format.

Text Books:-

1. Programming in C# : E. Balguruswamy
2. Mastering in C# : BPB Publication
3. Programming C# : TMH Publication
4. Programming C# : PHI Publication

Practical: Minimum 16 programs should be prepared on above syllabi.

13 : COMPUTER APPLICATION/ INFORMATION TECHNOLOGY

Semester –VI

Paper:

6S: Computer Graphics, Multimedia and Animation

- Unit-I : Overview of Graphics Systems:** Refresh Cathode-Ray Tubes (CRT), Raster-Scan Display, Random-Scan Display, color CRT monitor, Flat-Panel Displays, 3D viewing system, stereoscopic and virtual reality system, raster scan system, graphics monitor and workstations, Input Devices, keyboards, mouse, trackball and spaceball, joysticks, image Scanners, Touch panels, light pen, voice system
- Unit-II : Output Primitives:** Points and lines, line drawing algorithm, DDA algorithm, Bresenham's Line Algorithm, parallel line algorithm, loading the frame buffer, line function, circle generating algorithm, Attributes: line Attributes, line type, line width, pen and brush option, line color, curve Attributes, color and grayscale level, color tables, grayscale
- Unit-III:** Areas fill Attributes, character Attributes, basic transformation, matrix representation, composite transformation: translation, rotation and scaling
- Unit-IV : Introduction to Multimedia:** What is multimedia, multimedia and hypermedia, overview of multimedia, software tools: music, sequencing and notation, digital audio, graphics and image editing, video editing, Animation, multimedia authoring, file format: GGIF, JPEG, PNG, TIFF, EXIF, graphics, animation files, PS and PDF, Window WMF, Window BMP.
- Unit-V : Multimedia Compression:** IZW, DCT run length coding, JPEG MPEG, Hypertext, MHEG, Hypermedia, Document

architecture, SGML, ooa Augmented and virtual reality and multimedia: Concept, VR devices, VR chair, CCD, VCR, 3D Sound System, head mounted display.

Unit-VI : Animation: Introduction, History of Animation, Anatomy study, Basic Sketching, Introduction to 2D animation, Animation with flash ó Tweening, Motion tweening, Shape twining

Text Books:-

1. Computer graphics ó C Version, Hearn D and Baker M.P, 2nd Edition, Pearson Education
2. Multimedia Computing, Communications and Applications, Ralf Steinmetz, Klara Steinmetz, Pearson education, 2004.
3. Multimedia in Practice: Technology and Application ó Judith (PHI)
4. Fundamental of Multimedia by DREW-Pearson (Practical Approach)
5. Multimedia : Making it Work: T. Vaughan
6. Multimedia programming : Siamon J. Gibbs and Dionysios C. Tsichritzis, Addison Wesley, 1995.
7. Multimedia Graphics : John Villamil, Casanova and Leony Fernandez, Eliar, PHI, 1998.

Practical: Minimum 16 programs should be prepared on above syllabi.

B.SC. FINAL, SEMESTER-V

14 : COMPUTER APPLICATION (VOCATIONAL)

5S- COMPUTER APPLICATION (VOCATIONAL)

JAVA and ASP Programming

UNIT-I : Object Oriented Programming Paradigm, Basic Concepts of OOPs, Benefits and applications of OOPs.

Introduction to JAVA : History, Benefits and Applications, features, Java environment, Java Byte codes, Java virtual machine, Security Platform independence and portability, Java Support System.

UNIT-II: Java character set, keywords, Identifiers, constants, variables, operators and expressions, separators, Data types, Type conversion and casting.

Java Statements : Assignment statements, control statements, structure of Java program.

Methods of Java programming : Application (main) and applet methods, simple Java program.

UNIT-III: Classes, defining a class, adding variables and methods, creating objects, accessing class members, constructors, the `this` keyword, Garbage collection. The `finalize()` method, method overloading, static members, inheritance, method overriding, abstract methods and classes.

UNIT-IV: HTML : Introduction, Components, editor, entering Tags and attributes, Document structure tags : HTML, HEAD, TITLE, BODY tags; Text Formatting : Headings, BLOCKQUOTE, PRE, CODE, FONT tags, LIST tags : Unordered & ordered list, Table formatting tags; TABLE, TR, TH, TD tags; Anchor tags, Image tag.

UNIT-V : ASP : Introduction, Dynamic web pages, necessity, scripting languages : Server-side and client-side scripting, data types, variables, constants, operators, decision making and looping structure, functions, GET, POST.

UNIT-VI: Object : Introductions : Object terms - Instances & classes, properties, methods, events, encapsulation; Request object, request object collections : Form, Query string, Server variables collection; properties and methods; Response Object : Introduction, creating and managing output / information, content expiration and caching, redirection.

Books Recommended :

1. The Complete Reference JAVA2 by Herbert Schildt (Tata McGraw)
2. The Complete Reference JAVA by Patrik Noughton
3. Programming with JAVA - A Primer : By E.Balguruswamy (Tata McGraw)
4. Beginning ASP 3.0 : Chris Ulman, David Buser, Jon Drukelt, Shroff Publisher & Distributors P.L.
5. ASP3 Programming : Eric A Smith - Wiley Publication.

Practicals :

- 1) Computer Lab : Minimum 16 practicals based on above syllabus.
- 2) Softwares legal versions based on syllabus.

**B.SC. FINAL, SEMESTER-VI
COMPUTER APPLICATION (VOCATIONAL)
6S- COMPUTER APPLICATION (VOCATIONAL)**

ADVANCED JAVA AND ASP

UNIT-I : Array : Declaration and initialization of one dimensional and multidimension arrays, strings, different operations on arrays.

Packages : Introduction, Java API packages, creating accessing & using a package, adding a class to a package.

UNIT-II: Multithreading : Introduction, creating threads & multiple threads.

Error and Exception Handling : Introduction, Fundamental of exception handling, types of errors, types of exceptions, uncaught exception, using try and catch, multiple catch clauses, nested try statement, built-in exceptions, creating your own exception.

UNIT-III : Applet Programming : Applet basics, difference between applets and applications, writing applets, applet code, applet life cycle, creating an executable applet, and applet tag, running the applets.

UNIT-IV : Cookies : Introduction, creating, modifying and deleting, Applications Objects : Object Collection, object methods.

Session Object : Collection, properties and method.

UNIT-V: Global.asa file : Creating application event code and session event code, declaring object.

Error Handling : Types of error - Syntax error, logical error, ASP error, Debugging ASP script, using write and conditional tracing.

UNIT-VI : ASP Components : Server object, AD Rotator component, content linking component.

Introduction to Oledb and Odbc : Connection object and record set and field object command and parameter object.

Books Recommended :

1. Programming in JAVA : By S.S.Khandare (S.Chand)
2. Teach Yourself -Javaøin 2 Hrs : By Sams.
3. Java for You : By P. Koparkar
4. OOP with C++ by E.Balguruswamy.
5. Mastering HTML 4.0 - D.S.Ray, E.J.Ray, BPB.
6. Active Server Pages 3.0, N.Chare (Que)

Practical : Minimum 8 practical based on above syllabus.

Project : The student have to carry out a mini project work, with group of maximum 03 students at department and project report should be prepared of the same.

B.Sc. Final Year, Semester-V
15. ELECTRONICS

General Provisions/Instructions**Part A**

- (i) The Examination in Electronics of each semester shall comprise of one theory paper of 80 marks of three hours duration and internal assessment of 20 marks.
- (ii) Theory paper of each semester shall comprise of six units. Each unit shall be completed in maximum 15 teaching periods of 48 minutes duration.
- (iii) There shall six questions of twelve marks on each unit with alternate choice and One compulsory question (08 subquestions of 01 mark each) of 08 marks covering syllabi of all units (short answer type).

Part B

- (i) The Practical examination of each semester of the B. Sc. (Electronics subject) shall be of 50 marks of 4 hours duration and shall be held at the end of each semester at the places as decided by the university.
 - (ii) Distribution of 50 marks assigned to practical for (Semester I to V) is as under-

1. Experiment	: 30 Marks
(Construction, testing and performance)	
2. Practical record	: 10 Marks
3. Viva-voce	: 10 Marks
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- Total : 50 Marks**
- (iii) Distribution of 50 marks assigned to practical for semester VI is as under-

1. Programming (Writing and execution) : 10 Marks
2. Project (Experimental) : 10 Marks
3. Project Report and Seminar : 10 Marks
4. Record : 10 Marks
5. Viva-voce : 10 Marks

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Total : 50 Marks

- (iv) Project will be given to a group of not more than four students.
- (v) Teacher may adopt any innovative practice for demonstration of practicals on the aspects given.
- (vi) College/ Department may prepare laboratory manuals of experiments

Semester-V
5S-Electronics
Measuring Instruments

Unit I : Basic Instrumentation:

Block diagram of generalized instrumentation system, Concept of transducers (Primary and secondary, active and passive, analog and digital). Resistive transducer - potentiometer, Inductive transducer - LVDT, capacitive transducer (by changing distance), measurement of displacement using capacitive transducer (By changing dielectric).

UNIT II: Measurement of Temperature:

Thermocouple, Thermopile, Thermister, RTD, Total Radiation Pyrometer, IC DS 1621 ,IC LM34 , IC LM35 , Infrared Pyrometer,

UNIT III: Timer and PLL:

IC 555 timer: Block diagram and function of each block, application of 555 timer as astable, bistable and monostable multivibrator (construction, working and expression for time period).

PLL Block diagram and function of each block, concept of capture range, pull in time, lock in range, electrical

characteristics, applications of PLL as FM demodulator, AM detector and frequency synthesizer.

UNIT IV: Display, digital Instrument and recorder:

Seven segment, 14 segment, dot matrix, 16x2 LCD display, advantage and disadvantage, Digital instrument: Digital frequency meter, Digital voltmeter (Ramp type), Digital capacitance meter (Block diagram and function of each block) .

Recorder: Classification, necessity of recorder, XY recorder, magnetic tape recorder.

Unit V : Sensors and Actuators:

Sensors: Definition, Methods of fabrication of Sensors, Types of sensors (Mechanical, Thermal, Optical, magnetic, chemical)

Actuators: Definition, Working principles of Electromechanical, Electro thermal, Electro-optical and Electrochemical Actuators.

UNIT VI: Biomedical electronics:

Introduction, Type of electrode, EEG, EMG, ECG-block diagram and function of each block, X ray machine, instantaneous heart rate meter-systolic and diastolic blood pressure meter, EAR oximeter, pulse Oximeter, range gated pulse Doppler blood flow meter, Laser Doppler blood flow meter.

Books Recommended:

1. Electrical and electronics measurement and Instrumentation by A.K. Sawhney
2. Linear integrated Circuits by Ramakant Gaikwad
3. Biomedical instrumentation by R.S.Khandpur

Practicals: Minimum Ten experiments at least one on each of the following aspects.

1. LVDT , displacement measurement using C transducer , pot meter.
2. Temp measurement using thermister,RTD, LM34 ,LM35 .
3. Astable , monostable , bistable using IC555 .
4. FM demodulator ,AM detector using PLL .

5. 16 x 2 LCD display , seven segment display and other display devices .
6. Sensors and actuators and its applications .
7. ECG , EMG, EEG , heart rate meter ,oximeter etc .

Semester VI 6S-Electronics Advance Microprocessor and Microcontroller

UNIT I : 8086 Architecture:

Block diagram of 8086 microprocessor, BIU and EU, operating modes of 8086, register of 8086-G.P.R,pointer and index register, segment register, concept of segmented memory, instruction pointer, status flag, pin diagram of 8086 microprocessor, physical and effective address.

UNIT II: Instructions and programming of 8086

Instructions: MOV, PUSH, POP, LEA, LDS, LES, Arithmetic & Logic Instructions. Addressing mode, 8086 instruction, Bus cycle, Programming: programs of data transfer, addition, subtraction, division, multiplication using various addressing mode.

Unit-III : 8051 Microcontroller Architecture :

Microcontroller Introduction, Difference between Microprocessor and Microcontroller, block diagram of microcontroller, CPU, registers, flags, PSW, PC, Data Pointer, SFR, SP, Internal RAM/ROM, External memory, I/O ports, counter & timers, interrupts.

Unit-IV:Instruction set of 8051 and Programming:

Addressing mode, Instruction set: Data transfer, arithmetic, logical operation, JUMP, Loop and CALL instructions. Assembly language programming examples: simple data transfer, arithmetic, logical and single bit.

Unit-V : 8051 Interfacing & Application

Basics of serial communication, interfacing with RS-232C, SCON and PCON registers, interfacing a DAC / ADC and

UNIT-II: DNA Replication

DNA Replication in prokaryotes-conservative, semiconservative and dispersive types, experimental evidence for semiconservative replication. DNA polymerases, other enzymes and protein factors involved in replication. Mechanism of replication. Inhibitors of DNA replication.

Transcription

Transcription in prokaryotes, RNA polymerase, promoters, initiation, elongation and termination of RNA synthesis, inhibitors of transcription, Reverse transcriptase, post-transcriptional processing of RNA in eukaryotes.

UNIT-III : Translation and Regulation of Gene Expression

- a. Genetic code : Basic features of genetic code, biological significance of degeneracy. Wobble hypothesis, gene within genes and overlapping genes.
- b. Mechanisms of translation : Ribosome structure, A and P sites, charges tRNA, f-met-rRNA, initiator codon, Shine-Dalgarno consensus sequence (AGGA), formation of 70S initiation complex, role of EF-Tu, EF-Ts, EF-G and GTP, non-sense codons and release factors, RF-1 and RF-2.
- c. Regulation of Gene Expression in prokaryotes : Enzyme induction and repression, operon concept, Lac operon, Trp operon.

UNIT-IV : Basic Concepts of recombinant DNA technology & Nucleic Acid Sequencing.

- a. r DNA technology, vectors.
- b. Nucleic acid hybridization.
- c. Sequencing : Restriction and modification system; sequencing of DNA and RNA.

UNIT-V: Basic Animal Biotechnology

- a. History of Development of Cell cultures. Importance of growth factors of the serum, primary cultures, secondary cultures. Transformed animal cells ó

established continuous cell lines, commonly used animal cell lines their origin and characteristics. Growth kinetics of cell in culture.

- b. Applications of animal cell cultures for studies on gene expression. Organ culture.

UNIT-VI : Basic Plant Biotechnology

- a. Tissue cultures, introduction and history. Media preparation and compositions. Totipotency and cell suspension culture. Use of growth regulators. Practical applications of tissue culture.
- b. In-vitro techniques in tissue culture. Induction of callus, ovary and ovule cultures, invitro pollination and fertilization. Practical applications of genetic transformation in plants.

Practicals :-**A) Molecular Biology :**

- 1) Extraction of RNA
- 2) Estimation of RNA by Orcinol method.
- 3) Extraction of DNA
- 4) Estimation of DNA by Diphenyl method.

B) Biotechnology :

- 1) Immobilization of yeast cells.
- 2) Production of alcohol by utilizing immobilized yeast cells.
- 3) Estimation of alcohol by Iodometric method.
- 4) Development of plant tissue callus.

List of Books Recommended :

- 1) Molecular Biology of Gene (Latest Edition) by J.D.Watson Hopkins Robertis, Sertz, Weiner.
- 2) Genetics by Sandhya Mitra (TMH Publication)
- 3) Gene VII by Lewis (Oxford)
- 4) Gene Structure and Expression by John D. Hawkins (Cambridge)
- 5) Plant Biotechnology S.Ignacimuthu S.J. (Oxford & IBH)
- 6) Gene Structure by Hawkins (Cambridge.)
- 7) Biotechnology ó Application & Research edited by Paul Chere misinoff and Robert Ouellete (Technomic Publications)
- 8) An Introduction to Plant Tissue and Cell Culture Emkay Publication.

- 9) Essentials of Molecular Biology : D.Freifelder
 10) Plant Cell, tissue and organ culture (ed) J.Reinert & YSP Bajaj.

6S BIOCHEMISTRY IMMUNOLOGY AND CLINICAL BIOCHEMISTRY

The examination in Biochemistry will comprise of one theory paper and one practical. Theory paper shall be of three hours duration and shall carry 80 marks each. The internal assessment will carry 20 marks. The practical examination shall be of six to eight hours duration for one day and shall carry 50 marks.

The following syllabus is prescribed on the basis of 6 lectures per paper per week and six practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question on every unit with internal choice for each of 12 marks, one compulsory objective type question on whole syllabus of Semester-VI carrying 8 marks.

Distribution of marks in practical shall be as follows:

1) Two short experiments	- 20 marks (10 each)
2) One long experiment	- 15 marks
3) Viva-voce	- 08 marks
4) Class work and practical record	- 07 marks
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	Total - 50 marks
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- UNIT-I :** A) **Immunology:** Concept of immunity classification, humoral and cellular immunity.
 B) **Antigen:** Definition, factors determining antigenicity, complete antigen, types of antigens.
 C) **Antibodies:** Definition, structure, classification, properties and differences.
- UNIT-II:** **Antigen - Antibody reaction:** Definition, mechanism and application of precipitation, agglutination, complement fixation and toxin - antitoxin reaction, ELISA, RIA.
- UNIT-III:** A) **Monoclonal Antibodies:** Hybridoma technology.
 B) **Complement:** Components, Classical Pathway, Alternative Pathway.

- C) **Allergy and hypersensitivity:** Cell and coombs classification, definition and description of I- IV types of hypersensitivity.

UNIT-IV : **Clinical Biochemistry:**

- A) Basic concepts of clinical biochemistry. Definition and scope of clinical biochemistry in diagnosis. Brief review of units and abbreviations used expressing concentration and standard solution. Quality Control.
 B) Manual versus automation in clinical laboratory, Analyzer-Semi and auto analyser.

UNIT-V: A) Collection and preservation of biological fluids (Blood, serum, plasma, urine and CSF).

- B) Chemical analysis of blood, urine and CSF. Normal values for important constituents (in SI units) in blood (Plasma/serum) CSF and urine
 C) Clearance test for urea and Creatinine.

UNIT-VI : **Clinical Enzymology:**

- A) Definition of functional and non-functional plasma enzymes, isozymes and diagnostic applications of isozymes. Enzyme pattern in health and diseases with special reference to plasma lipase, amylase, choline esterase, alkaline and acid phosphatase, SGOT and SGPT, LDH and CPK.
 B) Hypo and Hyper glycemia, glycogen storage diseases, lipid malabsorption and statorrhea, albinism.

Practicals :-

A) **Clinical Biochemistry :**

- 1) Glucose tolerance test
- 2) Liver function tests (SGPT/SGOT/Alkaline Phosphatase/Serum bilirubin)
- 3) Cardiac function tests (Serum Cholesterol, CPK, Triglycerides, LDL-Cholesterol, HDL-Cholesterol, LDH)
- 4) Kidney function tests (Blood urea, Serum creatinine, Serum Na⁺, K⁺)

B) Immunology :

- 1) Blood Grouping
- 2) HBsAg (Hepatitis/B/C)
- 3) Pregnancy test

List of Books Recommended :

- 1) Immunology by Roitt (Blackwell)
- 2) Cell and Molecular Biology : Darnell Lodish Baltimore.
- 3) Animal Cell Culture : Practical approach : R.J.Freshney.
- 4) Introduction to Practical Biochemistry by Plummer
- 5) Practical Manual in Biochemistry by Jairaman.
- 6) Text Book of Biochemistry and Human Physiology by J.P.Talwar.
- 7) Lehninger Principles of Biochemistry (2000) by - Nelson, Cox, M.M.Macmillan, New York.
- 8) Text Book of Biochemistry by U.Satyanarayana.
- 9) Text Book of Biochemistry by Sucheeta Dandekar.
- 10) Practical Clinical Biochemistry by Hirowled Varle.

**List of Instruments/Equipments/Glass-ware with specification
required for B.Sc. Ist year Second yr. and
Final (Biochemistry)Lab.**

Instruments/Equipments:

Sr. No.	Name	Make	Specification	Quantity
Required				
1.	Photoelectric Colorimeter	Erma Japan J.Mitra Elico, Specol Systronic, Aimil Instrumentation or any one filters.	Single cell with either glass or quartz cuvettes visible range with Coloured	1
2.	pH. Meter	Elico, Systronic J.Mitra	with glass electrode pH Scale from 0 to 14 Resistant to temp. change.	1

3.	Table centrifuge	"Remi Model R-8C" Tempo.	with replaceable Swing out rotor heads. One to hold 8-16 tubes of 15 ml capacity Another head to hold 4 tubes of 50-100 capacity.	1
4.	Incubator	Tempo. Lab.Hosp. Yarco.	Double walled insulated with double doors. (Inner glass door) Tempo upto 60°C with thermostat. Sensitivity +0.5°C Size: 455x605x455 mm.	1
5.	Hot-air Ovan	Yarco Tempo. Lab. Hosp.	Double walled Thermostat temperature regulator. Size: 455x605x455mm.	1
6.	Refrigerator	"Voltas" "Goderj" Allwyn Kelvinator or any make.	Double door with 300 Lit. capacity. having separate freezer.	1
7.	Serological water Bath	"Tempo" " Lab. Hosp" Yarco or any make.	Double walled Thermoregulated. Mix. temp. upto 80°C Size: 12x15x12 with cover.	1
8.	Magnetic Stirrer with Hot	"Tempo" "Remi" Lab Hosp. or any make	2 Lit. Capacity with 500 Wt. temp. regulated or any hot plate.	1
9.	Metal Water Distillation plant	"Remi" "Tempo" Lab.Hosp.	2 Lits/Hr capacity with metal condenser.	1

10.	Thin Layer Chromatography Assembly	--- --- ---	Chamber of Glass Tank Spreader Glass Plates Stage for glass Plates.	1
11.	Hot Plate	"Tempo" "Remi" "Lab. Hosp." or any make.	Round 7 Diameter with 3 way control switch. 1000 watts.	2
12.	Mixer	"Remi" "Sumit" any make.	with 3 jars and timer.	1
13.	Single Pan Balance (Tripple beam)	National Scientific Work VARANASI	100gm. capacity	2
14.	One Pan Electric Balance	Umex Instraments works. VARANASI	100 gm. Capacity. Accury upto 4th decimal of gm.	1
15.	Cyclo-Mixer	"Vortex" "Remi"	For one test tube only	1
16.	Laboratory Microscope	"Olympus" or any make. scope with	Monocular Medicial micro-Sliding stage.	4
17.	Fingure pricking nedle.	"Auto Let" Japan	with Disposable Needler.	2
18.	Haemometer Sahil's	GDR make or Top.	with Comparator Glass, Tube and Hb pippet	2
19.	Neubauer's Counting Chamber.	---	with Bright rullings.	4
20.	RBC Pipettes	GDR or England mak or any make.	---	25 Nags.

21.	WBC Pipettes	-do-	---	25 Nags.
22.	lab. Cell Counter	any make	---	5 Nags.
GLASS-WARE:-				
1.	Test Tubes	Borosil/Corning/Vensil	20ml capacity	1000 Nos.
2.	Centrifuge	Borosil/Corning/Vensil	15ml capacity	100 Nos.
3.	Folin-Wu Tubes	Corning/ Borosil/ Vensil	25ml capacity with bulb.	50 Nos.
4.	Nessler's Tubes	Corning/ Borosil/ Vensil	25 ml capacity with 12.5 ml mark.	50 Nos.
5.	Boiling Tubes (Hard glass)	Corning/ Borosil/ Vensil	50ml capacity	60 Nos.
6.	K.T. Tubes	Borosil/ Corning/ Vensil	5 ml capacity	20 Nos.
7.	Burettes	Emkay or any make	50 ml capacity with stop cock	20 Nos.
8.	Microburettes	Borosil/Emkay	10 ml	10 Nos.
9.	Pipettes	Corning/ Borosil/ Vensil	10 ml capacity with graduation	20 Nos.
			5 ml capacity with graduation	20 Nos.
			with graduation zero at tip	20 Nos.
			1 ml capacity (graduated)	20 Nos.
			0.2 ml capacity (graduated)	20 Nos.
			0.1 ml capacity with graduation	20 Nos.
			zero at tip.	20 Nos.

10.	Measuring Cylinders	Corning/ Borosil/ Vensil	1000 ml graduated 500 ml graduated 100 ml graduation 50 ml capacity with graduation 10 ml capacity graduation	1 No. 1 No. 5 Nos. 5 Nos. 3 Nos.
11.	Standard Volumetric Flasks	Corning/ Borosil/ Vensil	1 Lit. capacity 500 ml capacity 250 ml capacity 100 ml capacity	3 Nos. 5 Nos. 12 Nos. 20 Nos.
12.	Beakers	Corning/ Borosil/ Vensil	1 Lit. capacity 500 ml capacity 250 ml capacity 100 ml capacity	5 Nos. 30 Nos. 30 Nos. 50 Nos.
13.	Conical Flasks	Corning Borosil Vensil	500 ml capacity 250 ml capacity 100 ml capacity 50 ml capacity	30 Nos. 30 Nos. 30 Nos. 30 Nos.
14.	Reagent	Emkay	2 Lit. capacity 1 Lit. capacity 500 ml capacity 250 ml capacity 100 ml capacity	5 Nos. 5 Nos. 100 Nos. 100 Nos. 10 Nos.
15.	Dropping Bottle.	Emkay	100 ml capacity	10 Nos.
16.	Flat Bottom Round Flask	Emkay	500 ml capacity	20 Nos.
17.	Funneis	Emkay	2.5" diameter 3" diameter 6" diameter	20 Nos. 20 Nos. 3 Nos.
18.	Glass Tubings		1/2 mm.	1 kg.
19.	Glass Rods		1/2 mm.	1 kg.

MISCELLENIOUS:-

1.	Propipettes	Any make	Able to hold any pipettes from 0.1 ml to 10 ml capacity Rubber or Plastic.	5 Nos.
2.	Test tube Stands	Tarson	To hod 12 Tubes	20 Nos.
3.	Burette stands	---	Metal rod and base with tarson clamp.	20 Nos.
4.	Rubber Crock		To fit in concial flasks of all capacity.	20 each
5.	Procelain Giazed tiles		6x6"	20 Nos.
6.	Mortar and Pestal	---	6" diameter	1 Nos.

**B.SC. FINAL (SEMESTER-V)
17 : MICROBIOLOGY**

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper have been devided into 6 units. There shall be one question on each unit, will internal choice and for each of 12 marks and one compulsory question covering all the syllabus of semester V(8 marks).

**5S MICROBIOLOGY
(Environmental Microbiology and Bioinstrumentation)**

Unit-I : Microbial Associations and Air Microbiology

- A. Microbial Associations :** Definition and examples of positive(Mutualism, Commensalism, Synergism), negative (Antagonism,Competition, Parasitism) and neutral association.

B. Air Microbiology

- a) The atmosphere and its layers.
- b) Different types of microorganisms in air.
- c) Techniques for microbiological analysis of air:
 - i) Solid impingement devices
 - ii) Liquid impingement devices.
- d) Airborne diseases : Etiology, symptoms and prevention.
- e) Control of microorganisms in air.

Unit-II : Microbiology of Soil.

- a) Microorganisms in soil.
- b) Rhizosphere.
- c) Decomposition of plant and animal residues in soil.
- d) Definition, formation, function and microbiology of humus and compost.
- e) Biological Nitrogen fixation : Type of nitrogen fixing microorganisms, factors affecting and mechanism of symbiotic and non-symbiotic nitrogen fixation. Process of nodulation, nitrogenase complex, recombinant DNA and nitrogen fixation, legume inoculants.
- f) Cycles of elements in nature :
 - i) Carbon cycle : CO₂ fixation, organic carbon degradation.
 - ii) Nitrogen cycle : Proteolysis, amino acid degradation, Nitrification, Denitrification, Degradation of nucleic acids.
 - iii) Sulphur cycle
 - iv) Phosphorus cycle.
 - v) Biofertilizers, biological pest control.

Unit III : Water Microbiology

- a) Planktons : Definition, types, factors affecting growth of planktons, methods of enumeration, beneficial and harmful activities of planktons.

- b) Control of plankton problems
- c) Eutrophication and its control.

Unit IV : Assessment of Water Quality and Treatment

Bacteriological analysis of water:

- i) Significance of bacteriological analysis of water.
- ii) Collection and handling of water sample from various sources.
- iii) Indicators of excretal pollution.
- iv) Multiple tube dilution technique, MPN.
- v) IMViC classification of coliform.
- vi) Membrane filter technique for coliform and faecal Streptococci.
- vii) ICMR and WHO Bacteriological standards of drinking water.

Unit V : A) Water Treatment

- a) Self purification of water : Various zones and factors responsible for self purification.
- b) Treatment of water : Aeration, Coagulation, Flocculation, Sedimentation and Filtration.
- c) Slow and Rapid sand filters : Construction, mechanism of filtration, differences.
- d) Methods of chlorination : Plain, super chlorination, ammoniachlorine treatment, Break-point chlorination

B) Waste Water Treatment

- a) Aims of sewage treatment, composition of sewage.
- b) Municipal sewage treatment plant.
- c) Preliminary treatment (seiving and Grit chamber)
- d) Primary treatment(sedimentation)
- e) Secondary treatment (Aerobic)
 - i) Trickling filter
 - ii) Activated sludge process
 - iii) Oxidation pond
- f) Anaerobic sludge digestion

- g) Domestic sewage treatment by septic tank and Imhoff tank.
- h) Concept of COD,BOD.
- i) Outline of bio-gas production

Unit VI : Bio-Instrumentation

- a) Spectroscopy- Definition, Principle, types (UV&IR) & its applications.
- b) Electrophoresis- Definition, Principle, types (Paper&Gel) & its applications.
- c) Chromatography- Definition, Principle, types (Paper&TLC) & its applications.
- d) Isotopic Tracer Techniques - Definition, Principle & applications.

Microbiology Practicals.

1. Bacteriological analysis of water and Waste Water.
 - a) Standard plate Count.
 - b) Multiple tube dilution technique (MPN for Coliform)
 - i) Presumptive test ii) Confirmatory test
 - iii) Completed test.
 - c) IMViC test for coliform
 - d) Multiple tube dilution technique for faecal strepto cocci.
 - e) Membrane filter technique for coliforms & faecal streptococci.
 - f) BOD estimation.
 - g) Isolation of Bacteriophage from Sewage.
 - h) Determination of Chlorine demand and residual chlorine.
2. Study of Soil Microbiology
 - a) Enumeration of Soil microorganisms.
 - b) Isolation of Azotobacter from Soil.
 - c) Isolation of Rhizobium from Soil

- d) Isolation of Antibiotic producers from soil
- 3. Effect of Ultra-violet/Filtration on micro-organism present in water
- 4. Separation of amino acids and sugars by paper chromatography.

Distribution of marks for Microbiology practical Examination:

1. Major Experiment	- 15 marks
2. Minor Experiment	- 10 Marks
3. Viva Voce	- 10 marks
4. Spotting	- 10 marks
5. Laboratory Journals	- 05 Marks
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Total	- 50 marks
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List of Reference Books for 5S Microbiology:

1. Introduction to Soil Microbiology : Alexander Martin
2. Soil Microbiology : Subbaroa N.S.
3. Introduction to environmental Microbiology: Mitchell, Ralph
4. Sewage & Waste treatment : Hammer
5. Water Pollution : Zajic J.E.
6. Water Pollution Microbiology : Mitchell R.
7. Air Pollution : Perlins H.L.
8. Aquatic Microbiology : Stainer & Shewan
9. Introduction to Waste Water Treatment processes: Ramalhr R.S.

B.SC. FINAL (SEMESTER-VI) 6 S. MICROBIOLOGY

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper have been divided into 6 units. There shall be one question on each unit, will internal choice and for each of 12 marks and one compulsory question covering all the syllabus of semester VI(8 marks).

(Industrial Fermentation, Food Microbiology and Metabolism)**Unit- I : Fermentation in General.**

- a) Definition and scope of Industrial microbiology and biotechnology.
- b) Important classes of industrial microorganisms.
- c) Fermentation :- Definition and types (batch and continuous, aerobic and anaerobic, surface and submerged fermentations)
- d) Production strains
- e) Screening :- Definition, Primary screening (crowded plate technique, auxonography, enrichment culture technique, use of indicator dyes), secondary screening.
- f) Scale up process :- Definition and significance.
- g) Inoculum buildup : Spore and vegetative inoculum.
- h) General layout of fermentation plant :- Fermentation equipment and its uses.
- i) Raw materials :- Composition and uses. Saccharine, starchy, cellulose raw materials, hydrocarbon and vegetable oils, nitrogenous material (corn steep liquor).
- j) Antifoam agents.
- k) Sterilization of media :- Batch and continuous sterilization.
- l) Detection and assay of fermentation products.

Unit- II : Industrial Productions I:

Microorganisms, raw material, inoculums buildup, fermentation conditions, recovery, uses and mechanism of the following products.

- a) Ethyl-alcohol : From molasses and waste sulphite liquor.
- b) Beer.
- c) Wine (Red table and White table).
- d) Acetone- Butanol from corn.

- e) Citric acid
- f) Vinegar- Fringø process

Unit- III : Industrial Productions II:

- a) Bakerø yeast : From molasses, Definition of compressed and active dry yeast.
- b) Single cell protein : From bacteria.
- c) Penicillin.
- d) Amylase : Bacterial and fungal.
- e) Vitamin B12.

Unit-IV : Microbiology of Milk

- a) Definition
- b) Composition and types of milk.
- c) Sources of microorganisms in Milk.
- d) Types of microorganisms in milk.
- e) Pasteurization of milk : LHT, HTST, UHT. Phosphatase test.
- f) Grades of milk.
- g) Concentrated milk and milk powder.
- h) Preparation of fermented milk products, butter and cheese.

Unit-V : Food Microbiology

- a) Sources of contamination of fresh food.
- b) Microbial spoilage of foods.
- c) Preservation of foods :- Low and high temperature, dehydration, high osmotic pressure, chemical preservation, radiations and canning.
- d) Fermented foods : Idli, pickles and sauerkraut.
- e) Food poisoning : Food infection and food intoxication.
- f) Indicators of food contamination as per WHO.

Unit VI : Enzymology and Metabolism**A Enzymology :**

- a) Nature and Definition.

- b) Classification and nomenclature of enzymes.
- c) Terminologies used in enzymology :- Enzyme, active site, substrate, co-enzyme, cofactors, prosthetic group, poloenzyme, apoenzyme, activation energy, isoenzyme, allosteric enzyme, inhibitors, immobilised enzymes.

B Metabolism :

- a) General strategies of metabolism.
- b) EMP pathway, TCA cycle.
- c) Oxidative phosphorylation and Electron transport chain.

Microbiology Practicals:

1. A) Microbiological Examination of milk:
- Plate count
 - Methylene blue reduction test (MBRT)
 - Phosphates test
 - Test for coliform bacteria
 - Estimation of fats in milk
 - Milk testing for Adulteration
- B) Demonstration of microbes in Curd.**
2. A) Laboratory scale production, recovery and quantitative estimation of following products:
- Ethyl alcohol. b) Citric Acid c) Amylase
- B) Immobilisation of Yeast.
- C) Production of Curd/ Pickle/ Cheese by microorganisms
- D) Production of wine from grapes/ other raw material
4. Microbiological Examination of Vegetables, fruits and Fast Foods by
- Plate Count
 - Test for Coliform bacteria.
 - Yeast & Molds.

Distribution of marks for Microbiology Practical Examination:

1. Major Experiment	- 15 marks
2. Minor Experiment	- 10 Marks
3. Viva Voce	- 10 marks
4. Spotting	- 10 marks
5. Laboratory Journals	- 05 Marks
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Total	- 50 marks
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List of Reference Books for 6S Microbiology:

- Food Microbiology : Frazier W.C. & Westhoff D.C.
- Fermented Foods (Vol.7) : Rose A.A.
- Industrial Microbiology : Prescott S.C. & Dunn C.G.
- Industrial Microbiology : Miller B.M. & W. Litsky
- Industrial Microbiology : A.H. Patel
- Microbial Technology : Pepller H.J. (Vol. I & II)
- Industrial Microbiology : Casida L.E.
- Principles of Fermentation : Stanbury, Peter F. & Technology Allan. Whitaker
- Outlines of Dairy Bacteriology : Sukumar De
- Modern Food Microbiology : Jay, Mames M.
- Principles of Industrial : Rhodes & Fletcher. Microbiology
- Industrial Fermentation : Under Kofler & Hick. Vol. I & II
- Dairy Microbiology : Foster Etal
- Industrial Microbiology : Rose

BOOKS RECOMMENDED FOR PRACTICALS :

- Microbes in Action : Seely, Wander Mark, Taraporewala, Bombay.
- Manual of Microbiological : A.J. Salle, Methods
- Microbiological Methods : Collins
- Difco Manual.

B.Sc. Final (Semester V)
18 : FOOD SCIENCE
5S. Food Science
Food Processing : I

Unit-I : Cooking & Food processing :

Importance of cooking, objectives of cooking, Advantages & disadvantages of preliminary preparation of cooking; cooking term, (cleaning, peeling, & stringing cutting & grating, sieving, soaking etc.)

Food processing : Physical, functional & growth property of foods. Cleaning, sorting, & grading of foods.

Mixing of liquids & solids (powder), mixing equipment.

Classification of cooking method (moist heat method e.g. Boiling, stammering, poaching etc.

Dry heat: roasting, toasting frying advantages & disadvantages.

Microwave cooking: Information diagram, advantages & disadvantages

Solar cooking : figure, advantage & disadvantages.

Unit-II : Food quality & Hygiene

General principle of food hygiene in rural & urban areas in relation to food preparation, personal hygiene & food handling habits, place of sanitation in food plant. Sanitary aspects of building & equipment.

Food quality: sensory evaluation; selection of panel of judges, types of test, judging

Objective ; measurement of colour , measurement of texture. Food quality & safety:

Food quality describing: composition , appearance, flavour attributes.

Nutritional quality of food, its assessment, content & quality of nutrient.

Sensory quality & its evaluation, subjective & instrumental measurements of sensory attributes of colour viscosity & texture etc.

Unit III : Cereals and legumes processing

Structure, type, composition, quality characteristics & physiochemical properties of wheat, milling processes for different wheat, milling product (Atta, semolina and refined flour). Flour grades & their suitability for baked goods. Quality characteristics and rheological properties of wheat milling products & its assessment by product utilization.

Rice ; types, composition processed rice products (flaked, expanded & puffed rice)

Corn: types of corn, dry wet milling of corn. Starch & its conversion products. Processed corn products (popped corn, corn flakes etc.

Legumes: composition & properties of legumes, milling of different legumes. Sweet & savoury products from legumes in India.

Sprouted grains, palatability & Nutritional quality.

Unit-IV : Oil and fat processing;

Importance of processing, Sources, chemical composition, physical & chemical properties, functional and nutritional importance of dietary fats & oils, Processing of oil seeds for direct use & consumptions, processing of refined oils hydrogenation .

Unit-V : Bakery & confectionary:

Bakery products ; Ingredients , assessing quality, ingredients, products like bread, biscuit, coolies & cakes & pastries. Equipment uses for above.

Confectionary products: Hard boil candies, toffees, chocolates etc. Ingredients, equipments & process, product quality parameters,

Unit-VI : Food additives& food safety: Introduction, definition, need of additives , types of additives like antioxidant , colouring agents, flavours, natural & synthetic , flour improver ,

leavening agents, nutrient supplements & non-nutritive sweeteners,

Speciality foods; Scope, importance on speciality food , health food, functional foods, infant food & baby food fortification & supplementary foods.

Practical: (semester V)

- 1) Carry out preservation of certain vegetables by dehydration.
- 2) Study the rehydration characteristic of dried vegetables.
- 3) Perform osmotic dehydration of certain fruits & vegetables by sugar & salt solution.
- 4) To determine the water absorption capacity of the wheat flour / Maida .
- 5) Assessment of market sample of wheat, rice & Pulses for conforming some PFA specifications
- 6) Storage studies of cereal & legumes grains.
- 7) Determination of gluten content in wheat flour.
- 8) Adulteration of edible fats & oils
- 9) Preparation of Bread & its assessment of sensory quality.
- 10) Preparation of cake & its assessment of sensory quality.
- 11) Preparation of candy & its assessment of sensory quality.
- 12) Preparation of toffee & its assessment of sensory quality.
- 13) Preparation of cookies & its assessment of sensory quality.

The distribution of marks in practical shall be as follows:

A) Two short experiment	- 20 marks (10 Each)
B) One long experiments	- 15 marks
C) Viva voce	- 10 marks
D) Practical records	- 05 marks
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Total	- 50 marks
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Book Recommended :

- 1) Food Science 3^r edition , B. Srilakahmi, New Age International publication .
- 2) Food Science & Nutrition , Sunetra Roday , Oxford.
- 3) Preservation of fruits & vegetables , Girdhari Lal, G. S. Siddappad & G. L. Tandon, Publication & Information Division Indian Council of Agricultural Research.

- 4) Outline of food Technology , Harry W. Volonesecke, Agrobios.
- 5) A Hand book of Food & Nutrition , F. C. Blank; Agrobios.
- 6) Laboratory Techniques in Food analysis, D. person
- 7) Nutrition & Dietetics 2nd edition , Shubhangini A. Joshi; Tata Mc Graw-Hill Publishing Company Limited.
- 8) Foods, facts & Principle 2nd edition ;N. Shakuntala Manay ; New Age International .
- 9) Food Science 5th edition ;Norman N. Potter ;CBS
- 10) Fundamental of foods & Nutrition by R. Mudambi & M. V. Rajgopal
- 11) Outline of Dairy Technology by sukumar De- Oxford university press.
- 12) Food Microbiology by Adams & Moss
- 13) Industrial Microbiology by Prescott & Dum

B.Sc. Final (Semester VI)

6S. Food Science

Food Processing : II

Unit-I : Milk & milk products

Introduction; chemical composition, nutritional importance of milk and milk products. Fluid Milk: Testing quality, cooling, storage & transportation of liquid milk

Standardization and or processing (pasteurization, sterilization), Storage, packaging and distribution of liquids milks

Milk Products : composition, methods of preparation & production, quality or grading parameters, shelf-life of cream, butter & ghee, evaporated & condensed milk , skimmed, whole & instant milk powders

Ice- creams, fermented milk (curd, yogurt etc,) Milk products (cheeses, butter milk, lassie etc.) other milk products (khoa, casein, whey proteins) Milk and milks product based, sweetmeats (butfi, rasogolla, milk, cake, kalakand, etc.)

Unit-II : Fruits & vegetable processing:

Current status of production & processing of fruit and vegetables

Products : juices & pulp, beverages, concentrates & powders, squashes, beverages carbonated & its quality control. Fermented products (wine).

Jam, jelly, & marmalades; dried fruit, soup mixture; sauces & ketchups; puree & pastes; chutneys, & pickles.

Unit-III : Poultry, Meat & Fish processing:

Nutritional, safety/ health & hygienic considerations.

Egg; structure, composition , nutritional & functional characteristic of egg, grading spoilage, preservation of egg, solid products through drying & freezing.

Fish: types, care in handling processing of fish, freezing , canning, salting & drying of fish.

Unit-IV : Beverages ;

Introduction, Importance, Types of beverages, classification Example, composition, (coffee, cocoa,& chocolate, tea, its processing, composition, soft drinks, its ingredients, , different beverages, alcoholic beverage (wine , beer, etc.) , non alcoholic beverages, mineral water, carbonated, non beverages, and their processing methods.

Unit-V : Traditional and functional foods;

Fermentation ; basic concept of fermentation, dairy base fermented products, and its importance.

Production of bakers yeast, food yeas,t wine, beer, vinegar, organic acid (citric acid & lactic acid)

Oriented fermented products, soya sauce, pickles, fermented milk, cheeses.

Indian traditional sweet, papads, idli, dosa , dhokla etc.

Unit-VI : Spices:

Introduction , Method of classification , List of spices , sources , Medicinal importance , composition , properties

of spices (antioxidant)

Role of spices in cooking . preparation of different masalas & keeping quality

Practical :Semester VI

- 1) Preservation of fruits and vegetables by pickling
- 2) Preparation of squash
- 3) Shelf life study of egg by using different preservation methods.
- 4) Determination of quality of milk (Lactometer, pH & acidity, fat content, Specific gravity
- 5) Preparation of certain dairy products (khoa, paneer, cream, shikhand etc.)
- 6) Preparation of tomato ketchup & its preservation.
- 7) Preparation of tomato purr & its preservation.
- 8) Preparation of pickles.(lemon, mango, onion, amla).
- 9) Preparation of jam & its preservation.
- 10) Preparation of Jelly & its preservation.
- 11) Preparation of squash & its preservation.
- 12) Preparation of different types of measles.

The distribution of marks in practical shall be as follows:

- | | |
|-------------------------|----------------------|
| A) Two short experiment | - 20 marks (10 Each) |
| B) One long experiments | - 15 marks |
| C) Viva voce | - 10 marks |
| D) Practical records | - 05 marks |

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Total - 50 marks

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Book Recommended :

- 1) Food Science 3^r edition , B. Srilakahmi, New Age International publication .
- 2) Food Science & Nutrition , Sunetra Roday , Oxford.
- 3) Preservation of fruits & vegetables , Girdhari Lal, G. S. Siddappad & G. L. Tandon, Publication & Information Division Indian council of Agricultural Research.
- 4) Outline of food Technology , Harry W. Volonesecke, Agrobios.
- 5) A Hand book of Food & Nutrition , F. C. Blank; Agrobios.
- 6) Laboratory Techniques in Food analysis, D. person
- 7) Nutrition & Dietetics 2nd edition , Shubhangini A. Joshi; Tata

Mc Graw-Hill Publishing Company Limited.

- 8) Foods, facts & Principle 2nd edition ;N. Shakuntala Manay ; New Age International .
- 9) Food Science 5th edition ;Norman N. Potter ;CBS
- 10) Fundamental of foods & Nutrition by R. Mudambi & M. V. Rajgopal
- 11) Outline of Dairy Technology by sukumar De- Oxfort university press.
- 12) Food Microbiology by Adams & Moss
- 13) Industrial Microbiology by Prescott & Dum

B.SC. FINAL SEMESTER-V 19 : INDUSTRIAL MICROBIOLOGY

The examination shall comprise of two theory papers, one in each semester and one practical in each semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of at least 4 hours duration in one day and shall carry 50 marks.

The following syllabus is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question on every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-V (8 Marks).

5S. INDUSTRIAL MICROBIOLOGY (Industrial Biotechnology)

UNIT I : TOOLS & TECHNIQUES OF GENETIC ENGINEERING:

- a) Preparation of pure samples of DNA.
- b) Enzymes in genetic engineering : Exo and endonucleases, restriction endonucleases, ligases, polymerases, DNA manipulating enzymes.
- c) Analysis of DNA fragment size : Agarose gel electrophoresis.
- d) Identification of DNA fragment : Southern Blotting
- e) Cloning vehicles ó Plasmids, Cosmids & Bacteriophages.

UNIT II: GENE MANIPULATION AND EXPRESSION

- a) Methods of gene transfer : Transformation, transduction, electroporation, microinjection.
- b) DNA sequencing : Maxam and Gilbert technique, di-deoxynucleotide method, DNA chips.
- c) Polymerase Chain Reaction.
- d) Genomic DNA library, cDNA library.
- e) Identification of clones : Colony hybridization.

UNIT III: GENETIC TECHNIQUES IN STRAIN IMPROVEMENT:

Mutation and selection of different types of mutants e.g. Auxotrophic, antibiotic resistant, analogue- resistant mutants. Mutants resistant to feedback effect and toxic compounds. Isolation of revertant mutants (Ames Test)

UNIT IV: HEALTH CARE INDUSTRIAL PRODUCTS

- a) Production of hormones- Insulin
- b) Production of interferon
- c) Production of vaccines ó Recombinant Hepatitis vaccine.
- d) Hybridoma technology & monoclonal antibodies.
- e) Gene therapy.
- f) SCP (Single Cell Protein)

UNIT V : INDUSTRIAL PRODUCTS FROM ACTINO MYCETES

- a) Primary metabolides : Enzymes, vitamins, amino acids, siderophores.
- b) Secondary metabolides : Antibacterial, antifungal, antiviral, insecticidal, anticancer, groth promoter herbicides, immunosuppressive.
- c) Bioconversion products
- d) Recombinant products

UNIT VI: PROBIOTICS :

- a) Introduction to prebiotics, probiotics and synbiotics.
- b) Types of probiotics,
- c) Beneficial characteristics of probiotic microbes

- d) Probiotic organisms and its role in human health.
- e) Probiotic products - (i) Yogurt, (ii) Koji, (iii) Tofu, (iv) Kefir, (v) Yakult, (vi) Miso.

Practicals:

1. Isolation of genomic DNA
2. Isolation of plasmid DNA.
3. Cultivation of yeasts and bacteria for single cell protein
4. Antibiotic sensitivity test
5. Isolation of antibiotic resistant mutants.
6. UV induced auxotrophic mutants production and isolation of mutants by replica plating technique.
7. Ames test for detecting potential carcinogenes.
8. Cultivation of actino mycetes.
9. Screening for antagonism
10. Preparation of Koji.

Distribution of marks for Industrial Microbiology Practical Examination:

1. Major Experiment	- 15 marks
2. Minor Experiment	- 10 Marks
3. Viva Voce	- 10 marks
4. Spotting	- 10 marks
5. Laboratory Journal	- 05 Marks
Total	- 50 marks

B.SC. FINAL (INDUSTRIAL MICROBIOLOGY) SEMESTER-VI

The examination shall comprise of two theory papers, one in each semester and one practical in each semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of at least 4 hours duration in one day and shall carry 50 marks.

The following syllabus is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question on every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of semester-VI (8 Marks).

**6S. INDUSTRIAL MICROBIOLOGY
(Tissue Culture and Industrial Waste Management)**

UNIT I : ANIMAL TISSUE CULTURE

- 1) Introduction, Definition of terms ó Tissue culture, Cell culture, Organ culture. Primary, Secondary, Continuous & Established Cell lines.
- 2) Culture media for animal cells.
- 3) Primary Cell Culture Methods - Mechanical disintegration, Enzymatic disaggregation, primary explant technique.
- 4) Uses of Cell lines.
- 5) Cell culture products

UNIT II: PLANT TISSUE CULTURE

- 1) Introduction ó Terms used in plant tissue culture, types of tissue culture : callus, organ, cell, protoplast, suspension (batch and continuous).
- 2) Media used in Plant Tissue Culture, media constituents : Composition and preparation.
- 3) Callus Culture - Isolation & Culturing techniques.
- 4) Regeneration
 - a) shoot regeneration
 - b) somatic embryogenesis
- 5) Types of plant tissue culture
 - a) Anther culture
 - b) Ovary culture
 - c) Meristem culture
 - d) Embryo culture

UNIT III: PROTOPLAST CULTURE, SOMATIC HYBRIDIZATION & TRANSGENIC PLANTS

- 1) Protoplast isolation, culture & regeneration.
- 2) Somatic hybridization : Protoplast fusion, selection, identification and applications of hybrid cells.

- 3) Transgenic Plants :-
 - a) Resistance to biotic stresses : Insect resistance, virus resistance, fungal and bacterial disease resistance.
 - b) Resistance to abiotic stresses : Herbicide resistance (Glyphosate, Phosphinothricin, sulphonyl urea).
- 4) Improvement of crop yield and quality, Commercial transgenic crop plants.

UNIT IV : WASTE MANAGEMENT

- 1) Composition of Sewage, Need for waste water treatment
- 2) Physical, Biological & Chemical methods for treatment of industrial effluents
- 3) Solid waste management (outline).
- 4) Biogas production.
- 5) Composting

UNIT V : BIOREMEDIATION

- 1) Bioremediation, biodegradation, xenobiotics, recalcitrant compounds.
- 2) Types of bioremediation : In situ and Ex situ with advantages and disadvantages.
- 3) Role of microbes in -
 - a) Degradation of crude oil
 - b) Bioleaching of metals
 - c) Recovery of metals
 - d) Biodegradation of pesticides and herbicides.
- 4) Genetically engineered microbes in bioremediation.

UNIT VI : ENTREPRENEURSHIP

Basic regulations of excise. Survey the demand for a given microbial product, feasibility of its production under the given constraints, project preparation for financial assistance, different funding agencies. Subsidies for various projects, patenting the product.

Practicals

- 1) Preparation of various media for Tissue culture.
- 2) Development of Callus Culture.
- 3) Plant Regeneration from Callus Culture.
- 4) Organogenesis from different types of Explants.
- 5) Isolation and culture of plant protoplast.
- 6) Estimation of DO of different industrial effluents.
- 7) Estimation of BOD of different industrial effluents.
- 8) Estimation of COD of different industrial effluents.
- 9) Visit to Industrial effluent treatment plant, Dairy; Food processing industry etc.
- 10) Study tour.

Distribution of marks for Industrial Microbiology Practical Examination:

1. Major Experiment	- 15 marks
2. Minor Experiment	- 10 Marks
3. Viva Voce	- 10 marks
4. Spotting	- 10 marks
5. Laboratory Journal	- 05 Marks
Total	50 marks

List of books recommended for 5S and 6S:

- 1) Old, S.B. Primrose. (1994) Principles of Gene Manipulations, Blackwell Scientific Publications.
- 2) Brown T.A. Gene Cloning- An Introduction, Chapman and Hall India.
- 3) Brown (1991) Essential Molecular Biology ó A practical Approach Vol I & II, Oxford University Press.
- 4) Freshney, R.I (ed), 1992, Animal cell culture: A practical approach (2 nd ed), Oxford University Press, New York.
- 5) Freshney, R.I 1987, Culture of animal cells: A Manual of basic techniques (2 nded), Alan R. Liss, New York.
- 6) Paul, J., 1975, Cell and Tissue culture (5thed) Livingstone, Edinburgh.
- 7) Bhojwani, S.S., (ed) 1990, Plant Tissue Culture: Application and Limitations, Elsevier, Amsterdam.
- 8) Street, H.E., 1977, Plant cell and Tissue Culture, Blackwell, London.
- 9) Davar R.S, Principles and Practice of Management.

- 10) Jain and Agarwal, Production Management and Industrial Organization.
- 11) Sherlekar, S.A., Marketing / Management.
- 12) Satyanarayan, Biotechnology.

B.Sc. Final (Semester - V)

20 : Biotechnology (Regular/Vocational)

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of at least 4 hours duration in one day and shall carry 50 marks.

The following syllabi are prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-V (8 marks).

5S : Biotechnology (Regular / Vocational)

ANIMAL CELL BIOTECHNOLOGY

UNIT I : Major types of tissues- Epithelial, Muscle, Connective, Nerve, Blood. Structure and organization of cells in various tissues, Origin and lineage. Junctions between cells ó Tight junctions, Adherens junctions, Gap junctions, Desmosomes. Extracellular matrix ó structural proteins, specialized proteins and proteoglycans.

History of development of cell cultures ó Contributions of Ross Harrison, Alex Carrel, Charles Lindbergh, Ian Wilmut.

UNIT II: Design and Layout of the laboratory, Functioning of Equipments: Various incubators, biosafety cabinets, Sterilizers, Refrigerators and freezers, inverted microscope, Deionizers and water purification systems, CO₂ incubators, Colony counters, Flow cytometer. Laboratory safety and Biohazards, ethics and good laboratory practices (GLP).

UNIT III: Introduction to the balanced salt solutions and simple growth medium, Chemical, physical and metabolic functions of different constituents of culture medium, Gas phase,

buffering and Osmolality of medium. Role of serum and supplements. Selection of medium and serum, Serum free medium.

UNIT IV : Type of tissue culture: Disaggregation of tissues for primary culture ó Primary explants technique, Enzymatic disaggregation, Mechanical disaggregation, Physical methods of cell separation.

Established cell line- Commonly used animal cell lines, Origin of cell culture, characteristics of cells in culture. Plating efficiency. Characterization of cell lines ó karyotyping, Isozyme analysis. Cryopreservation.

UNIT V : Applications of animal cell culture ó Production of viral vaccines, growth factors, Erythropoietin, Interleukins. Studies on gene ex-pression, Transfection of animal cells: selectable markers, antibiotic resistance, Somatic cell fusion- HAT selection, production of monoclonal antibodies.

UNIT VI: Specialized Techniques: Mass culture techniques ó Suspension culture, Continuous culture, Monolayer culture ó Roller culture, Spiral propagator, Micro-carriers, Establishment of Synchronous cultures, Culture of Amniocentesis.

Practical :

1. Preparation of balance salt solution.
2. Preparation of TPVG and filter sterilization.
3. Separation serum and filter sterilization.
4. Dissociation of cells from primary tissue.
5. Dissociation of cells from culture vessels.
6. Enumeration of cells using Hemocytometer.
7. Estimation of viability of cells by dye exclusion method.
8. Preparation of primary culture from chick embryo.
9. Maintenance and subculturing of cell lines.

Equipments :

1. Autoclave
2. Incubator
3. Laminar flow
4. Balance

5. Centrifuge
6. Inverted Microscope
7. Quartz Distillation unit
8. CO₂ incubator
9. Magnetic stirrer
10. Water bath
11. Hot air oven

Books Recommended:

1. Freshney, R.J.: Culture of Animal Cells, Wiley-Lissz
2. Masters, J.R. W (ed.): Animal Cell Culture ó Practical Approach, Oxford Uni. Press
3. Sudha Gangal: Principle and practice of animal tissue culture, Universities Press, India
4. Freshney, R.J.: Animal cell culture- Practical Approach.
5. Gupta P.K.: Elements in Biotechnology.

Semester-V : Animal Cell Biotechnology

Distribution of Practical Marks :

1. Major Experiment	12 Marks
2. Minor Experiment	08 Marks
3. Spotting	05 Marks
4. Viva Voce	10 Marks
5. Practical Record	10 Marks
6. Study tour / visit	05 Marks
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Total	50 Marks
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B.SC. FINAL (SEMESTER-VI)

20 : BIOTECHNOLOGY (REGULAR / VOCATIONAL)

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 hours duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of at least 4 hours duration in one day and shall carry 50 marks.

The following syllabi are prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in

every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-VI (8 marks).

6S : Biotechnology (Regular / Vocational)
PLANT BIOTECHNOLOGY

UNIT-I: Growth : Terminology and definitions, methods of measuring growth and differentiation. Growth curves and growth analysis, Geotropism, Phototropism, Apical dominance, Effect of environmental factors on growth: Photoperiod, Radiation energy, (Intensity, Wavelength), transpiration and nutrition.

UNIT-II: Plant Growth Substances: Hormone concept, Auxins, Gibberellins, Cytokinins, Ethylene, Abscisic acid. Physiological effect of hormones, Mechanism of action of plant growth substances, Use of plant growth substances in agriculture and horticulture.

UNIT-III: Plant Tissue Culture ó Introduction and history, Practical applications of tissue and organ cultures, Equipments and other requirements, Commercialization of tissue culture: Design of typical tissue culture laboratory and its management. Media preparation and composition.

UNIT-IV: In vitro techniques in tissue culture: Beginning of in vitro culture. Clonal multiplication of elite species (Micropropagation) from axillary bud, shoot tips, protocorms (Orchids), meristem culture. Hardening of tissue cultured plants.

Induction of callus, ovary and ovule culture. Embryo rescue, embryo culture and its applications. Somaclonal variation and its applications, Pollen and anther culture, Endosperm culture and triploids

UNIT-V : Single cell suspension cultures and their applications in selection of variants/mutants. Transport processes in plant cells and tissues, Protoplasmic membrane, General transport law, active and passive transport across the membrane. Protoplast isolation and regeneration,

UNIT –VI:Somatic hybridization - Markers for selection of hybrid cells, Hybrids, cybrids, application of somatic hybridization,

protoplast and tissue culture for genetic manipulation of plants, various methods of genetic manipulations (electroporation, gene gun, Agrobacterium mediated, etc.), practical applications of genetic transformation of plants.

Practical :

1. Bioassay of Indole acetic acid using coleoptiles.
2. Bioassay of Gibberlic acid using barley seeds.
3. Initiation and maintenance of callus culture of soybean.
4. Bioassay Cytokinin using soyabean callus.
5. Study of growth parameters in callus culture.
6. Initiation and growth study of suspension culture.
7. Initiation of shoots from apical or axillary bud
8. Induction of shoot initiation by modulating hormone balance.
9. Induction of root initiation by modulating hormone balance.
10. Single cell suspension culture from carrot.
11. Generation of somatic embryo from suspension culture of carrot.
12. Induction of Agrobacterium infection in any dicot leaf and maintenance of resultant callus.

Equipments :

1. Autoclave
2. Incubator with illumination and temperature control
3. Laminar flow
4. Balance
5. Centrifuge
6. Microscope
7. Quartz Distillation unit
8. Magnetic stirrer
9. Water bath
10. Hot air oven

Semester-VI : Plant Biotechnology

Distribution of Practical Marks :

1. Major Experiment	12 Marks
2. Minor Experiment	08 Marks
3. Spotting	05 Marks
4. Viva Voce	10 Marks
5. Practical Record	10 Marks
6. Study tour / visit	05 Marks
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Total	50 Marks
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Book Recommended :-

- 1) Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture : (Ed.) J.Reinert and Y.S.P. Bajaj
- 2) Plant Tissue Culture : Application and Limitations : S.S.Bhojwani
- 3) Plant Cell Culture : A Practical Approach (IRL Press) : R.A. Dixon and Geonzales
- 4) Introductory Plant Physiology : G.Ray Noggle and George J.Fritz (Prentice Hall of India Pvt.Ltd.)
- 5) Introduction to Plant Biotechnology : H.S.Chawla

B.SC. FINAL (SEMESTER-V)

21 : BIOINFORMATICS

5S : BIOINFORMATICS

Paper V (Methods in Bioinformatics)

UNIT-I : Introduction to Database :

Importance of Database, Types of Database, Data Models, Data Abstraction, Test Databases. Database Design (DBMS & RDBMS), Data Security, Data Warehousing, capture and Analysis, Data Management and Architecture.

Microarray Database, Enzyme Database, Biodiversity Database.

UNIT-II: Biology and Computer Science :

Structural Organization of genome. *In silico* analysis of primary structures of nucleic acid sequences. Representing sequence Data , a program to store a DNA sequence, DNA Fragments, Transcription : DNA to RNA Nucleic Acid Sequence databanks : GenBank, Genomic Databases. Repositories : EST and STS, Limitation of Computation Analysis.

UNIT-III: Mutations, Randomization and genetic code :

Random number generators. A program using randomization. A program to simulate DNA mutation generating random DNA analyzing DNA. The genetic code. Hashes data structures and algorithms for biology. Translating DNA into proteins. Reading DNA from files in

- (8) Snedecor G. and Cochran W. (1989), *Statistical Methods*. 8th Ed. Iowa State University Press Iowa.
- (9) Weller J.I. (2001), *Quantitative trait loci analysis in animals*, CABI Publishing, London.
- (10) Myers E.W. (1997), *Computational Methods in genomic research* Plenum Press, New York.
- (11) NCBI : National Centre for Biotechnology Information (1993), *Manual for NCBI software development tool kit version, 1.8*. National Library of medicine, National Institute of Health, Washington.
- (12) Branden C. and Tooze J. (1991), *Introduction to Protein Structure*, Garland Publication, New York.
- (13) Bushman F. (2002), *Lateral DNA transfer : Mechanism and consequences*. Cold Spring Harbur Laboratory Press, Cold Spring Harbur Laboratory, New York.
- (14) Durbin R., Eddy S., Krogh A., and Mitchison G. (1998) *Biological sequence analysis : Probabilistic models of proteins and nucleic acid*, Cambridge University Press, U.K.
- (15) Li. W. and Graur D. (1991) *Fundamentals of Molecular Evolution*, Sinaur Associates, Sunderland, Massachusetts.
- (16) Dayhoff M.O. (1978), *Atlas of Protein sequence and structure*, Volume 5, National Biomedical Foundation, Georgetown University, Washington.
- (17) Waterman M.S. (1989), *Sequence Alignment*. In *mathematical methods for DNA sequences*. CRC Press, Boca Raton, Florida.
- (18) Von Heijne G. (1987), *Sequence Analysis in molecular Biology* ó *Treasure trove or trivial pursuit*, Academic Press. San Diego.
- (19) James Tisdall, 2001, *óBeginning Perl for Bioinformaticsö*, O'Reilly & Associates (2001), *Learning Perl*, 3rd Edition.
- (20) *Bioinformatics and Functional Genomics* ó Jonathan Persner (3) S.C.Rastogi, Namita Mendirata, Parag Rastogi, *óBioinformatics concepts skills and application*, CBS Publisher.
- (21) D.Baxevanis and F.Oulette, (2002), *óBioinformatics : A practical guide to the analysis of genes and proteinsö*, Wiley.

- (22) Arthur M. Lesk, (2002), *óIntroduction to Bioinformaticsö*, Oxford University.

Semester-VI
6S : BIOINFORMATICS

Paper VI (Advanced Bio-computing)

UNIT-I : Object Oriented Programming using C++ :

Introduction to OOPS, features, structure, data types and user defined database, Constants, variables, operators, control statements, creating and writing functions, inline functions and function overloading.

UNIT-II: Classes & Objects :

Data abstraction, encapsulation, data hiding, defining class, member functions and data members, creating objects, accessing class members, constructors, destructors, array of objects, pointer to objects, operator overloading, inheritance and its types.

UNIT-III: RDBMS ORACLE 9i :

Architecture, Database models : Relational, Hierarchical, Networks; data dictionary, DMI operations, Domains and attributes, normalization process, Normal forms : 1NF, 2NF, 3NF, 4NF, BCNF. SQL : Components of SQL, data types and operators. DDL Commands : CREATE, ALTER, DROP, for tables and views. DML Commands : SELECT, INSERT, DELETE, UPDATE, BREAK & COMPUTE.

UNIT-IV: Functions

Number, Character, Concatenating functions, joins, unions, data integrity and constraints. PL/SQL : Features, Block structures, variables, constants, data types, control structures, cursor, concept, type, opening, declaring, classify and cursor attributes. Transactions : Rollback, commit, save point, Rollback segment.

UNIT-V : Features of SQL form of SQL report :

Users, Roles and Privileges : Concept, creating users, system and object privilege, GRANT privilege, REVOKE

privilege, passing on privileges, creating roles.

UNIT-VI: Perl and Programming :-

Low and long learning curve. Perl's benefits. Installing Perl on computer. Perl program peration text editors. Finding help. Individual approaches to programming Edit-Run-Revise (and Save) An environment of programs, programming strategies. The programming process using the Perl. documentation calculating the reverse complement in Perl Proteins, files and arrays reading proteins in files arrays scalar and list context. Subroutines scoping and subroutines command-line arguments and arrays. Passing data to subroutines modules and libraries of subroutines fixing bugs in code.

Practicals :-

Minimum 18 experiments based on theory paper Advanced Bio-computing covering all aspect of syllabus.

Distribution of Practical Marks :-

(5) To perform one major experiments :	15 Marks
(6) To perform two minor experiments :	15 Marks
(7) Viva-voce:	10 Marks
(8) Practical Record:	10 Marks
Total 50 Marks	

List of Equipments :-

	Quantity
1) Computer Terminals :- Pentium-IV with latest configuration	8 computers for batch of 16 students
2) Printer CDMP : Configuration :- 24 pim, 132/80 columns	02 Nos.
3) C++ Software (Compiler or Interpreter)	01
4) Perl Language Compiler	01
5) Broad Band Internet Connection	01

Recommended Books :

- 1) Object Oriented Programming with C++ : E.Balaguruswamy
- 2) Programming with C++ : R.S. Nisar Ali
- 3) Mastering C++ : Venugopalan.

- 4) C++ Programming : Ravi Chandran
- 5) Understanding Oracle : Perry and Latic ó BPB
- 6) Essentials of oracle 8 : TOM Lewis.
- 7) An Introduction of Data Base Systems : C.J.Date ó Narosa
- 8) Programming with C++ : Robert Lafore
- 9) Oracle Press Introduction to oracle (TMH)
- 10) Oracle Unleashed (Sams)

B.SC. FINAL (SEMESTER-V)

22 : APICULTURE

5S : APICULTURE

Paper V (Cytogenetic & Bee breeding)

Unit-I : A. Cytology in General: Cell and its structure and function, Cell division, Cell membrane, mitochondria, endoplasmic reticulum, lysosome, Golgi apparatus, nucleus. Elementary principles of heredity, Applications of genetics to bee improvement.

B. Inbreeding and heterosis, mass selection of superior genotypes. Examination of matings among superior genotypes is isolated apiaries.

C. Progeny testing methods for bees. Elementary analysis. Scope and limitations of instrumental insemination for bees.

Unit-II : A. Bee breeding: General methods of breeding and selection, mitosis and miosis, applicability of individual methods for bees.

B. Organization of breeding apiaries: Acquisition of colonies from their natural nests. Their transference to movable frame of standard hives.

Location of different types of breeding apiaries duly related to their functions. Equipment and tools for bee breeding programme. Special apiary management problems for bee breeding programme.

Unit-III : Selection Criteria : General Criteria- Particular criteria to meet the demands of local habitats, Desirable and undesirable characters. Quantitative and qualitative characters.

Differential components subscribing to higher yield and better performance -Honey yield , Body size, Tongue reach , frequency of egg laying and hatching, percentage Temper, Steadiness , Discretion, Absconding, Swarming, Parsimonious habit , Hive sanitation , Disease resistance.

Unit-IV : A. Individual colony records: Pedigree records system adapted for maternal living age of bees. Periodicity for observation and recordings. Providing uniform conditions for valid comparison of pedigrees.

B. Evaluation of Individual colony records : Tabulation of individual colony records. Apiary averages for characters susceptible to environmental influences. Grouping of individual colonies.

Unit-V : Assigning of maternal pedigree number for selection: Rearing of pedigree queen bees. Migration for queen rearing programme. Distribution of individual groups to isolated apiaries for maximizing superior mating and minimizing inferior mating. Available resources. Advance provisioning for implementing the programme.

Unit-VI : Transport of sealed queen cells: Preparation of mating nuclei with sealed queen cells or virgin queens, Special management problems for organizing mating yards. Provision of adequate population or pedigree drones, single and multiple mating, mating signs. Re-migration of stocks, Progeny testing.

Equalization of colony strength through upgrading or downgrading for equal starts for pedigree and unselected controls.

Practical Course PR-5 :

1. DNA isolation from honey bee
2. Study of permanent stained slides (Meiosis)
3. Polytene Chromosome isolation and staining
4. Morphometric study of different species of honey bee.
5. Phylogenetic study of honey bee using sequences from NCBI
6. Mutation study using UV rays in honey bee larvae.
7. Estimation of tongue reach.
8. Demonstration of equalization of colonies.

9. General methods of bee breeding and selection.
10. Organization of breeding apiaries.
11. Study of mitosis in onion root tip.

Distribution of Marks : 4 Hrs.

- | | |
|--|----------|
| 1. DNA isolation of Honey bee /Tounge reach estimation. | 15 Marks |
| 2. Polytene Chromosome Isolation and staining / study of mitosis, stages in onion root tip | 15 Marks |
| 3. Morphometric study of honey bees | 05 Marks |
| 4. Practical Record | 05 Marks |
| 5. Field Diary | 05 Marks |
| 6. Viva-voce | 05 Marks |

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Total Marks 50 Marks

List of Equipments :

1. Centrifuge
2. Vernier caliper
3. Bee colony hives
4. UV source
5. Equipments for tongue rich estimation
6. USB digital camera with dimensional software

B.SC. FINAL (SEMESTER-VI)

6S : APICULTURE

Paper VI (Management, Marketing & Extraction)

Unit-I : Apiary management

- A. A. Apiary selection and establishment of bee colonies and bee management. Establishment of Apiary. Choice of apiary site, consideration of climatic conditions like wind, light, rain temperature .
- B. How to handle colony. Recognition of easier of a colony. Capturing of a natural colony. Hiving of the colony and maintenance. Survey and location of colony. Collection of honey -hygienically.
- C. Approach to colony, method of handling bees (periodic inspection). Reorganization of queen, her

age, health, egg laying, behavior of honeybees. Brood and food condition.

Unit-II : Special Management

- A. Special Management for practice - Seasonal management, variation in management, pattern related to regional differences.
- B. Method of recording humidity, Temperature and other meteorological data, use of thermometer, barometer, rain gauge, anemometer and other simple meteorological instruments.
- C. Production of comb honey. Commercial beekeeping management. Maintenance of technical record. Laying worker causes and remedial measures. Topography evaluations of the place. Drainage of rain water. Availability of water. Observation on competition between crops, crops & weeds & insect pollinations.
- D. Migratory Beekeeping: Survey, packing transporting, pollination service.

Unit-III : Queen Rearing : In nature, need and scope of artificial methods of queen rearing, various methods of preparing various mating nuclei and distribution of mating nuclei, packing bees, introduction of queens and packages, clipping and making queens.

- A. Drone breeding, queen cells formation, laying workers. Feeding, uniting dividing, of colonies. Sanitation, cleaning, observation of colonies for diseases. Routine forage and other activities.
- B. Swarming: Its purpose, period of growth, various methods of swarm control and prevention. Desertion: Its causes and methods of prevention

Unit-IV : Marketing of honey & bee wax

- A. Quality control & purity standard.
- B. Organization of marketing of honey & bee wax.
- C. Production, consumption & promotion for domestic, industrial market. Problems of marketing of honey & bee wax. Scope of marketing indigenous market for

industrial & domestic purpose. Scope of marketing for export of honey. Future strategy.

- D. Accounts and book keeping.

Unit-V : Beekeeping laws and regulations

- A. Import restrictions on bee colonies package bees, queens, etc. in various countries, quarantine laws governing bee disease notifications in major honey producing countries.
- B. Regulations, protecting bee populations against indiscriminate spraying.
- C. Rules regarding honey house, processing, bottling packing, adulterations.
- D. Laws governing standards on beekeeping equipments.
- E. Laws governing standards on beekeeping products. International law. Legislation affecting beekeeping in general in various countries.

Unit-VI : Extension of Honey Bee Keeping:

- A. Principles of Extension work with reference to Indian conditions and economy place of beekeeping in rural economics, beekeeping as agro-industry, and economics of the Industry: a glance of beekeeping in India and abroad.
- B. Commission & co-operative Organization, Model bye-laws, Role of co-operative movement in the propagation of Beekeeping in this country Registered Industries Commission.

Field study:

1. Market survey for honey bee products.
2. Study of different bee colonies (rock bees, florea & trigona species)

Practicals :-

1. To isolate and study pollen from freshly extracted honey
2. Extraction of wax from comb.
3. To study technique for mounting of wax foundation sheet to frame.
4. To monitor internal bee colony hive temperature and humidity.
5. To study properties of propolis.
6. To study physical properties of squeezed honey.

7. Protocol for packing of bee products.
8. Methods of colony handling
9. Bee recognition with respect to sex, age, and brood.
10. Determination of humidity temperature and other meteorological factors,
11. Use of thermometers, rain gauge, anemometer.
12. Queen rearing and drone breeding.
13. Market survey technique
14. Costing of apiary products, quotations
15. Storage and packing of apiary products
16. Use of Computer in maintenance of stock quotations, etc.

Distribution of practical marks : 6 Hrs.

1.	Practical based on apiculture management		
	A. Methods of Colony handling	05 Marks	
	B. Determination of meteorological factor	05 Marks	
	C. Bee recognitions	05 Marks	
2.	Preparation of order/Bill of apiary products. OR Processing of Assorted data by using computers	15 Marks	
3.	Spotters, based of Syllabus of the paper	10 Marks	
4.	Certified practical record	05 Marks	
5.	Viva-voce	05 Marks.	
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	Total	50 Marks	

List of Equipments-

1. Queen grafting kit.
2. Thermometers
3. Wax extraction unit.
4. Wax foundation sheet

B.Sc. Part-I (Sem-I & II)
Exam. 2016-17

Prospectus No. 2017121

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका
विज्ञान स्नातक भाग-१
सत्र-१, परीक्षा हिवाळी-२०१६
सत्र-२, परीक्षा उन्हाळी-२०१७

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I N D E X
B.Sc.Part-I (Semester-I & II)
(Prospectus No.2016121)

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SANT GADGE BABA AMRAVATI UNIVERSITY
SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

- (1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects, papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.
- (2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc. refer the University OrdinanceBooklet the various conditions/provisions pertaining to examinations as prescribed in the following Ordinances-

Ordinance No. 1	:	Enrolment of Students.
Ordinance No.2	:	Admission of Students
Ordinance No. 4	:	National Cadet Corps
Ordinance No. 6	:	Examination in General (relevant extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No.9	:	Conduct of Examinations (Relevant extracts)
Ordinance No.10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission Candidates to Degrees
Ordinance No.109	:	Recording of a change of name of a University Student in the records of the University

Ordinance No. 138	:	For improvement of Division
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dr. Ajay P. Deshmukh
Registrar

Sant Gadge Baba Amravati University

**SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI
DIRECTION**

No. : 16/2010

Date : 11/06/2010

Subject : Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course-Semester Pattern), Direciton, 2010.

Whereas, University Grants Commission, New Delhi vide D.O.No.F-2/2008/(XI Plan), Dtd.31 Jan.2008 regarding new initiatives under the 11th Plan ó Academic Reforms in the University has suggested for improving quality of higher education and to initiate the Academic Reform at the earliest.

AND

Whereas, the Academic Council while considering the above letter in its meeting held on 30.4.2008, vide item No.55 has resolved to refer the same to Dean's Committee, and the Dean's Committee in its meeting held on 19.07.2008 has decided to refer the matter to all Board of Studies.

AND

Whereas the recommendations of various Board of Studies in the faculty of Science regarding Upgradation and Revision of various syllabi and introduction and implementation of Semester Pattern Examination System at under graduate level was considered by the faculty of Science in its meeting held on 7.12.2009 and constituted a Committee of all Chairmen of Board of Studies and one member nominated by Chairmen of respective B.O.S. under the Chairmanship of Dean of faculty to decide the policy decision regarding semester pattern examination system.

AND

Whereas, the faculty of Science in its emergent meeting held on 11th May, 2010 vide item No.26, has considered, accepted and recommended to Academic Council, the policy decision regarding introduction of Semester pattern and the draft syllabi of B.Sc. Part-I (Semester-I & II) along with draft ordinance and other details. The recommendations of the faculty was approved by the Academic Council in its emergent meeting held on 28.5.2010, vide item No.35 D).

AND

Whereas, Ordinance No.143 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) is in existence in the University as per annual pattern examination system.

AND

Whereas, new scheme of examination as per semester pattern is to be implemented from the Academic Session 2010-11 for Semester-I & onwards which is regulated by an Ordinance and framing of an Ordinance for the above examination is likely to take some time.

AND

Whereas, the admission of students in the semester pattern at B.Sc. Part-I (Semester-I) are to be made in the Academic Session 2010-11.

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called, "Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course-Semester Pattern), Direciton, 2010".
2. This direction shall come into force with effect from the date of its issuance.
3. (i) The following shall be the examination leading to the Degree of विज्ञान स्नातक (Bachelor of Science) in the faculty of Science-
 - (1) The विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination;
 - (2) The विज्ञान स्नातक भाग-२, सत्र-३ (B.Sc. Part-II, Semester-III) Examination;
 - (3) The विज्ञान स्नातक भाग-२, सत्र-४ (B.Sc. Part-II, Semester-IV) Examination;
 - (4) The विज्ञान स्नातक अन्त्य, सत्र-५ (B.Sc. Final, Semester-V) Examination; and
 - (5) The विज्ञान स्नातक अन्त्य, सत्र-६ (B.Sc. Final, Semester-VI) Examination.
- (ii) The period of Academic Session shall be such as may be notified by the University.
4. (i) The theory examination of Semester-I & II shall be simultaneously conducted by the University at the end of Semester-II in Summer.
- (ii) The examination of Semester-III, IV, V & VI shall be conducted by the University and shall held by the end of each semester separately.

- (iii) The main examination of Semester-III & V and that of Semester-IV & VI shall be held in Winter and Summer respectively.
- (iv) The supplementary examination for Semester-I & II shall be held in Winter and that of Semester-III & V and Semester-IV & VI in Summer and Winter respectively.

That means the theory examination of all the Semesters shall be conducted by the University and shall be held as per the schedule.

Sr.No.	Name of the Examination	Main Examination	Supplementary Examination
1	Semester-I & Semester-II	Summer (Simultaneously)	Winter (Simultaneously)
2	Semester-III & Semester-V	Winter	Summer
3	Semester-IV & Semester-VI	Summer	Winter

5. Subject to their compliance with the provisions of this Direction and of other Ordinances in force from time to time, the following persons shall be eligible for admission to the examinations, namely:-
- A student of a College who has prosecuted a regular course of study for not less than one academic year prior to that examination;
 - A teacher in a Educational Institution eligible under the provisions of Ordinance No.18, and
 - A women candidate who has not pursued a regular course of study.

Provided that in the case of the persons eligible under clauses (b) and (c) an applicant to the examination shall have attended a full course of laboratory instructions in a College in the subject in which laboratory work is prescribed. The candidate shall submit a Certificate to that effect signed by the Principal of the college.

6. **(I) The Students passing H.S.C. Examination with Physics, Chemistry and Mathematics shall offer following subjects at B.Sc. Part-I Examination.**
- English and any one of the following languages Marathi, Hindi, Urdu, Sanskrit, and Supplementary English.
 - Three optional subjects atleast one subject from the following groups be selected.

- Group A** :- Chemistry, Industrial Chemistry, Petro-Chemical Science, Electronics, Mathematics.
- Group B** :- Physics, Geology, Statistics, Computer Science, Computer Application, Information Technology and Geography.

The Students passing H.S.C. Examination with Chemistry and Biology shall offer following subjects:-

- English and any one of the following languages. Marathi, Hindi, Urdu, Sanskrit and Supplementary English.
- Chemistry.
- Two optional subjects from the following group be selected.

Group C : Botany, Zoology, Bio-Chemistry, Geography, Fisheries, Environmental Science, Microbiology, Geology, Food Science, Industrial Microbiology, Biotechnology and Apiculture.

For Vocational subjects sanctioned by U.G.C. there shall be following scheme of Combination of subjects :-

Students with Mathematics at H.S.C. Examination shall select two subjects from Group D and one from Group F.

Students passing with Biology, at H.S.C Examination. Shall select two subjects from Group E and One from Group F.

Group D : Physics, Chemistry, Mathematics, Electronics, Statistics Computer Science, Computer Application, Information Technology and Geology.

Group E : Chemistry, Botany, Zoology, Micro-Biology, Geology, Geography, Environmental Science, Industrial Microbiology and Biochemistry.

Group F : Biological Techniques and Specimen Preparation. Industrial Chemistry, Instrumentation, Computer Application, Seed Technology, Industrial Fish and Fisheries, Computer Maintenance, Biotechnology and other Vocational subjects proposed by U.G.C. from time to time shall be included in Group F.

The students passing HSC examination with Physics, Chemistry, Biology and Mathematics shall

have the option of opting **Bioinformatics** subject with any one subject from **Group-G** and any one subject from **Group-H**.

Group G: Botany, Zoology, Bio-Chemistry, Microbiology, Industrial Microbiology, and Biotechnology.

Group H: Chemistry, Physics, Electronics, Statistics, Geology, Mathematics and Computer Science.

- (II) The students passing H.S.C. examination (M.C.V.C. stream) with technical trades mentioned in column No.2 of the following table shall be eligible for admission to the B.Sc. Part-I course in the optional subjects mentioned in column Nos. 3 of the said table as per the scheme given in Group A to H.

TABLE

Sr. No.	M.C.V.C. group and trade	Subjects allowed for admission to B.Sc.Part-I (Any three from the following)
1	2	3
1	Para Medical Group Medical Laboratory Technician Trade	Botany, Zoology, Computer Application (Vocational), Microbiology, Biochemistry, Biotechnology (Regular/ Vocational), Geology, Geography, Environmental Science, Seed Technology (Vocational), Industrial Fish & Fisheries (Vocational), B.T.S.P. (Vocational), Chemistry, Bioinformatics.
2	Agricultural Group Horticulture Trade or Crop Science Trade	Zoology, Chemistry, Computer Application (Vocational), B.T.S.P. (Vocational), Seed Technology(Vocational), Microbiology, Biochemistry, Biotechnology (Regular/ Vocational), Geology, Geography, Environmental Science, Botany, Bioinformatics.
3	Fisheries Group Inland Fisheries Trade Fish Processing Technology Trade	Botany, Chemistry, Computer Application (Vocational), B.T.S.P.(Vocational), Industrial Fish & Fisheries (Vocational), Microbiology, Biochemistry,

		Biotechnology (Regular/Vocational), Geology, Geography, Environmental Science, Zoology, Bioinformatics, Apiculture.
4	Engineering and Technology Group Electronics Technology Trade	Physics, Computer Science, Geology, Geography, Statistics, Chemistry, Mathematics, Industrial Chemistry (Regular/Vocational), Computer Application (Vocational), Electronics, Information Technology.

- (III) In the case of विज्ञान स्नातक भाग-२ सत्र-३ व ४ (B.Sc. Part-II, Sem-III & IV) Examination:-

have passed not less than one academic year previously the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination of the University or an examination recognised as equivalent thereto, and

- (IV) In the case of the विज्ञान स्नातक अन्त्य, सत्र-५ व ६ (B.Sc. Final, Sem-V & VI) Examination:- have passed not less than one academic year previously the विज्ञान स्नातक भाग-२, सत्र-३ व ४ (B.Sc. Part-II, Sem-III & IV) Examination of the University or an examination recognised as equivalent thereto;

7. Subject to his/her compliance with the provisions of this Direction and other Ordinances (pertaining to Examination in General) in force from time to time, the applicant for admission, at the end of the course of study of a particular semester to an examination specified in column (1) of the table below, shall be eligible to appear at it, if,
- he/she satisfied the condition in the table and the provisions thereunder.
 - he/she has prosecuted a regular course of study in a college affiliated to the University.
 - he/she has in the opinion of the Principal shown the satisfactory progress in his/her studies.

TABLE

Name of the Exam to appear	The student should have completed the Session / term satisfactorily	The student should have passed
1	2	3
B.Sc. Part-I (Sem-I & II)	Sem-I & II	Qualifying examination.
B.Sc.-II Semester-III	Semester-I & II	One half of the total head prescribed for Sem-I & Sem-II examination
B.Sc.-II Semester-IV	Semester-III	One half of the total head prescribed for Sem-I & Sem-II examination
B.Sc.-III Semester-V	Semester-III & IV	(i) passed the Sem-I & II examination and (ii) One half of the total head prescribed for Sem-III & Sem-IV examination
B.Sc.-III Semester-VI	Semester-V	(i) passed the Sem-I & II examination and (ii) One half of the total head prescribed for Sem-III & Sem-IV examination

(Note : For Calculating the Heads, the theory and the practical shall be consider as a separate head and on calculation fraction if any shall be ignored.)

8. Without prejudice to the other provisions of Ordinance No. 6 relating to the Examination in General, the provisions of Paragraph 5, 8, 10 and 31 of the said ordinance shall apply to every collegiate candidate.
9. The fee for the examination shall be as prescribed by he University

from time to time.

10. Every examinee for the विज्ञान स्नातक भाग-२, सत्र-३ व सत्र-४ (B.Sc.Part-II, Sem-III & Sem-IV), Examination shall be examined in each of the three Science subjects in which he has been examined at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination.
11. Every examinee for the विज्ञान स्नातक अन्त्य, सत्र-५ व ६ (B.Sc.Final, Sem-V & VI), Examination shall be examined in each of the three Science subjects in which he has been examined at the विज्ञान स्नातक भाग-२, सत्र-३ व सत्र-४ (B.Sc. Part-II, Sem-III & Sem-IV) Examination.
12. An examinee who is successful at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination, may offer an additional subject mentioned in Para (6) (iii) not offered by him at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) Examination, on his prosecuting a regular course of study for one academic year in that subject. Such an examinee shall not be permitted to take any other examination simultaneously with the examination in the additional subjects. The fee for the additional subject shall be as prescribed by the University from time to time.
13. The Scope of the subjects of all semester opted by the students shall be as indicated in the respective syllabi from time to time. The medium of instruction and examination shall be English except for the courses in Languages.
14. The maximum marks allotted to each subject and paper and the minimum marks which an examinee must obtain in order to pass the examination shall be as per Appendices A, B, C, D, E and F appended to this Ordinance.
15. The practical examination of all semesters shall be conducted annually. That means the practical examination shall be conducted as per following schedule.

Sr.No.	Semester	Examination
1	Semester-I & II	Summer
2	Semester-III & IV	Summer
3	Semester-V & VI	Summer

16. The scheme of awarding internal marks shall be as per **Appendix-G** appended with this Direction.
17. Successful examinees at the विज्ञान स्नातक अन्त्य, सत्र-६ (B.Sc. Final, Sem-VI) Examination who obtain not less than 60% marks in

aggregate of Sem-I, II, III, IV, V & VI Examination taken together shall be placed in the First Division, those obtaining less than 60% but not less than 45% in the Second Division, and all other successful examinees in the pass Division.

Explanation :

Division at the विज्ञान स्नातक अन्त्य, सत्र-५ व ६ (B.Sc. Final, Sem-V & Sem-VI) Examination shall be declared on the basis of the marks obtained in the Science Subjects at the Sem-I, II, III, IV, V & VI Examination taken together.

18. There shall be no classification of successful examinees at the Sem-I to Sem-V Examinations.
19. An examinee successful in the minimum period prescribed for the examination, obtaining not less than 75% of the maximum marks prescribed in the subject shall be declared to have passed the examination with Distinction in the subject.

Explanation :

- (1) Distinction shall be awarded only in Science Subjects including Mathematics.
- (2) Distinction at the विज्ञान स्नातक अन्त्य (B.Sc. Final) Examination shall be awarded on the basis of the marks obtained at the विज्ञान स्नातक भाग-१, सत्र-१ व २; विज्ञान स्नातक भाग-२, सत्र-३ व ४; व विज्ञान स्नातक अन्त्य, सत्र ५ व ६ (B.Sc. Part-I, Sem-I & II; B.Sc. Part-II, Sem-III & IV, and B.Sc. Final-Sem-V & VI) Examination taken together.
- (3) Distinction shall not be awarded to an examinee availing of the provision of the exemptions and compartments at any of the examination.
20. Provisions of Ordinance No18/2001 in respect of an Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001 shall apply.
21. (A) The students who have passed B.Sc.Final examination of this University or any other statutory University shall be eligible to seek admission for studying practical of any other optional subjects offered for B.Sc. Degree for simultaneous study of complete three year course for that subject in one year and to appear simultaneously for all parts of examination leading to the degree of Bachelor of Science (additional) in that subject, subject to the following condition.

An examinee shall have attended full course of laboratory instructions in a College in the subject in which laboratory work is prescribed. An examinee shall submit a certificate to that effect signed by the Principal of the College.

- (B) On securing not less than minimum marks prescribed for the subject / subjects shall be issued a certificate of having passed the examination in the additional subject/subjects as the case may be.
- (C) The application for admission to the examination under (A) above shall be submitted to the Registrar not less than three months before the date of commencement of the examination.
22. As soon as possible after the examinations the Board of Examination shall publish a list of successful examinees at the B.Sc Part-I, Sem-I & II; B.Sc. Part-II, Sem-III & IV and B.Sc. Final Sem-V & VI Examinations. Such list at the विज्ञान स्नातक अन्त्य (B.Sc. Final) Examination shall be arranged in three Divisions. The names of the examinees passing the examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in First or Second Division shall be arranged in Order of Merit as provided in the Examinations in General Ordinance No. 6.
23. No Person shall be admitted to B.Sc Part-I, Sem-I & II; B.Sc. Part-II, Sem-III & IV and B.Sc. Final Sem-V & VI Examinations, if he has already passed the corresponding or an equivalent examination of any other Statutory University.
24. Successful Examinees at the विज्ञान स्नातक भाग-१, सत्र-१ व २ (B.Sc. Part-I, Sem-I & II) and the विज्ञान स्नातक भाग-२, सत्र-३ व ४ (B.Sc. Part-II, Sem-III & IV) Examination shall be entitled to receive a Certificate signed by the Registrar and successful examinee at the end of विज्ञान स्नातक अन्त्य सत्र-६ (B.Sc. Final, Sem-VI) Examination, shall on payment of the prescribed fees, receive a Degree in the Prescribed form, signed by the Vice-Chancellor.

Appendix-A

Examination Scheme

विज्ञान स्नातक भाग-१

(B.Sc. Part-I) (Semester-I)

Sr. No.	Subject	Examination Scheme						Total Theory, Pract. & Int.Ass.
		Theory			Practical			
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. pass Marks	Max. Marks Practical	Min. Pass Mar.	
1	Compulsory English	40	10	50	18	0	0	50
2	Languages	40	10	50	18	0	0	50
3	Mathematics (Paper-I)	60	15	150	54	0	0	150
4	Mathematics (Paper -II)	60	15			0		
5	Science subjects excluding Mathematics	80	20	100	35	50	18	150

Grand Total of Semester-I : 450+100

Appendix-B

विज्ञान स्नातक भाग-१

(B.Sc. Part-I) (Semester-II)

Sr. No.	Subject	Examination Scheme						Total Theory, Pract. & Int.Ass.
		Theory			Practical			
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. pass Marks	Max. Marks Practical	Min. Pass Mar.	
1	Compulsory English	40	10	50	18	0	0	50
2	Languages	40	10	50	18	0	0	50
3	Mathematics (Paper-III)	60	15	150	54	0	0	150
4	Mathematics (Paper -IV)	60	15			0		
5	Science subjects excluding Mathematics	80	20	100	35	50	18	150

Grand Total of Semester-I : 450+100

Appendix-C

विज्ञान स्नातक भाग-२ . सत्र ३
(B.Sc. Part-II) (Semester-III)

Sr. No.	Subject	Examination Scheme						Total Theory, Pract. & Int.Ass.
		Theory			Practical			
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	
1	Mathematics (Paper-V)	60	15	150	60	0	0	150
2	Mathematics (Paper-VI)	60	15			0		
3	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-III : 450

Appendix-D

विज्ञान स्नातक भाग-२ . सत्र ४
(B.Sc. Part-II) (Semester-IV)

Sr. No.	Subject	Examination Scheme						Total Theory, Pract. & Int.Ass.
		Theory			Practical			
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	
1	Mathematics (Paper-VII)	60	15	150	60	0	0	150
2	Mathematics (Paper-VIII)	60	15			0		
3	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-IV : 450

Appendix-E

विज्ञान स्नातक अंत्य सत्र ५
(B.Sc. Final) (Semester-V)

Sr. No.	Subject	Examination Scheme						Total
		Theory			Practical			
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Mathematics (Paper-IX)	60	15	150	60	0	0	150
2	Mathematics (Paper-X)	60	15			0	0	
3	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-V : 450

Appendix-F

विज्ञान स्नातक अंत्य सत्र ६
(B.Sc. Final) (Semester-VI)

Sr. No.	Subject	Examination Scheme						Total
		Theory			Practical			
		Max. Mar. Theory Papers	Max. Marks Int. Ass.	Total	Min. Pass Marks	Max. Marks Practical	Min. Pass Mar.	Theory, Pract. & Int.Ass.
1	Mathematics (Paper-VII)	60	15	150	60	0	0	150
2	Mathematics (Paper-VIII)	60	15			0	0	
3	Science subjects excluding Mathematics	80	20	100	40	50	20	150

Grand Total of Semester-VI : 450

- Note :**
- 1 There shall be only one theory paper of each science subject other than Mathematics for every semester.
 - 2 Distribution of marks of practical within the limit of Max. Marks shall be as prescribed by the B.O.S. of the concerned subject.
 - 3 In absence of certificate for practical record book (Appendix-H), examinee shall not be allowed to appear for the practical examination.

Appendix-G

The internal assessment marks assigned to each theory paper as mentioned in **Appendix-A to F** shall be awarded on the basis of assignment, class test, attendance, project assignments, Seminar, Study tour, Industrial visit, Visit to educational institutions and research organization, field work, group discussion or any other innovative practice/activity. The marking scheme for each of the practice/activity shall be as under :-

Sr. No.	Semester	Practice /Activity	Details of marking scheme	Total marks for		
				Languages	Mathe-matics	Other Science Subjects
1	2	3	4	5	6	7
1	Semester -I & II	Assignment	Two assignments per theory paper	04	05	08
2	Semester-I & II	Class Test	Two class test (on passing test)	06	10	12
Total marks for Sem-I /II				10	15	20
3	Sem-III, IV, V & VI	Project Assignment	On latest developments in the subject in 100-200 words	0	03	04
4	Sem-III, IV, V & VI	Class Test	Two class test (on passing test)	0	08	10

1	2	3	4	5	6	7
5	Sem-III, IV, V & VI	Seminar, Study tour, Industrial visit, Visit to educational institutions, research organization, field work, group discussion or any other innovative practice/ activity.	Any one of the activity with report of the activity.	0	04	06
Total marks of Sem-III/ IV/V/ VI				—	15	20

- Note :**
- The concerned teacher shall have to keep the record of all the above activities till the passing out of that batch.
 - At the beginning of each semester, every teacher shall inform his/her students unambiguously the method he/she proposes to adopt a scheme of marking for the internal assessment.
 - Teacher shall announce the schedule of activity for Internal Assessment in advance in consultation with HOD/ Principal.
 - Normally the teacher concerned may conduct three written tests spread periodically during the semester and award the marks on the test on passing of any two tests.
 - The internal marks shall be displayed on the notice board before three weeks of the commencement of the theory examination. Grievances if any, of the student regarding Internal Assessment marks shall be settled by the Principal at college level in consultation with the concerned teacher.
 - Final submission of internal marks to the University shall be before commencement of the theory examinations.

CERTIFICATE

Name of College / Institution :

Name of the Department :- _____

This is to certify that this Book contains the bonafide record of the practical work of Shri/Kumari/Shrimati

of B.Sc.Part-____ (Semester-____) during the Academic year _____

Dated : / /20

Signature of the Teacher who taught the examinee

1. í í í í í í í í

2. í í í í í í í í

Head of the Department

(**Note :** In absence of certificate for practical record book (Appendix-H), examinee shall not be allowed to appear for the practical examination.)

Amravati
Date : 11/6/2010

Sd/-
(Dr.Kamal Singh)
Vice-Chancellor

Sang Gadge Baba Amravati University, Amravati

DIRECTION

No. : 37 / 2011

Date : 26.7.2011

Subject : Corrigendum to Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science)(Three Year Degree Course – Semester Pattern)

Whereas, the Direction No. 16 of 2010 regarding Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course ó Semester Pattern), Direction-2010 is in existence.

AND

Whereas, the existing provision regarding theory examination of Semester-I & II shall be simultaneously conducted by the University at the end of Semester-II in Summer as well as the practical examinations shall be conducted annually for each semester.

AND

Whereas, the Committee constituted by the faculty of Science, under the Chairmanship of Dean of the faculty in its meeting held on 28.6.2011 and 14.7.2011 has considered the issues regarding conduction of theory and practical examination of B.Sc. Semester-I to VI at the end of each semester, from the Academic Session 2011-12.

AND

Whereas, making amendments in the Ordinance for above examination is a time consuming process.

AND

Whereas, it is necessary to carryout the corrections to Direction No.16 of 2010 issued earlier as stated in para No.1 above, urgently.

Now, therefore, I, Dr.Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called õCorrigendum to Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course ó Semester Pattern)õ.
2. This direction shall come into force from the date of its issuance.
3. From the Academic Session 2011-12, theory and practical examinations of each Semester shall be conducted separately at the end of each semester.

Sd/-

Amravati
Date : 26/7/2011

(Dr.Mohan K.Khedkar)
Vice-Chancellor

DIRECTION

No. : 1 / 2012

Date : 23.1.2012

Subject : Corrigendum to Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science)(Three Year Degree Course – Semester Pattern)

Whereas, the Direction No.16 of 2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course ó Semester Pattern) in the faculty of Science is in existence.

AND

Whereas, corrigendum to Direction No.16 of 2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course ó Semester Pattern) was issued vide Direction No.37/2011 on dated 26.7.2011.

AND

Whereas, the Academic Council in its meeting held on 13.1.2012 vide item Nos.14 (5) (E) and 14 (5) (O) respectively has accepted to allow the students passing H.S.S.C. examination (M.C.V.C. stream) with Medical Laboratory Technician Trade for admission to B.Sc. Part-I under the group-õChemistry, Environmental Science, Industrial Microbiology,õ, and the recommendations of the Monitoring Committee under the Chairmanship of Dean, faculty of Science of its meeting dated 15.11.2011 regarding correction in marking scheme of Internal Assessment Marks at B.Sc. level.

AND

Whereas, as per decision of Academic Council, the above correction are to be carried out in Column No.3 against Sr.No. 1 under the table of sub-clause (II) of Para 6 and in Appendix-G of Direction No.16 of 2010 issued earlier for the Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course ó Semester Pattern) in the faculty of Science for Summer-2012 examinations and onwards.

AND

Whereas, it is necessary to carry out the corrections in the above said Direction immediately.

Now, therefore, I, Dr.Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called õCorrigendum to Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science)

(Three Year Degree Course ó Semester Pattern) in the faculty of Scienceö.

2. This direction shall come into force from the date of its issuance.
3. In Direction No.16/2010 in respect of Examinations leading to the Degree of (Bachelor of Science) (Three Year Degree Course ó Semester Pattern) in the faculty of Science-
 - A) the words öIndustrial Microbiologyö after the word öBioinformaticsö in column No.3 against Sr.No.1 under the table of Sub-clause (II) of para 6 of Direction No.16 of 2010 shall be added.
 - B) in Appendix-G following corrections be carried out :
 1. In column No.4, at Sr.No.1, the words öTwo assignmentsö be replaced by the words öOne assignmentö.
 2. In column No.4, at Sr.No.2, the words & signs öTwo Class Tests (On passing test)ö be replaced by the words öOne testö.
 3. In column No.4, at Sr.No.4, the words & signs öTwo Class Tests (On passing test)ö be replaced by the words öOne testö.
 4. In column No.4, at Sr.No.5, the words öAny one of the activityö be replaced by the words öAny one of the activitiesö.
 5. The Note No.4 be deleted and substituted by the following para. öThe test with maximum 30 marks be conducted for the students and the marks be allotted based on the performance of the students as under-ö

	Languages		Mathematics		Other Sci. subjects	
	Sem-I & II	Sem-I & II	Sem-III to VI	Sem-I & II	Sem-III to VI	Sem-III to VI
For the score 24 and above.	06	10	08	12	10	
From 18 to 23	05	08	06	10	07	
From 11 to 17	04	06	04	07	05	
From 0 to 10	00	00	00	00	00	

6. The following Note be added at Sr.No.7 -

öThe student who remain absent for internal assessment through out the semester, -Zeroømarks be given to him/her while posting the marks instead of writing öAbö before his/her name.ö

Sd/-

(Mohan K.Khedkar)

Vice-Chancellor

Amravati

Date : 23/1/2012

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI

DIRECTION

No. : 5 of 2015

Date : 03/07/2015

Subject : Corrigendum to Direction No. 16 of 2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course – Semester Pattern), Direction, 2015.

Whereas, Direction No.16/2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course ó Semester Pattern), Direction 2010, in the Faculty of Science is in existence in the University.

AND

Whereas, Direction No. 16 of 2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course ó Semester Pattern), Direction 2010 is already corrected by Direction Nos. 37/2011 & 1/2012.

AND

Whereas, the recommendation of the Committee appointed by Faculty of Science in respect of Government Resolution No. व्हीओसी-२०१२/५९१/प्र.क्र.२४५(अ)/व्यशि-४, दि.२८.९.२०१२ to decide equivalence for the +2 year courses of Vocational Education Examination Board for admission to higher education was accepted by the Honöble Vice-Chancellor u/s 14(7) of Maharashtra Universities Act, 1994 on behalf Faculty of Science and Academic Council.

AND

Whereas, Honöble Vice-Chancellor has accepted the recommendation of the Committee appointed by Faculty of Science for the students admitted to B.Sc.Part-I having passed 12th M.C.V.C. courses with trades öDairy Technologyö, öPoultry Productionö, öSeed Production Technologyö, öWatershed Managementö, öPost Harvest Technologyö and öWatershed Managementö u/s 14(7) of Maharashtra Universities Act, 1994 on behalf Faculty of Science and Academic Council.

AND

Whereas, the Department of Higher and Technical Education, Govt. of Maharashtra vide its Order No.एन.जी.सी.२०१४/(१०२/१४)/मशि-४, दि.14.6.2014, granted permission to start B.Sc. Part-I Forensic Science at Shri Shivaji Arts, Commerce and Science College, Akola; and the recommendations of Ad-hoc Committee of its meeting held on 9.4.2015 regarding draft syllabus

and other details for the subject Forensic Science at B.Sc. level were accepted by the Honorable Vice-Chancellor u/s 14(7) of the M.U.Act, 1994 on 15.4.2015 on behalf of Faculty of Science.

AND

Whereas, the Academic Council in its meeting held on 6.5.2015 while considering the above recommendations of Faculty of Science vide item No. 35) 2) G) has approved the Draft Syllabi and other details for the subject Forensic Science at B.Sc. level to be implemented from the Academic Session 2015-16.

AND

Whereas, the matter is required to be regulated by framing the Ordinance and making of an Ordinance may likely to take some time.

AND

Whereas, the Academic Session 2015-16 is commencing in June, 2015.

Now, therefore, I, Dr.M.K.Khedkar, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:

- 1) Corrigendum to Direction No. 16 of 2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course ó Semester Pattern), Direction, 2015.
- 2) This Direction shall come into force w.e.f. the date of its issuance.
- 3) As per Government Resolution No. व्हीओसी-२०१२/५९९/ प्र.क्र.२४५(अ)/ व्यशि-४, दि.२८.९.२०१२,
 - i) The students passing the Certificate Course Examination from Computer, Electronics, Electric and Chemical group shall be eligible for admission to B.Sc. Part-I under the Group-A, B, D & H.
 - ii) The students passing the Certificate Course Examination from Paramedical and Agriculture group shall be eligible for admission to B.Sc. Part-I under the Group-C, E, F & G.
- 4) For the admitted and hereinafter admitting students to B.Sc. Part-I, in Direction No.16/2010 in para 6(II), in Sr.No.2 of the table, in the column of óM.C.V.C. Group and Tradeö, the trades óDairy Technologyö, óPoultry Productionö, óSeed Production Technologyö, óWatershed Managementö, óPost Harvest Technologyö be added below the Trade óCrop Science Tradeö under Agriculture Groupö and the trade óWatershed Managementö be also added below the Trade óElectronics Technology Tradeö.

- 5) Forensic Science subject shall be started as an optional subject for B.Sc. Degree course in the University.
- 6) In Direction 16/2010, in Para 6. (I), the subject óForensic Scienceö shall be added in Group-C after the subject óApicultureö, in Group-E after the subject óBiochemistryö and in Group-G after the subject óBiotechnologyö.

Date : 03/07/2015

Sd/-

(Dr.M.K.Khedkar)

Vice-Chancellor

Sant Gadge Baba Amravati University

DIRECTION**No. : 15 of 2015****Date : 24/09/2015**

Subject : Corrigendum to Direction No. 16 of 2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course - Semester Pattern), Direction, 2015.

Whereas, Direction No.16/2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course - Semester Pattern), Direction 2010, in the Faculty of Science is in existence in the University.

AND

Whereas, Direction No. 16 of 2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course - Semester Pattern), Direction 2010 is already corrected by Direction Nos. 37/2011, 1/2012 & 5/2015.

AND

Whereas, the Department of Higher and Technical Education, Govt. of Maharashtra vide its Order No.एन.जी.सी.२०१४/(१०२/१४)/मशि-४, दि.14.6.2014, granted permission to start B.Sc. Part-I i) Renewable Energy & ii) Animation at Gayadevi Joshi Aryabhata Mahavidyalaya, Akola;

AND

Whereas, the Honb'le Vice-Chancellor has constituted the Ad-hoc Committees for the subjects Renewable Energy & Animation for preparation of draft syllabi and other details.

AND

Whereas, the recommendations of Ad-hoc Committee of its meeting held on 6.8.2015 for the subject "Renewable Energy" and 18.09.2015 for the subject "Animation" regarding draft syllabus and other details for the above subjects at B.Sc. level were accepted by the Hon'ble Vice-Chancellor u/s 14(7) of the Maharashtra Universities Act, 1994 on 24.9.2015 on behalf of Faculty of Science and Academic Council.

AND

Whereas, the above recommendations of the Draft Syllabi and other details for the subjects i) Renewable Energy & ii) Animation at B.Sc. level to be implemented for B.Sc.Part I from the Academic Session 2015-16.

AND

Whereas, the matter is required to be regulated by framing the Ordinance and making of an Ordinance may likely to take some time.

AND

Whereas, the Academic Session 2015-16 is already started.

Now, therefore, I, Dr.M.K.Khedkar, Vice-Chancellor of Sant Gadge Baba Amravati University, Amravati in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under:

- 1) This Direction shall be called as "Corrigendum to Direction No. 16 of 2010 in respect of Examinations leading to the Degree of विज्ञान स्नातक (Bachelor of Science) (Three Year Degree Course - Semester Pattern), Direction, 2015".
- 2) This Direction shall come into force w.e.f. the date of its issuance.
- 3) The subjects i) Renewable Energy & ii) Animation shall be started as optional subjects for B.Sc. Degree course in the University.
- 4) In Direction 16/2010, in Para 6. (I), the subject "Renewable Energy" and "Animation" shall be added at the end of Group-A.

Date : 24/09/2015

Sd/-

(Dr.M.K.Khedkar)
Vice-Chancellor

The Executive Council, dated 1/2-4-1977, 11-7-1977 has prescribed the Teaching periods in the various subject in the Faculty of Science as follows.

Examination:**B. Sc. Part - I**

	Subject	Theory	Practical
1.	Chemistry	6	6
2.	Physics	6 + 1 Tutorial	6
3.	Botany	6	6
4.	Zoology	6	6
5.	Geology	6	6
6.	Mathematics	9+1 Tutorial-	-
7.	Statistics	6	6
8.	English		
	Languages:	4 + 1 Tutorial--	
9.	Supplementary English	3	
10.	Marathi	3	
11.	Hindi	3	
12.	Sanskrit	3	
13.	Biochemistry	6	6
14.	Microbiology	6	6
15.	Electronics	6	6
16.	Computer Science	6	6

B.Sc. Part - II and B.Sc. Final

1.	Physics	6 + 2	6
2.	Mathematics	9 + 1 Tutorial--	
3.	Chemistry	6	6
4.	Botany	6	6
5.	Zoology	6	6
6.	Geology	6	6
7.	Statistics	6	6
8.	biochemistry	6	6
9.	Microbiology	6	6
10.	Electronics	6	6
11.	Computer Science	6	6

Note : 1) * The strength of a batch of practical and Tutorials for Under-Graduate classes shall be 16 with an addition of 10% with the

permission of Vice-Chancellor.

*(As amended by the Executive Council dated 27/28-4-1979).

- 2) A Period will be counted of 45 minutes duration at Under-graduate level.
- 3) For Tutorial class a batch will be of 16 students with an addition of 10% with the permission of the Vice-Chancellor per week.

**SYLLABUS PRESCRIBED FOR B.Sc. PART-I
SEMESTER-I**

1. COMPULSORY ENGLISH**1S Compulsory English****Effective from Session 2010-2011****Text Book Prescribed : REALMS OF GOLD (SPACIAL EDITION)**

Edited by Board of Editors, Sant Gadge Baba
Amravati University, Amravati.

Publisher: Orient Blackswan Pvt. Ltd. Mumbai.

- Prose Passages:**
1. The Power of Prayer : Abdul Kalam
 2. Rising Tide of Urban Chaos : Colin Legum
 3. The Gold Frame : R.K.Laxman
 4. Vivekananda : The Great Journey to the West :
Romain Rolland
 5. Good Manners : J.C.Hill

- Poems :**
1. The Village Schoolmaster ó Oliver Goldsmith
 2. Lucy ó William Wordsworth
 3. When I Set Out for Lyonesse ó Thomas Hardy
 4. All in June ó W. H. Davies.

Grammar: Parts of Speech, Use of Articles and Prepositions, Tenses, Transformation of Sentences.

Communication Skills Everyday English – Part I**Preparing a CV and Writing Letters.****Pattern of Question Paper and Distribution of Marks.****Maximum Marks : 40****Time: Three Hours**

- Q.1 : Prose Passages No. 1 to 5
There shall be five short answer questions í .05 marks
- Q. 2 : Prose Passages No. 1 to 5
There shall be five long answer questions. Out of these, students will have to answer any two questions of five marks each
í í 10 marks
- Q. 3 : Poems no. 1 to 4
There shall be four long-answer questions. Out of these students will have to answer any two questions of five marks each
í .10 marks
- Q. 4 : Grammar : Parts of Speech, Articles and Prepositions, Tenses, Transformation of Sentences.
There shall be five questions based on the prescribed grammar and usage. í .05 marks
- [Note : The paper setter shall have his/her discretion as regards

selection]

Q.5 : There shall be two questions based on Everyday English ó Part I. Out of these students will have to answer any one

í í 05 marks

Q. 6 : There shall be one question on preparing a CV for seeking a job

í í 05 marks

Total 40 marks

2S COMPULSORY ENGLISH**Text Book Prescribed : REALMS OF GOLD (SPACIAL EDITION)**

Edited by Board of Editors, Sant Gadge Baba
Amravati University, Amravati.

Publisher: Orient Blackswan Pvt. Ltd. Mumbai.

- Prose Lessons Prescribed:**
1. With the Photographer ó Stephen Leacock
 2. A Talk on Advertising ó Herman Wouk
 3. Making a Contract ó Philip Bingham
 4. The Scientific Point of View ó J. B. S. Haldane
 5. The Sun, the Planets and Stars ó C. Jones.

- Poems Prescribed:**
1. The Best of School ó D. H. Lawrence
 2. Ballad of the Landlord ó Langston Hughes
 3. To the Indians Who Died in Africa ó T. S. Eliot
 4. Ecology ó A. K. Ramanujan

Grammar : Parts of Speech, Use of Articles and Prepositions, Tenses, Transformation of Sentences.

Communication Skills : Note-making and Reporting, Paragraph Writing.

Pattern of Question Paper and Distribution of Marks.**Maximum Marks : 40****Time: Three Hours**

- Q.1 : There shall be five short answer questions based on prescribed prose passages
í05 marks
- Q. 2 : There shall be five long answer questions based on prescribed prose passages. Out of these, students will have to answer any two questions of five marks each
...í 10 marks
- Q. 3 : There shall be four long-answer questions based on prescribed poems. Out of these students will have to answer any two questions of five marks each
.....10 marks
- Q.4 : There shall be five questions of one mark each, from Grammar Sec-

tion-Parts of Speech, Use of articles and Prepositions, Tenses, Transformation of Sentences05 marks

Q. 5 : There shall be one question either on Note-making or on Reporting (Note: The paper setter shall have the discretion)í .. 05 marks

Q. 6 : There shall be one question on Paragraph Writing on topics of current relevance. Students will have to write a paragraph of about 200 words out of four given topics í í 05 marks

Total 40 marks

२. मराठी अनिवार्य

विज्ञान स्नातक भाग-१, सत्र-१ व सत्र-२

अभ्यासक्रमासाठी सूक्ष्म वाचनाकरिता पाठ्यपुस्तक “शलाका” ओरिएन्ट ब्लॅकस्वॉन प्रा.लि.मुंबई ४००००१ यांनी प्रकाशित केले आहे.

उपरोक्त “शलाका” पाठ्यपुस्तक विज्ञान शाखा भाषा अभ्यास मंडळाने संपादित केलेले असेल व त्यात खालील घटकांचा व पाठ्यांशांचा समावेश राहिल.

सत्र-१

घटक अ (गद्य)

१)	पुरुष सूक्त	-	लक्ष्मण लोंढे
२)	विज्ञान कथेतील सत्य आणि कथित	-	चंद्रकांत पाटील
३)	येशूची लोकशिक्षणाची शैली	-	फ्रान्सीस दिब्रिटो
४)	लोकभ्रम	-	विष्णूशास्त्री चिपळूणकर
५)	महात्मा ज्योतिराव फुले	-	भा.ल.भोळे
६)	गाडगे बाबांचे अखेरचे किर्तन	-	गाडगे बाबा

घटक ब (पद्य)

१)	पसायदान	-	ज्ञानेश्वर
२)	डोईचा पदर	-	जनाबाई
३)	टिळा टोपी उंच दावी	-	तुकाराम
४)	जैसा वृक्ष नेणे	-	नामदेव

घटक क (व्यावहारिक मराठी)

कार्यालयीन पत्रव्यवहार -

सत्र-२

घटक अ (गद्य)

१)	स्टीफन हॉकिंग	-	निवास पाटील
२)	मला शब्द द्या	-	वि.वा.शिरवाडकर
३)	आंबेडकरांचे ग्रंथप्रेम	-	शां.शं.रेगे
४)	विज्ञान, तंत्रज्ञान आणि मराठी भाषा	-	जयंत नारळीकर
५)	चिंतन	-	ए.पी.जे.अब्दूल कलाम
६)	जगायचं कशासाठी	-	डॉ.निर्मलकुमार फडकुले

घटक ब (पद्य)

१)	विद्यार्थ्याप्रत	-	केशवसूत
२)	लपे कर्माची रेखा	-	बहिणाबाई चौधरी
३)	मेंढर	-	विठ्ठल वाघ
४)	संग्राम	-	यशवंत मनोहर

घटक क (व्यावहारिक मराठी)

प्रसारमाध्यमांसाठी लेखन

मराठी अनिवार्य

विज्ञान स्नातक भाग-१, सत्र-१ व सत्र-२

वेळ ३ तास

सत्र-१

गुण - ४०

या विषयाची एक प्रश्नपत्रिका राहिल.

सूक्ष्म वाचनाकरिता पाठ्यपुस्तक - “शलाका”

या पाठ्यपुस्तकातील घटक अ (पाठ क्र.१ ते ६) व घटक ब (कविता क्र.१ ते ४) व घटक क (व्यावहारिक मराठी) यावर प्रश्न व गुणविभागणी खालील प्रमाणे राहिल.

प्रश्न-१ घटक अ	-	दिर्घोत्तरी प्रश्न (कोणताही एक)	गुण - १०
प्रश्न-२ घटक अ	-	लघुत्तरी प्रश्न (कोणतेही दोन)	गुण - (५+५+१०)
प्रश्न-३ घटक ब	-	लघुत्तरी प्रश्न (कोणतेही दोन)	गुण - (५+५+१०)
प्रश्न-४ घटक क	-	व्यावहारिक मराठी- कार्यालयीन पत्रव्यवहार	गुण - (५+५+१०)

पाच गुणांचे दोन प्रश्न राहिल.

विज्ञान स्नातक भाग-१, सत्र-१ व सत्र-२

वेळ ३ तास

सत्र-२

गुण - ४०

या विषयाची एक प्रश्नपत्रिका राहिल.

सूक्ष्म वाचनाकरिता पाठ्यपुस्तक - “शलाका”

या पाठ्यपुस्तकातील घटक अ (पाठ क्र.७ ते १२) व घटक ब (कविता क्र.५ ते ८) व घटक क (व्यावहारिक मराठी) यावर प्रश्न व गुणविभागणी खालील प्रमाणे राहिल.

प्रश्न-१ घटक अ	-	दिर्घोत्तरी प्रश्न (कोणताही एक)	गुण - १०
प्रश्न-२ घटक अ	-	लघुत्तरी प्रश्न (कोणतेही दोन)	गुण - (५+५+१०)
प्रश्न-३ घटक ब	-	लघुत्तरी प्रश्न (कोणतेही दोन)	गुण - (५+५+१०)

प्रश्न-४ घटक क - व्यावहारिक मराठी- प्रसारमाध्यमांसाठी लेखन गुण - (५+५=१०)
पाच गुणांचे दोन प्रश्न राहिल.

३. हिंदी अनिवार्य

प्रथम सत्रांत परीक्षा शैक्षणिक सत्र २०१०-११

पाठ्यपुस्तक - अस्मिता

समय ३ घंटे		पूर्णांक - ४०
प्रथम इकाई -	आधारभूत पाठ्यक्रम	
प्रश्न-१ (क)	दीर्घोत्तरी प्रश्न (एक)	०८ अंक
प्रश्न-२ (ख)	लघुत्तरी प्रश्न (दोन)	०८ अंक
द्वितीय इकाई -	भाषागत पाठ्यक्रम (विज्ञान संकाय)	
प्रश्न-३ (ग)	दीर्घोत्तरी प्रश्न (एक)	०८ अंक
प्रश्न-४ (घ)	लघुत्तरी प्रश्न (दोन)	०८ अंक
प्रश्न-५	अतिलघुत्तरी प्रश्न	

आधारभूत पाठ्यक्रमपर आधारित चार एवं भाषागत पाठ्यक्रमपर आधारित

चार ऐसे कुल आठ प्रश्न एक-एक अंक के लिए पुछे जाएंगे

सूचना - प्रश्न ५ को छोडकर सभी प्रश्न विकल्प के साथ पुछे जाएंगे

हिंदी अनिवार्य

द्वितीय सत्रांत परीक्षा शैक्षणिक सत्र २०१०-११

पाठ्यपुस्तक - अस्मिता

समय ३ घंटे		पूर्णांक - ४०
तृतीय इकाई -	पद्य विभाग	
प्रश्न-१ ला	संदर्भ सहित व्याख्या (एक)	१० अंक
प्रश्न-२ रा	कविताओंपर आधारित (२ प्रश्न)	१० अंक
चतुर्थ इकाई -	व्यावहारिक भाषा एवं व्याकरण	
प्रश्न-३ रा	अंग्रेजी से हिंदी में अनुवाद	०५ अंक
प्रश्न-४ था	पत्रलेखन (कार्यालयीन)	०५ अंक
प्रश्न-५	(अ) मुहावरे और लोकोक्तियों (२)	०४ अंक
	(ब) शब्द समूह के लिये एक शब्द (२)	०४ अंक
	(क) वाक्य शुद्ध कीजिए (१)	०२ अंक

कुल अंक ४०

SEMESTER - I

URDU COMPULSORY

Time : 3 Hours)

(Marks : 40

Text Prescribed : Shua - E - Adab (Part - I)

Published by TAFSA Printers & Publishers, Amravati.

Unitwise Distribution of Marks

Unit - I	The Following Lessons from Text	8 Marks
	جزو "الف" حصہ نثر	
	۱- تاریخ ۲- دنیا کی پہلی تہذیبیں ۳- سائنس کا کرشمہ	
Unit - II	The following poems from Text	8 Marks
	جزو "ب" (حصہ نظم)	
	۱- دنیا ۲- گلزار وطن ۳- نوجوانوں سے	
Unit - III	The following lessons from Text	8 Marks
	جزو "ج"	
	۱- گھر کی تربیت ۲- مردہ بدست زندہ	
Unit - IV	The following lesson from text	8 Marks
	کالے خاں	
Unit - V	Communication Skill	8 Marks
	Reporting of any function, incidence, match excursion	

Q. 1. Two short answertype questions out of four based on Unit -I
(Carrying four marks each) 8Marks

Q. 2. Two short answertype questions out of four based on Unit -II
(Carrying four marks each) 8Marks

Q. 3. Two short answertype questions out of four based on Unit -III
(Carrying four marks each) 8 Marks

Q. 4. One long answertype question out of two based on Unit -IV
(Carrying 8 marks) 8 Marks

Q. 5. Reporting of any function, incidence, match excursion
8 Marks

SEMESTER - II
URDU COMPULSORY

Time : 3 Hours)

(Marks : 40

Text Prescribed : Shua - E - Adab (Part - I)

Published by TAFSA Printers & Publishers, Amravati.

Unitwise Distribution of Marks

Unit - I The Following Lessons from Text 8 Marks

جزو "الف" حصہ نثر

۱۔ اردو ادب اور قومی یکجہتی ۲۔ سلونو Unit

- II The following poems from Text 8 Marks

جزو "ب" (حصہ نظم)

۱۔ ایضاً ۲۔ ایک خواب اور

Unit - III The following lessons from Text 8 Marks

جزو "ج"

۱۔ بلٹ ٹرین میں کبھی نہ بیٹھو

Unit - IV The following lesson from text 8 Marks

گدڑی کالال - نور خاں

Unit - V Communication Skill 8 Marks

a) Expansion of given idea 4 Marks

b) Idioms and Phrases 4 Marks

Q. 1. Two short answer type questions out of four based on Unit -I

(Carrying four marks each) 8Marks

Q. 2. Two short answer type questions out of four based on Unit -II

(Carrying four marks each) 8Marks

Q. 3. Two short answer type questions out of four based on Unit -III

(Carrying four marks each) 8 Marks

Q. 4. One long answer type question out of two based on Unit -IV

(Carrying 8 marks) 8 Marks

Q. 5. a) Expansion of given idea 4 Marks

b) Idioms and Phrases 4 Marks

या विषयाची एक प्रश्नपत्रिका राहिल.

सुक्ष्म वाचनाकरीता पाठ्यपुस्तक

कविकुलगुरु कालिदास विरचित रघुवंशम या महाकाव्याचा द्वितीय सर्ग वरील गुण ४०

पाठ्यपुस्तकाची पुढीलप्रमाणे चार गटात विभागणी करावी.

गट-१ : रघुवंशम (द्वितीय सर्ग) यातील श्लोक १ ते २४

गट-२ : रघुवंशम (द्वितीय सर्ग) यातील श्लोक २५ ते ५०

गट-३ : रघुवंशम (द्वितीय सर्ग) यातील श्लोक ५१ ते ७५

गट-४ : कालिदासांची शैली, दिलीपाचे व्यक्तिचित्र, नन्दिनी, वसिष्ठ, वज्रपाणि,

सुरविद सेनानी: गौरीगुरु: कालिदासाची माहिती.

प्रश्नपत्रिकेचे स्वरूप व गुणविभागणी पुढील प्रमाणे करावी.

वेळ : ३ तास

गुण : ४०

प्रश्न १ : गट १ मधील २ श्लोकांपैकी एकाचा अनुवाद : ०६

प्रश्न २ : गट २ मधील २ श्लोकांपैकी एकाचा अनुवाद : ०६

प्रश्न ३ : गट ३ मधील २ श्लोकांपैकी एकाचा अनुवाद : ०६

प्रश्न ४ : गट १, २, ३ यावर आधारित दीर्घोत्तरी प्रश्न : १०

दोन पैकी एक

प्रश्न ५ : गट ४ मधील टिपा ३ पैकी २ १२

सत्र-२

संस्कृत (आवश्यक)

या विषयाची एक प्रश्नपत्रिका राहिल.

सुक्ष्म वाचनाकरीत पाठ्यपुस्तक भगवद्गीता १४ वा अध्याय.

वरील पाठ्यपुस्तकाची पुढील प्रमाणे चार गटात विभागणी करावी.

गट-१ : भगवद्गीता १४ वा अध्याय

श्लोक १ ते ८

गट-२ : भगवद्गीता १४ वा अध्याय

श्लोक ९ ते १७

गट-३ : भगवद्गीता १४ वा अध्याय

श्लोक १८ ते २७

गट-४ : त्रिगुण, त्रिगुणांचे स्वरूप, कार्य, फल, प्रकृती गुणातीत इत्यादी.

प्रश्नपत्रिकेचे स्वरूप व गुणविभागणी पुढील प्रमाणे असावी.

वेळ : ३ तास

गुण : ४०

प्रश्न-१:	गट १ मधील २ श्लोकांपैकी एकाचा अनुवाद :	गुण-६
प्रश्न-२:	गट २ मधील २ श्लोकांपैकी एकाचा अनुवाद :	गुण-६
प्रश्न-३:	गट ३ मधील २ श्लोकांपैकी एकाचा अनुवाद :	गुण-६
प्रश्न-४:	गट १, २, ३ यावर आधारित दीर्घोत्तरी प्रश्न : २ पैकी १	गुण-१०
प्रश्न-५:	गट ४ मधील टिपा : ३ पैकी २	गुण-१२

6. SUPPLEMENTARY ENGLISH

1S Supplementary English

Time : 3 Hours

Total Marks : 40

Text Book Prescribed : Wisdom and Experience

Edited by Board of Editors, Sant Gadge Baba Amravati University, Amravati.

Publisher : Orient Blackswan Pvt. Ltd. Mumbai.

- Prose Section :**
1. The Sun, the Planets & the Stars ó C. Jones
 2. Water : The Elixir of Life ó C. V. Raman
 3. Sir Isaac Newton ó Nathaniel Hawthorne
 4. Toasted English ó R. K. Narayan
 5. What is Courage ? ó William Slim

- Poetry Section :**
1. A Requiem ó William Shakespeare
 2. The Sun Rising ó John Donne
 3. From Paradise Lost ó John Milton
 4. The Chimney Sweeper ó William Blake

Grammar : Parts of Speech, Use of Articles and Prepositions, Tenses, Transformation of Sentences.

- Professional :** 1) Interviews Communication
2) Group discussions

Distribution of Marks.

Maximum Marks : 40

Time: Three Hours

- Q.1 : There shall be five short answer questions based on prescribed prose. í05 marks
- Q. 2 : There shall be five long answer questions based on prescribed prose, out of these students will have to answer any two questions of five marks each í í 10 marks
- Q.3: There shall be four long answer questions based on prescribed

poems. Out of these, students will have to answer any two questions of five marks each ...í .10 marks

- Q.4 : There shall be five questions of one mark each, from Grammar Section-Parts of Speech, Use of articles and Prepositions, Tenses, Transformation of Sentences (Selection of Questions shall be at the discretion of paper setter) ...í .05 marks
- Q.5 : There shall be one question either on Interviews or on Group Discussions 05 marks
- Q.6 : There shall be one question either on Principles of Good Writing or on Report Writing. ..í ..05 marks

Total 40 marks

2S Supplementary English

Time : 3 Hours

Total Marks : 40

Text Book Prescribed : Wisdom and Experience

Edited by Board of Editors, Sant Gadge Baba Amravati University, Amravati.

Publisher : Orient Blackswan Pvt. Ltd. Mumbai.

- Prose Section :**
1. The Gold Frame ó R. K. Laxman
 2. My Financial Career ó Stephen Leacock
 3. The Power of Prayer ó A. P. J. Abdul Kalam
 4. Why is the Sea Blue ? ó G. Venkataraman
 5. The Myths of Artificial Intelligence ó Attila Narin

- Poetry Section :**
1. Ode to Autumn ó John Keats
 2. The Road not Taken ó Robert Frost
 3. Ballad of the Landlord ó Longston Hughes
 4. The Wind hover ó G. M. Hopkins

Grammar : Parts of Speech, Use of Articles and Prepositions, Tenses, Transformation of Sentences.

- Professional :** 1) Soft Skills
Communication 2) Public Speaking
Writing Skills
1) Curriculum Vitae
2) Report writing

Distribution of Marks.**Maximum Marks : 40****Time: Three Hours**

- Q.1 : There shall be five short answer questions based on prescribed prose.
í05 marks
- Q.2 : There shall be five long answer questions based on prescribed prose, out of these students will have to answer any two questions of five marks each
í í 10 marks
- Q.3 : There shall be four long answer questions based on prescribed poems. Out of these, students will have to answer any two questions of five marks each
.....10 marks
- Q.4 : There shall be five questions of one marks each, from Grammar Section-Parts of Speech, Use of articles and Prepositions, Tenses, Transformation of Sentences
.....05 marks
(Selection of Questions shall be at the discretion of paper setter)
- Q.5 : There shall be one question either on Soft skills or on Public speaking
..... 05 marks
- Q.6 : There shall be one question either on Curriculum Vitae or on Report Writing.
í í 05 marks
- Total 40 marks

[Notes : 1. For additional knowledge & practice of Grammar the following books are suggested.
English Grammar Practice by Raj N. Bakshi, Publisher ó Orient Blackswan Pvt. Ltd. Mumbai.]

7. MATHEMATICS

- Notes:** (1) There shall be Two Papers of 60 marks each for every Semester.
(2) There shall be FIVE units in each theory paper.
(3) There shall be Total Six Questions in each paper. Out of these Six, there shall be One Compulsory Question (based on all five units) and Five Questions on Five units with alternative choice from the same unit.
(4) Each question will carry 10 marks.
(5) Each paper will have 3Hrs.duration.

Layout of Question Paper

Question No.1	Compulsory question based on all five units	10 Marks
Question No. 2	Either/Or (on unit-I)	10 Marks
Question No. 3	Either/Or (on unit-II)	10 Marks

Question No. 4	Either/Or (on unit-III)	10 Marks
Question No. 5	Either/Or (on unit-IV)	10 Marks
Question No. 6	Either/Or (on unit-V)	10 Marks
Total Marks :		60 Marks

Semester I
1S Mathematics Paper-I
(Algebra and Trigonometry)
(Implemented from the A.S. 2015-16)

- Unit-I : De Moivre's theorem**, roots of complex number, circular functions, hyperbolic function, inverse hyperbolic function. Relation between circular functions and hyperbolic functions. Separation of real and imaginary parts of the circular and hyperbolic functions of complex variable.
- Unit-II :** Trigonometric series: Gregory series, Euler's series, Machin's series, Rutherford's series, summation of series, series based upon $\sin x$, $\cos x$, $\sinh x$, $\cosh x$, exponential series, logarithmic series and series based upon Gregory series.
- Unit-III:** Elements of quaternion: Definition. Equality and addition, multiplication, complex conjugate of a quaternion, norm, inverse, quaternion as a rotation operator, geometric interpretation, a special quaternion product, operator algorithm, quaternion to matrices.
- Unit-IV:** Theory of equations: Relations between the roots and coefficients, transformation of equations, cubic equations (Cardon method), Descartes' rule of signs, biquadratic equations.
- Unit-V :** **Matrices:** Rank of a matrix, row rank, column rank, eigenvalues, eigenvectors and the characteristic equation of a matrix. Cayley-Hamilton theorem and its application.

References Books:

- 1) K.B.Datta, Matrix and Linear Algebra, Prentice Hall of India Pvt.Ltd. New Delhi, 2000.
- 2) H.S.Hall and S.R.Knight, Higher Algebra, H.M.Publications, 1994.
- 3) Chandrika Prasad, Text Book on Algebra & Theory of Equations, Pothishala Private Ltd., Allahabad.
- 4) S.L.Loney, Plane Trigonometry Part-II, MacMillan & Co., London.
- 5) R.S.Verma & K.S.Shukla, Text Book on Trigonometry, Pothishala Pvt.Ltd. Allahabad.
- 6) Ayres Jr Frank : Matrices : Schaum's outline series, McGraw Hill Book Company, Singapore, 1983.

- 7) T M Karade, Maya S. Bendre, Lectures on Algebra and Trigonometry.
- 8) Hohn Franz E : Elementary Matrix Algebra, Amerind Publishing Co., Pvt.Ltd. 1964.
- 9) Spiegel M.R. : Complex Variables, Schaum's outline series, McGraw Hill, 1981.
- 10) Shanti Narayan : A Test Book of Matrices, S.Chand & Co. Delhi.
- 11) Jack B Kuipers: quaternion algebra of Quaternions and rotation sequences, Princeton University Press, Fifth printing, 2002.

Semester I

1S Mathematics Paper-II (Differential and Integral Calculus) (Implemented from the A.S. 2015-16)

- Unit-I** : Definition of the limit of a function, basic properties of limits, continuous functions and classification of discontinuities.
- Unit-II** : Differentiability, successive differentiation, Leibnitz theorem, indeterminate forms and L'Hospital rule.
- Unit-III** : Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Maclaurin and Taylor series expansions.
- Unit-IV** : Partial derivatives and differentiation of real valued function of two variables, homogeneous functions, Euler's theorem on homogeneous functions.

Unit-V: Integration of the form $\int \frac{P_n(x)}{\sqrt{Q}} dx$, reduction formulae for

$$\int \sin^n x dx, \int \cos^n x dx \text{ and Wallis's formula, } \int \tan^n x dx,$$

$$\int \cot^n x dx, \int \sec^n x dx, \int \operatorname{cosec}^n x dx, \int \sin^n x \cdot \cos^m x dx,$$

quadrature, rectification,

References :

- 1) Ayres F Jr. : Differential equations, Schaum's outline series, McGraw Hill, 1981.
- 2) Ayres F Jr. : Calculus, Schaum's Outline series, McGraw Hill, 1981.
- 3) Karade T.M., J.N.Salunke, M.S.Bendre : Graduate level Calculus, Sonu-Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
- 4) Karade T.M., Maya S. Bendre : Integration and Differential equations, Sonu-Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
- 5) Edwards J : Differential Calculus for Beginners, MacMillan and Co.Ltd.,1963.
- 6) Edwards J : Integral Calculus for Beginners, AITBS, Publishers and Distributors, 1994.
- 7) Forsyth A.R.: A Treatise on Differential Equations, (Sixth Edition) MacMillan and Co.1956.
- 8) Greenspan D. : Introduction to Calculus, Harper and Row, 1968.

- 9) Gorakh Prasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad.
- 10) Gorakh Prasad : Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
- 11) Erwin, Kreyszig : Advanced Engineering Mathematics, John Wiley & Sons, 1999.
- 12) N.Piskunov : Differential and Integral Calculus, Peace Publishers, Moscow.

8. PHYSICS

There shall be one theory paper and one practical of four hour duration for each semester examination of B.Sc. Part-I (Physics).

Theory papers :

Semester-I(1S-PHY: Mechanics, Properties of Matter, Waves and Oscillation)

Semester-II(2S-PHY: Kinetic theory, Thermodynamics and electric currents)

Practical : The distribution of marks for practical examination will be as follows:

Record Book	10 marks
Viva-voce	10 marks
Experiment	20 marks
Assignment	10 marks

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 ô
 Total 50 marks

- a) A student will have to perform at least ten experiments per semester.
- b) The semester examination will be of Four Hour duration and student will have to perform one experiment in the semester examination.
- c) In assignment, every student should be asked to submit the detailed report on one of experiments he or she has performed. The detailed report should include the theoretical background of the experiment.

Evaluation of the student during the semester :-

The teacher should explain, discuss and demonstrate one experiment per turn in the first twelve turns of the semester. At the same time in every turn, a teacher will have to conduct a test in the first period of the turn, based on the experiment; he or she has explained in the previous turn. The test is to be carried out with the interest to make the student aware of the basics of the experiments. This will enhance the viva voce competence of the student. A record of these tests is to be maintained in the department duly signed by the teacher in-charge and head of the

department. The record is to be maintained in the following format. Each assignment should be of at least 15 marks. Find the average and assign it in the end Semester practical examination.

Record of Marks scored in the assignments during the semester

Date											
Sr. No.	Name of the student	Expt1	Expt2	Expt 3	Expt 4	Expt 5	Expt 6	Expt7	Expt8	Expt9	Expt 10
1	ABC										
2	DEF										
3	GHI										
4	JKL										

Signature of the teacher incharge

Once this part is over, actual experimentation work should begin. The date-wise record is to be maintained in the following format.

Date-wise Record of the experiments performed

Sr. No.	Name of the student	Expt1	Expt2	Expt 3	Expt 4	Expt 5	Expt 6	Expt7	Expt8	Expt9	Expt 10
1	ABC										
2	DEF										
3	GHI										
4	JKL										

Signature of the teacher incharge

2. Completion Certificate: is must for practical record book.

1S-PHYSICS

Mechanics, Properties of Matter, Waves and Oscillation).

UNIT-I : Kepler's laws of planetary motion, Newton's law of gravitation, acceleration due gravity, variation with altitude and depth, Gravitational field, Gravitational Potential; Gauss's theorem, gravitational potential and intensity due to uniform solid sphere at a point inside and outside the sphere.

Numericals.

UNIT-II: Motion of a Rigid body; rotational motion; moment of inertia;

Principle of Perpendicular & Parallel axes, Radius of Gyration; M.I of regular shaped bodies like ring, disc, hollow sphere, solid sphere, cylinder & bar about different axes.

Linear momentum, angular momentum, Conservation of Linear Momentum & angular momentum

Numericals.

UNIT-III : Linear S.H.M, Angular S.H.M, Differential equations and solutions.

Displacement, Velocity and acceleration, Kinetic and Potential energy.

Simple pendulum, compound pendulum, Kater's Reversible pendulum,

Spring and mass system, Vibration of a magnet, bifilar oscillations,

Damped and forced harmonic oscillations, Resonance.

Numericals.

UNIT-IV : Superposition of two SHM of same frequency along the same line

Interference, superposition of two mutually perpendicular SHM of same Frequency, Lissajous figures.

Standing waves, velocity of longitudinal waves (Newton's formula)

velocity of waves by Kundt's tube, velocity of transverse waves in stretched string, harmonics and overtones.

Production and detection of ultrasonic waves and its applications.

Numericals

UNIT-V : Introduction of Elasticity; Hooke's Law of Elasticity, Three

Elastic constants; Relation between, U , s , k and h . Bending of beam and Bending moment; Cantilever, Depression of centrally loaded beam, twisting couple, torsional pendulum; Maxwell's

needle.

Numericals.

UNIT-VI : Kinematics of moving fluids; Streamline and turbulent flow,

viscous drag, Coefficient of viscosity, equation of continuity; Euler's equation, Bernoulli's theorem, Poiseuille's equation,

Reynold's number, Terminal velocity, Stokes's law, Variation of viscosity with temperature.

Surface tension, angle of contact and wetting, Jaeger's method

Numericals

Practical : (Every student will have to perform at least 10 experiments from the following list. At the time of examination, each student will

have to perform 1 (one) experiment)

1. Study of laws of Parallel and perpendiculars axes for moment of inertia.
2. Determination of coefficient of restitution for inelastic collision.
3. Moment of inertia of fly wheel.
4. Study of compound pendulum.
5. To determine moment of inertia of a body using bifilar suspension.
6. Modulus of rigidity by Torsional Pendulum.
7. Acceleration due to gravity by Kater's pendulum.
8. Study of Oscillations of mass under different combinations of springs.
9. Young's modulus by cantilever.
10. Young's Modulus by bending of beam.
11. Modulus of rigidity by statical method.
12. Young's modulus by Vibration Method.
13. Modulus of rigidity by Maxwell's needle.
14. Coefficient of Viscosity by Poiseuille's method.
15. Surface tension by Quincke's method.
16. Determination of Surface tension by Jager's method.

Reference BOOKS : Semester 1S-PHY

1. Mechanics ó Chadha T.K.
2. Waves and Oscillations ó Chaudhary R.N.
3. University Physics I Mechanics of Particles waves and Oscillations ó Kamal, Anwar
4. Mechanics ó Shukla R.K.
5. Mechanics ó Shrivastava P.K.
6. Properties of Matter ó Murugesan R
7. Properties of Matter ó Brijlal
8. Text book of vibrations and waves ó Puri, MacMillan Publisher India Ltd.
9. Barkeley Physics course Vol. I Eno Purcell Ed. (McGraw Hill)
10. The Feymann Lectures in Physics ó Vol. I, R.P.Feymann, R.B.Lighton & M. Sands
11. Mechnics & properties of matter ó D.S.Mathur
12. Fundamental of Physics ó Halliday & Resncik (6th edition)
13. Concepts of Physics Vol I & Vol II by H.C.Varma

9.CHEMISTRY

1S Chemistry

(Effective from session 2013-14)

The examination in Chemistry of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

B.Sc. Part- I (Semester- I)

1S Chemistry

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit I

14L

A] Periodic Properties:

Atomic and ionic radii. Types of atomic radii (only definitions - covalent radius, metallic radius, Van der Waals radius and ionic radius). Periodic trends in atomic and ionic radii. Ionization energy, electron affinity and electronegativity (definition and periodic trends). Effect of ionization energy and electronegativity on different properties of elements namely metallic and non-metallic character, relative reactivity, oxidizing and reducing properties., Scales of electronegativity Pauling scale and Mulliken Scales. Electronegativity and partial ionic character of a covalent bond. [6]
Screening effect, screening constant and effective nuclear charge. Slater's rules for calculating screening constant. Problems. [2]

B] Ionic bonding:

Definition of ionic bond, types of cations. Factors affecting ionic bond formation (energetic of ionic bond formation ionization energy, electron affinity and lattice energy). Born Lande equation (no derivation) to calculate lattice energy. Born-Haber cycle to determine lattice energy. Solvation and salvation energy, factors affecting salvation energy, Determination of salvation energy. Solubility of ionic solids, lattice energy and salvation energy. [6]

Unit II**14L****A] S-Block element:**

Comparative study of 1st and 2nd group elements with reference to electronic configuration, ionisation energy, oxidation states, reactivity and flame colouration. Diagonal relationship between Li and Mg.

[5]**B] P-Block element:**

Comparative study of 13th, 14th and 15th group elements with reference to electronic configuration, ionisation energy, oxidation states. Concept of inert pair effect. Diagonal relationship between Be and Al. Structure of diamond and graphite. Abnormal behaviour of nitrogen. Hydrides of boron- preparation (from BCl₃ and NaBH₄), properties (action of heat, water, alkali and oxygen), structure and bonding in diborane. Carbides, types of carbides and fullerenes.

[9]**Unit III****14L****A] Electronic Displacements:**

Inductive effect, Electromeric effect, Resonance and Hyperconjugation (definition, and applications of these effects). [3]

B] Reactive Intermediates:

Carbocations, Carbanions and free radicals: their generation stability and reactions. [2]

C] Aliphatic Hydrocarbons:

Alkanes: Methods of formation: i) Wurtz reaction and ii) Corey-House reaction, Reactions: i) Halogenation (With mechanism), ii) Aromatisation. [2]

Alkenes: Methods of formation (With mechanism): i) Dehydrohalogenation of alkyl halides (E₁ & E₂) ii) Dehydration of alcohols, Reactions: Electrophilic and free radical addition of HX and X₂ (with mechanism). [3]

Alkynes: Preparation from vicinal and geminal dihalides, Reaction-Hydrogenation. [2]

Alkadienes: Classification, 1,3-Butadiene- Preparation from cyclohexene, Reactions- Addition of H₂, Br₂ and HBr. [2]

Unit IV- Aromatic Hydrocarbons**14L**

A] Nomenclature and Isomerism of Aromatic Compounds. Structure of Benzene: Kekule structure and Molecular orbital structure. [4]

B] Aromaticity and Huckel's rule Aromatic, antiaromatic and non-aromatic systems. [4]

C] Mechanism of Electrophilic Aromatic Substitution: Nitration, Friedel Craft Alkylation and Acylation. Nuclear and Side Chain Halogenation, Birch Reduction. [4]

D] Orientation: Effect of substituent groups. Activating and deactivating groups. Theory of reactivity and orientation on the basis of inductive and resonance effects (-CH₃, -OH, -NO₂ and δ Cl groups). [2]

Unit V : Thermodynamics**14L**

Adiabatic and Isothermal processes. Work done in adiabatic and isothermal processes, Evaluation of different expressions showing relationship between pressure, volume and temperature. First law of Thermodynamics and its limitations, Need of Second law. Carnot's heat engine, derivation of expression for the work done and efficiency of Carnot's engine. Statements of Second law of thermodynamics. Concept of Entropy, Physical significance of Entropy, Derivation of expression for the Entropy change for an ideal gas in terms of pressure, temperature and volume. Entropy change for an ideal gas for isothermal, isobaric and isochoric processes, Entropy of fusion, sublimation, vapourization, transition and its calculations. Entropy change for reversible and irreversible processes. Entropy change as a criteria for spontaneity. Numericals. [14]

Unit VI**14L**

A] Gaseous State: Postulates of Kinetic theory of gases, Derivation of Kinetic gas equation. RMS, Average and Most probable velocities and their relationship. Maxwell-Boltzmann distribution law of molecular velocities (only qualitative treatment), Mean free path, collision number and collision diameter. Deviation of real gases from ideal gas behaviour. Vanderwaal's equation of state and its derivation for real gases. Critical phenomenon, Andrew's experiment - isotherm of CO₂. Critical state, critical constant, P_c, V_c and T_c in terms of Vanderwaal's constants a and b . Reduced equation of state and its derivation. Law of corresponding state. Numericals. [10]

B] Phase Rule:

Statement of phase rule, explanation of phase, number of components and degree of freedom. Application of phase rule to water and sulfur system. [4]

Semester I
1S Chemistry Practicals

Total Laboratory Sessions: 26 **Marks: 50**

Exercise 1: Inorganic Qualitative analysis
12 Laboratory sessions

Semimicro qualitative analysis of inorganic salt mixture containing two acidic radicals and two basic radicals of same or different groups. At least six mixtures to be given.

Analysis of basic radicals to be done by using spot test reagents. Following radicals to be given carbonate, nitrite, sulphite, sulphide, chloride, bromide, iodide, nitrate and sulphate, silver(I), lead(II), copper(II), bismuth(III), cadmium(II), tin(II), arsenic(III), antimony(III), iron(III), chromium(III), aluminium(III), nickel(II), cobalt(II), manganese(II), zinc(II), calcium(II), strontium(II), barium(II), magnesium(II).

Exercise II: Organic Preparations **14 Laboratory sessions**

1. Preparation of acetanilide (Acetylation).
2. Preparation of Benzanilide (Benzoylation).
3. Preparation of m-di-Nitrobenzene (Nitration).
4. Preparation of tri-Bromoaniline from Aniline (Bromination).
5. Preparation of Benzoic acid from Benzamide (Hydrolysis).
6. Preparation of Benzoic acid from benzaldehyde (Oxidation).
7. Preparation of phenylazo ó ß ó naphthol dye (Diazotisation).
8. Preparation of sulphanilic acid from aniline (Sulphonation).

Organic Preparations Using Green Chemistry Concept

9. Acetylation of primary amine (Preparation of acetanilide).
10. Base catalysed Aldol Condensation (Synthesis of dibenzal propanone).

Note:

- a) Student should perform the single stage preparation with the help of given procedure.
- b) Melting point and percentage yield should be reported.
- c) The sample should be submitted.
- d) Students should recrystallize the sample with suitable solvent.
- e) Students should know the reaction and its mechanism of given single stage preparation.

Distribution of Marks for Practical Examination

Time: 6 hours (One Day Examination) **Marks: 50**

Exercise-I	í í í ..	18
Exercise-II	í í í ..	18
Viva-Voce	.í í í .	07
Record	.í í í .	07
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Total:		50

Books Recommended:

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia- S. Naginchand & Co., Delhi.
2. Text book of Inorganic Chemistry by A.K. De, Wiley East Ltd.
3. Selected Topics in Inorganic Chemistry by Malik, Tuli and Madan- S. Chand & Co.
4. Modern Inorganic Chemistry by R.C. Agrawal, Kitab Mahal.
5. Instrumental Methods of analysis by Chatwal and Anand, Himalaya Publishing House.
6. Concise Inorganic Chemistry by J.D. Lee, ELBS.
7. Inorganic Chemistry by J.E. Huheey- Harper & Row.
8. Fundamental concepts of Inorganic Chemistry by E.S. Gilreath, McGraw Hill book Co.
9. Modern Inorganic Chemistry by W.L. Jolly, McGraw Hill Int.
10. Chemistry Facts, Patterns & Principles by Kneen, Rogers and Simpson, ELBS.
11. Theoretical Principles of Inorganic Chemistry by G.S. Manku, Tata McGraw Hill.
12. Inorganic complex compounds by Murmann, Chapman & Hall.
13. Text book of Inorganic Chemistry by K.N. Upadhyaya, Vikas Publishing House, Delhi.
14. Advanced Practical Inorganic Chemistry by Gurdeep Raj, Goel Pulishing House, Meerut.
15. Co-ordination Chemistry by D. Banerjee, TMH Publication.
16. Text book of Inorganic Chemistry by Marathe, Bhadange, Mopari and Kubade.
17. Organic Chemistry by R.T. Morrison & R.T. Boyd, 6th edition, PHI.
18. Organic Chemistry by Pine, 5th edition.
19. Organic Chemistry Vol. I, II and III by Mukharjee, Singh and Kapoor- Wiley Eastern.
20. Organic Chemistry by S.K. Ghosh.

21. Reaction Mechanism in Organic Chemistry by S.M. Mukharjee and S.P. Singh.
22. Spectroscopy of Organic Compounds by P.S. Kalsi.
23. Stereochemistry and mechanism through solved problems by P.S. Kalsi.
24. Organic Chemistry by TWG Solomons, 4th edition, John Wiley.
25. Hand Book of Organic Analysis by H.J. Clarke, Arnold Heinmen.
26. Text book of Practical Organic Chemistry by A. I. Vogel.
27. Text book of Organic Chemistry by Jamode, Ganar, Makode, Waghmare, Mahajan, Toshniwal.
28. Text book of Organic Chemistry by P.S. Kalsi published by Macmillan India Ltd., 1999, Delhi.
29. Practical Organic Chemistry by F.G. Mann, B.C. Saunders, Orient Longman.
30. Comparative Practical Organic Chemistry (Qualitative Analysis) by V.K. Ahluwalia and Sunita Dhingra, Orient Longman.
31. Comprehensive Practical Organic Chemistry (Preparation and Qualitative Analysis) by V.K. Ahluwalia and Renu Agrawal, Orient Longman.
32. Physical Chemistry: Walter, J. Moore, 5th edn., New Delhi.
33. Physical Chemistry: G.M. Barrow, McGraw Hill, Indian Edn.
34. Principles of Physical Chemistry: Maron and Prutton.
35. Principles of Physical Chemistry: Puri and Sharma.
36. Physical Chemistry: P.W. Atkins, 4th Edn.
37. Text book of Physical Chemistry: P.L. Sony O.R. Dhrma.
38. Physical Chemistry: Levine.
39. Practical Physical Chemistry: Palit and De.
40. Practical Physical Chemistry: Yadao.
41. Practical Physical Chemistry: Khosla.
42. Laboratory Manual of Physical Chemistry: W.J. Popiel.
43. Practical Chemistry: Dr. S.B. Lohiya, Bajaj publ., Amravati.
44. Text book of Physical Chemistry: Satpute, Kabra, Raghuvanshi, Wankhade, Jumle and Murarka.
45. Text book of Chemistry, B.Sc.-I, First Semester, BokeyPrakashan, Amravati

10. INDUSTRIAL CHEMISTRY (REGULAR/VOCATIONAL)

The examination in Industrial Chemistry (Regular/Vocational) of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 to 8 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has

been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

1S INDUSTRIAL CHEMISTRY (REGULAR/VOCATIONAL)

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

UNIT-I : [14]

- A] Dimensions and Units: Fundamental and derived quantities, Interconversions of units.
- B] Mole Concept: Mole, Atomic weight, Molecular weight, Equivalent weight, Methods of expressing compositions of i) solid mixtures, ii) liquid solutions, iii) gaseous mixtures Problems based on these.

UNIT-II : [14]

- A] Material Balance without Chemical Reactions: Distillation, Crystallization, Evaporation, Extraction, Filtration with flow sheet diagram and Problems
- B] Material Balance with Chemical Reactions: Stoichiometric equation, Stoichiometric coefficient, Conversion, Yield, Selectivity, Limiting and excess reactants, Problems.

UNIT-III : [14]

- A] Energy : General idea about conventional energy sources, and non-conventional Energy Sources óSolar energy, Space heating and water heating by solar energy, Production of electricity by solar energy, Tidal power, Wind energy , Biomass energy
- B] Energy Balance: Heat capacity, Cp, Cv, Molar heat capacity, Heat of reaction, formation, combustion, neutralisation, Heat of solution, Hessø law of constant heat summation. Problems based on heat of reaction, heat of vaporization, fusion and sublimation.

UNIT-IV [14]

Fuels : Classification, Units of heat and calorific value

- A] Solid fuels: Coal-Types of coal, Coal formation, Coal analysis (proximate and ultimate), Destructive distillation of coal, Coal tar distillation, uses of coal tar products, Manufacturing of coal gas and water gas.
- B] Liquid fuels: Petroleum-Origin and classification, Fractional distillation of crude oil, Cracking, Mining of petroleum, natu-

ral gases, Uses of petroleum.

UNIT-V :**[14]**

Heat Transfer: Fundamentals of heat transfer: Modes of heat transfer, Fourier's law, Newton's law, Stefan Boltzmann's law, Problems.

Concept of heat conduction, General heat conduction equation, Thermal conductivity, Thermal diffusivity.

Nature of heat transfer by convection, Forced and free convection, Phenomenon of pool boiling, Filmwise and dropwise condensation.

Nature of heat transfer by radiation, Absorptivity, Reflectivity, and Transmissivity, Kirchoff's law, Emissive power and emissivity, Concept of black body, Planck's law and Wien's displacement law.

Heat exchangers, Classification of heat exchangers on the basis of direction of fluid flow, U-tube heat exchanger, Kettle reboiler.

UNIT-VI : Fluid Mechanics:**[14]**

Definition and classification of fluids, Types of fluid flow- Laminar and Turbulent fluid flow, Equation of continuity, Bernoulli's equation, Pipe joints and fittings, Valves and pumps, Reciprocating and centrifugal pump, Venturimeter, Orificemeter, Pitot-tube, rotameter, Manometer, Reynolds's number, Reynolds's experiment.

Books Recommended:

- 1) Stoichiometry - B. I. Bhatt and S. M. Vora
- 2) Introduction to Stoichiometry - K. A. Gavane
- 3) Chemical Process Principles, Part I - O. A. Hougen, K. M. Watson, R. A. Ragatz
- 4) Unit Operation: I - K. A. Gavane
- 5) Industrial Chemistry - B. K. Sharma
- 6) A Text Book of Engineering Chemistry- S. S. Dara
- 7) Conventional and Non-conventional Energy Sources of R.C.Rai
- 8) Non-conventional Energy Sources - G.D.Rai
- 9) Principles of Physical Chemistry - Puri and Sharma
- 10) A Text Book of Physical Chemistry - P.L.Soni
- 11) Unit Operation - McCabe and Smith, McGraw Hill
- 12) Engineering Heat Transfer- Gupta and Prakash
- 13) Unit Operations II - K.A.Gavane

1S Industrial Chemistry Practical**List of Experiments****UNIT-I**

1. Problems based on Mass Relation.
2. Numerical Problems on Units and Conversions.
3. Preparation of Standard Solution of (Any Two)
i) Oxalic acid ii) Copper sulphate, iii) Potassium dichromate
4. Standardization of following Solutions (Any Two)
i) Potassium Permanganate ii) Sodium hydroxide
iii) Sodium thiosulphate
5. Determination of moisture content in the given coal sample.
6. Determination of ash content in the given coal sample.
7. Determination of flash point and fire point of given fuel sample.

UNIT-II

1. Determination of molecular weight of given sample by Rast's method.
2. Determination of viscosity of lubricant oil by Redwood viscometer.
3. Determination of Aniline point of diesel.
4. Comparison of the calorific value of the two fuels.
5. Measurement of pressure difference between two points within pipeline, using manometer.
6. Measurement of flow rate at a particular point by Venturimeter.
7. Determination of thermal conductivity of rubber by using Lee's disc method.

Distribution of Marks for Practical Examination.

Time: 6 – 8 hours (One Day Examination)	Marks: 50
Unit I: Exercise No.1 (Numericals)	1 1 1 .. 06
Exercise No.2 (Practical Expt.)	1 1 1 .. 12
Unit II: Exercise No.2 (Practical Expt.)	1 1 1 .. 12
Viva-Voce	1 1 1 .. 10
Record	1 1 1 .. 10

Total:	50

11. PETROCHEMICAL SCIENCE

The examination in Petrochemical Science of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 to 8 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

1S Petrochemical science

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

UNIT I [14]

Basic concept in Petro-chemistry.

PH, Molarity, Normality, Mole, Molality, Mole fraction, Mole ratio, Parts per million (p.p.m.), Weight fraction, Vapors pressure, Calorific value, Acid, Base, Equivalent weight, Atomic weight, Molecular weight, I.P., A.S.T.M, Arrhenius constant, Avogadro's number.

Units and Conversion of: - Temperature, Pressure, Length, Weight, Residence time, Viscosity.

UNIT II [14]

Fuel and Petroleum Industry

Definition Petroleum, Fuel, Conventional and nonconventional fuel
Type of Petroleum fuel, Primary and secondary, International Petroleum Scenario, National natural gas and petroleum scenario, Petroleum refineries in India, their location, capacity, year of installation, and organization. Map of petroleum reservoir in India.
Types of Natural gas, Wet, Dry, Lean gas, Associated gas, Casing head gas.

UNIT III [14]

Formation, Exploration and Drilling of Crude oil or Petroleum
Formation:- Condition under which petroleum crude is formed, Occurrence of petroleum crude, conversion of organic matter in to petroleum crude, Theories of origin of petroleum(organic, inorganic)
Exploration:- Of Petroleum with, Seismic method, Magnetic method, Gravity method, Electric method. Introduction to bore

hole logging.

Drilling:- Method of drilling, Cable tool drilling, Rotary drilling, Drilling fluid their function, Composition, Classification.

UNIT IV [14]

Chemistry and Composition of Petroleum

Composition, Characteristics, Constituents of Petroleum or crude oil
Types of Hydrocarbons and Non- hydrocarbons present in petroleum

Classification of crude oil:- with Characterization factor, Correlation index, Key fraction, Method of structural group analysis

UNIT V [14]

Refinery Operation

Field operation, Desalting, Dehydration,

De-emulsification

Necessity of the fractionation crude oil, Distillation:- introduction, Atmospheric distillation(ADU), vacuum distillation(VDU), Fractions from ADU and VDU, the range of carbon number, boiling point, and molecular weight, and details of composition of various fraction

UNIT VI [14]

Quality Monitoring of petroleum product

Classification of Laboratory tests

Distillation, Vapor pressure, Flash point, Fire point, Octane number, Cetane number, Aniline point, Diesel index, Calorific value, Smoke Point, Viscosity, Viscosity index, Penetration index, Freezing point, Cloud and pour point, Drop point of grease, Melting and Settling point of wax, Gum content, acidity and alkalinity, Copper corrosion test, Density and APT, Refractive index, Conradson carbon residue(CCR).

Semester – I

1S Petrochemical Science Practical

List of Experiments:

1. Density and API gravity of Given sample
2. Acid value of Petroleum sample
3. Drop point and melting of wax
4. Viscosity by U-tube Viscometer
5. Congealing point of wax
6. Saponification value of petroleum sample
7. Flash point and Fire point of petroleum sample

8. Numerical problems on unit conversion
9. Preparation of standard solution

Distribution of Marks for Practical Examination.

Time: 6 hours	(One Day Examination)	Marks: 50
Exercise No.1 (Practical Expt.)	í í í ..	15
Exercise No.2 (Practical Expt.)	í í í ..	15
Viva-Voce	í í í ..	10
Record	í í í ..	10

Total: 50		

12. GEOLOGY

1S – Geology

- UNIT-I :** General Geology ó Geology, Branches and scope. Origin of Earth ó Nebular, Planetesimal and Tidal Hypothesis. Age of Earth ó Radioactive Methods ó K/Ar, Rb/Sr., U/Pb and Carbon 14 Method. Constitution of Earth ó Crust, Mantle and Core.
- UNIT-II :** Mineralogy and Crystallography :- Definition of Mineral, Rock Forming & Ore Mineral, Physical Properties of Minerals ó Colour, Streak, Lustre Habit, Cleavage, Fracture, Hardness, Specific gravity and its determination by Spring balance, Walker's balance & Jolly's balance.
Crystallography ó Definition crystal, Faces, edges & Solid angle. Crystallography axes, Parameters- Weiss and Millers. Symmetry elements in seven system.
- UNIT-III :** **Petrology** ó Concept of Rock Cycle - Igneous, Sedimentary and Metamorphic Rocks. Mode of Occurrence & Forms of Igneous Rock (Intrusive & Extrusive Modes, Concordant & Discordant Bodies. Textures and Structures of Igneous Rocks. Sedimentary Rocks ó Formation of Sedimentary- Weathering, Transportation and deposition, Diagenesis and Lithification. Metamorphic Rocks ó Agents and kinds of Metamorphism.
- UNIT-IV :** **Physical Geology – I :** Weathering ó Physical Weathering and Chemical Weathering, biological weathering. Susceptibility of Rocks & Minerals to weathering.
Geological work done by Wind and River
- UNIT-V:** **Physical geology – II**
Earthquakes ó Elastic rebound Theory ó Causes, Effects, Magnitude & Intensity, Seismogram and Seismograph. Location of epicentre, Classification of Earth Quake; Seismic belts of India.

Volcanism :- Structure of Volcano, Products of Volcanoes. Types of Volcanic eruption, Causes and distribution of Volcanoes. Diastrophism ó Epirogenic & Orogenic movements. Evidence of uplift and Subsidence, Stages in orogenic cycle.

UNIT-VI : Paleontology & Stratigraphy :

Fossils Definition - Modes of Preservation and Importance. Index and Zone Fossils.
Physiographic Division of India. Principles of Stratigraphy and Correlation. Geological Time Scale and Stratigraphic Scale of India.

Practicals

1. Megascopic identification of common Minerals ó Quartz, Microcline/Orthoclase, Biotite, Muscovite, Calcite, Hornblende, Kyanite, Talc, Gypsum, Hematite, Chromite, Chalcopyrite.
 2. Megascopic identification of following rocks. Granite, Trachyte, Gabbro Basalt Sandstone, Shale, Limestone Schist, Gneiss Marble, Quartzite.
 3. Study of elements of Symmetry in the Crystals from Normal Seven Classes.
 4. Demarcating Physiographic division of India on outline Map.
 5. Identifying Mode of preservation in fossils - Cast / Mould / Imprint etc.
- Practical Examination will be of 4 hours duration and Carry 50 Marks. The distribution of marks for Practical will be as follows.

Semester – I

A) I	Megascopic Identification of Minerals	12 Marks
II	Megascopic Identification of Rocks	12 Marks
III	Symmetry Elements of Crystals	10 Marks
IV	Physiographic Division of India	02 Marks
V	Fossil ó Modes of Preservation	04 Marks
B)	Record	05 Marks
C)	Viva-Voce	05 Marks

Total 50 Marks.

13. BOTANY

There shall be following paper and practical for B. Sc. Part ó I Semester one examination. The syllabus is based on six theory periods and six practical periods per week (Total 75 ó 80 theory sessions and 25 practical sessions per complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for 4 hours. Every examinee shall offer the following paper of 100 marks (out of which 80 marks will be for written examination and 20 marks for internal assessment) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

1.	Paper ó 1		Marks
	a. Theory	-	80
	b. Internal Assessment	-	20
2.	Practical	-	50

Total 150 Marks

1S – BOTANY**Diversity & Applications of Microbes and Cryptogams****UNIT-I : Plant Diversity (15)**

- 1.1 Cyanobacteria and its impact on origin of life
- 1.2 Introduction to Plant Kingdom: Cryptogams
- 1.3 Diversity of plants with respect to habitat, form, nutrition and ecological status
- 1.4 General Account of Viruses and structure of TMV and HIV
- 1.5 Bacteria: structure, Nutrition and reproduction
- 1.6 Role of microbes in Agriculture, Medicine and Industries

UNIT-II: Algae (15)

- 2.1. Classification according to F. E. Fritsch and G. M. Smith up to classes
- 2.2. General characters of algae with reference to Habitat, Thallus organization, Pigmentation, Reserve food and Reproduction
- 2.3. General characters of following classes with special reference to examples mentioned ó
 - 2.3.1. Chlorophyta - Oedogonium
 - 2.3.2. Charophyta ó Chara (Thallus structure and reproduction)
 - 2.3.3. Phaeophyta ó Sargassum (Thallus structure and reproduction)
 - 2.3.4. Rhodophyta ó Batrachospermum

UNIT-III : Fungi (15)

- 3.1. Classification according to Ainsworth (1973)
- 3.2. General characteristics of following classes with special reference to examples mentioned ó
 - 3.2.1. Mastigomycotina : Albugo (Cystopus)
 - 3.2.2. Ascomycotina : Aspergillus
 - 3.2.3. Basidiomycotina : Puccinia graminis-tritici
 - 3.2.4. Deuteromycotina : General characters
- 3.3 Lichen-Types & Economic importance

Unit-IV : Bryophyte (15)

- 4.1. Classification according to G. M. Smith
- 4.2. General characters, thallus organization and life cycle ofó
 - 1.2.1. Hepaticopsida ó Marchantia
 - 1.2.2. Bryopsida ó Funaria
- 4.3. Evolution of sporophyte in bryophytes
- 4.4. Affinities of bryophytes with algae and pteridophytes
- 4.5. Brief Account on some Indian Bryologist.

Unit-V : Pteridophyte (15)

- 5.1. Pteridophytes as First Vascular Plants.
- 5.2. Classification according to G. M. Smith
- 5.3. General characters of the following classes with special reference to examples mentioned ó
 - 5.3.1. Sphenopsida ó Equisetum
 - 5.3.2. Filicopsida ó Marsilea
- 5.4. Stele types in pteridophytes
- 5.5 Heterospory and Seed Habit in Pteridophytes

Unit-VI : Application of Microbes Cryptogams (15)

- 6.1. Economic Importance of Algae with special reference to Food, Industries, Agriculture and Harmful aspects
- 6.2. Mycorrhiza ó Types and Application
- 6.3. Role of Fungi in Industries, Medicine, Food & Agriculture
- 6.4. Plant Diseases ó
 - 6.4.1. Viral ó TMV
 - 6.4.2. Bacteria ó Black arm of cotton (Xanthomonos malvacearum)
 - 6.4.3. Fungal ó Tikka disease of groundnut (Cercospora sps.)
- 6.5. Economical and Ecological Importance of Bryophytes

LABORATORY EXERCISE :**I ALGAE**

Preparation of temporary mount, identification with reason of following algal materials-
edogonium, Hydrodictyon, Chara, Vaucheria, Ectocarpus, Sargassum, Batrachospermum

II. FUNGI AND PLANT PATHOLOGY

- (1) Study of following genera
Albugo, Uncinula, Penicillium, Agaricus, Puccinia, Cercospora
- (2) Study of Crustose, Fruticose & Foliose Lichen
- (3) Study of symptoms of fungal, viral, bacterial and Mycoplasma diseases
- (4) Collection of fungal specimen & infected plant part from local region
- (6) Demonstration of Mushroom Cultivation Technology

III. BRYOPHYTES

Study of external and anatomy features of vegetative and reproductive parts of following genera ó Marchantia, Anthoceros, Funaria, Polytrichum and Sphagnum

IV. PTERIDOPHYTES

Study of Pteridophyte external and anatomy features of vegetative and reproductive parts of following genera ó Lycopodium, Equisetum, Osmunda, Selaginella, Adiantum, Marsilea and any one fossil specimen

- Note:**
1. Omit the details of development of sex organs and sporophyte.
 2. Botanical excursion (Two local and one outside the state is compulsory)
 3. Common algal, fungal, pathological, bryophytic and pteridophytic collection and excursion report must be submitted at the time of practical examination.

BOOKS RECOMMENDED

1. Dube, H. C. (1990). An Introduction to Fungi. Vikas Pub. House Ltd. New Delhi.
2. Gangulee, H. C. and Kar, A.K. (2001). College Botany Vol. II. Books and Allied Press Ltd. Kolkata.
3. Krushnamurthy, K. V. (2007). An advanced Text Book on Biodiversity: Principles and Practice. Oxford and IBH Publishing Kumar, H.D. (1988). Introductory Phycology. Affiliated East-West Pres Ltd. New Delhi.
4. Kumar, H. D. and Singh, H.N. (1976). A Text Book of Algae. Affili-

- ated East-West Pres Ltd. New Delhi.
5. Mehrotra, R. S. and Aneja, C.R. (1990). An Introduction To Mycology, Wiley Eastern Ltd. New Delhi.
 6. Pandey, B.P. (1994). A Text Book of Botany-Algae. S.Chand and Co. Ltd. New Delhi.
 7. Pandey, S.N. and Trivedi, P.S. (1997). A Text Book of Botany Vol. II, Vikas Publishing House (P.) Ltd. New Delhi.
 8. Pandey, S.N. and Trivedi, P.S. (1997). A Text Book of Botany Vol. I, Vikas Publishing House (P.) Ltd. New Delhi.
 9. Pandey, S.N., Trivedi, P.S. and Mishra, S.P. (1995). A Text Book of Algae, Vikas Publishing House (P.) Ltd. New Delhi.
 10. Parihar, N.S. (1977). Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
 11. Parihar, N.S. (1984). An Introduction To Embryophyta Vol. I Bryophyta. Central Book Depot, Allahabad
 12. Rashid, A. (1996). An Introduction To Bryophyta. Vikas Publishing House Ltd. New Delhi.
 13. Saxena, A.K. and Sarbhai, R.M. (1992). A Text Book of Botany Vol. II Embryophyta. Ratan Prakashan Mandir, Agra.
 14. Sharma, O.P. (1989). A Text Book of Fungi. Tata Mc Graw-hill Publishing Company Limited, New Delhi.
 15. Sharma, O.P. (1990). A Text Book of Algae. Tata Mc Graw-hill Publishing Company Limited, New Delhi.
 16. Smith, G.M. (1995). Cryptogamic Botany. Vol. II (Bryophytes and Pteridophytes). Mc Graw-Hill Book Company, New York and London.
 17. Sporne, K.R. (1995). The Morphology of Pteridophyta. The Hutchinson University Library, London, U.K.
 18. Varma, P. S. and Agrawal, V. K. (2000). Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Company (P.) Ltd. New Delhi.
 19. Vashistha, B.R. (1997). Botany For Degree Students-Bryophyta. S. Chand and company (P.) Ltd. New Delhi.
 20. Vashistha, P.C. (1984). Pteridophytes. S. Chand and company (P.) Ltd. New Delhi.
 21. Sharma, P.D. (1998). The Fungi. Rastogi Publications, Merrut.
 22. Smith, G.M. (1995). Cryptogamic Botany. Vol. I (Algae and Fungi). McGraw-Hill Book Company, New York and London.
 23. Vashistha, B.R. (1995). Botany for Degree Students-Algae. S. Chand and Company (P.) Ltd. New Delhi.

24. Vashistha, B.R. (1995). Botany for Degree Students-Fungi (9th Ed.) S. Chand and company (P.) Ltd. New Delhi. 7
25. Pandey Dr.B.P., Botany for Degree Students, S.Chand & Co. Ltd. New Delhi.
26. Modern Practical Botany Volume-I, Dr.P.B.Pandey, S.Chand Pub., N. D.
27. Modern Practical Botany Volume-II, Dr.P.B.Pandey, S.Chand Pub., N. D.
28. Modern Practical Botany Volume-III, Dr.P.B.Pandey,S.Chand Pub., N. D.
29. A Text Book of Botany ó Diversity of Microbes and Cryptogams (2013), Dr.N.H.Shahare, Dr.A.U.Pachkhede, Dr.D.V.Hande, Dr.S.H.Kanherkar, Sh.R.S.Dhande, Dr.D.S.Talwankar, Published by Nabh Prakashan, Amravati.

B. Sc. I : Semester – I
Practical Schedule

Time : 4 hours	Marks : 50
Q1: Temporary mount and identification of given algal form (any two)	10
Q2: Temporary mount and identification of given fungal form (any two)	10
Q3: Salient features and identification of bryophytic material	05
Q4: Salient features and identification of pteridophytic material	05
Q5: Spotting (Algae, Fungi, Bryophyte, Pteridophyte, Pathology)	10
Q6: Viva-voce and Practical Record	05
Q7: Excursion Report	05

14. ENVIRONMENTAL SCIENCE

1S Environmental Science

(CONCEPTS OF ENVIRONMENTAL SCIENCE)

- UNIT - I .** Fundamentals of Environmental Science ó Definition, scope, principles and environmental ethics.
Components of Environment: Atmosphere - Definition, structure and composition.
Hydrosphere ó Definition, distribution of water, hydrological cycle, and global water balance.
Lithosphere - Definition, internal structure of earth. Rocks - types and their formation.
Biosphere - Definition, boundaries of biosphere.

(Lectures-14)

UNIT – II. A. Natural Resources- Definition, classification.

- a). Water Resources (Freshwater) - types, availability, demand utilization and conservation.

- b). Forest resources - Distribution, Indian types, utilization and conservation.
- c). Mineral resources ó types, availability, distribution, utilization and conservation.

- B. Soil -** Definition, composition, formation, soil profile.
Humus ó significance and role.

(Lectures-14)

UNIT – III. Environmental meteorology-I.

- Solar radiation - concept of insolation and heat budget.
Temperature ó Horizontal distribution, lapse rate, temperature inversion. Humidity -definition and types.
Wind - origin and Earth's surface wind system (doldrums, trade wind belt, prevailing westerlies, and polar easterlies).

(Lectures-14)

UNIT – IV. Environmental meteorology-II.

- Atmospheric pressure, Vapor pressure, saturated vapor pressure, concept of fog.
Clouds- definition, formation and types.
Precipitation- types (orographic, convectional, cyclonic), forms of precipitation (rain, drizzle, sleet, hail, snow).
Monsoon- Meaning origin, Indian monsoon (Bay of Bengal branch and Arabian Sea branch) and significance.
El-Nino- concept and mechanism.

(Lectures-14)

UNIT – V. Environmental Geosciences.

- a. Climatic types and their distribution - Tropical Rainforest, Savanna, Taiga and Tundra with respect to their temperature, wind pattern, precipitation and vegetation.
- b. Geological hazards- Earth quakes, Floods, Volcanoes, Cyclones (causes, distribution types and effects).

(Lectures-14)

UNIT – VI Marine Environment

- a. Introduction to Marine Environment- zonation in the sea, physico-chemical properties, (viscosity, temperature, light penetration, salinity, CO₂, O₂).
- b. Oceanic movements- waves, tides, oceanic currents (origin and types). Tsunami- origin and effects.
- c. Marine Resources ó Food, medicinal, mineral, ornamental, petroleum deposits.

(Lectures-14)

Note- Visit to:

1. Meteorological Station
2. Ecosystem- Forest / pond / River.
3. Land slide/ Rock fall/ Flood affected areas.

BOOKS FOR REFERENCE:

1. Physical geography by Savendra Singh
2. Climatology by S.K. Lal
3. Climatology by Savendra Singh.
4. Environmental Geology by K.S. Waldia.
5. Engineering and general Geology by Parbin Singh
6. Physical Geology by P.K. Mukharji.
7. Fundamentals of Ecology by E.P. Odum.
8. A Text book of Ecology and Environment by P.C. Joshi and Namita Joshi, Himalaya.
9. Environmental Science, Danial Botkin and Edward Keller. John Wiley and Sons, New York (1997).
10. Environmental Geography by Savendra Singh.
11. A Text Book of Marine Ecology by Balkrushnan Nair .
12. Environmental Biology by Verma and Agrawal.

PRACTICAL - I**PRACTICAL COURSE FOR B.Sc. PART- I, SEMESTER-I
(Environmental Science)****A) Experiments on water analysis.**

1. Measurement of pH. Determination of
2. Measurement of electrical conductivity.
3. Determination of total Hardness.
4. Determination of dissolved Oxygen.
5. Determination of alkalinity.
6. Determination of free CO₂.
7. Determination of turbidity.

B) Experiments on Soil and rocks and minerals.

1. Determination of soil temperature.
2. Determination of soil moisture by tensiometer.
3. Determination of soil bulk density.
4. Determination of soil texture by sieve method.
5. Determination of soil electrical conductivity.
6. Determination of soil pH.
7. Determination of soil acidity

8. Determination of soil organic content.
9. Determination of soil calcium carbonate.
10. To study the properties of rocks and minerals (Streak, lusture, texture hardness, color etc.).

C) Experiments on meteorology.

1. Measurement of humidity and relative humidity.
2. Measurement of light intensity at different time.
3. To monitor wind speed and direction.
4. Measurement of rain fall.
5. Observation of clouds.

D) Spottings.

1. Rocks and minerals.
2. Observations and comments on meteorological instruments.
3. Economically important plants of forest origin (medicinal, timber yielding, fiber yielding, resinous and other).

EQUIPMENTS:

1. pH meter
2. Conductivity meter.
3. Anemometer & wind vane.
4. Sieves.
5. Psychrometer (Dry-wet bulb thermometer).
6. Rain gauge.
7. Hygrometer.
8. Turbidimeter.
9. Lux meter.
10. Soil thermometer
11. Tensiometer

DISTRIBUTION PF PRACTICAL MARKS**Time : 4 hrs.**

Q.1	Experiment on water analysis -----	10
Q.2	Experiment on soil analysis -----	10
Q.3	Experiment on meteorology -----	08
Q.4	Spotting (any four) -----	08
Q.5	Tour Diary -----	04
Q.6	Practical record -----	05
Q.7	Viva-voce -----	05

TOTAL**50**

15. SEED TECHNOLOGY (VOCATIONAL)

There shall be one theory paper of 80 marks and practical examination of 50 marks for each semester. Duration of theory paper shall be 3 hours and practical examination shall be of 4 hours .

The syllabus is based on 6 lectures and 6 practical periods per week

One on job training of one month duration shall be compulsory for each semester.

IS-Seed Technology

SEED DEVELOPMENT, SEED PHYSIOLOGY AND

INTRODUCTION TO PLANT BREEDING

UNIT I : Fertilization.

Seed structures and texture

Endosperm and embryo development Immature seed and germination.

Polyembryony

Apomixis.

Development of fruit and seed Monoanxic , Diauxic .

Physiological and Harvestable maturity.

Peroxidase test , GA3 test , RFLP Classification of fruits

Use and limitation of laboratory techniques .

Biochemical methods , elctrophoresis , phenol colour

Sequential approach in testing .

UNIT II : Physiology of seed development allometry .

Seed ripening and maturation processes .

Chemical composition of seeds.

Synthesis of food reserves.

Germination , pattern of water absorption .Types of germination and seedling abnormalities in major monocot and dicot crop species, its causes.

Factors affecting germination ,its implications.

Breakdown of different seed storage products during germination

UNIT III : Respiratory pathways during germination.

Enzymatic activities during germination.

Germination stimulators and inhibitors .

Dormancy and ecological implications.

Organic dormancy , Hardseededness.

Causes of dormancy and its breakage.

Seedling establishment and role of endosperm and embryo size

on seedling establishment.

Seed deterioration during storage , factors affecting physiological changes , its implications on seed quality

UNIT IV : Seed vigour ,its measurements and crop productivity .

Invigoration treatment to improve seedling establishment and its effect planting value .

Treatments to minimize seed ageing.

Seed longevity behaviour Orthodox and recalcitrant seeds.

Specific problems of dormancy and seed longevity in some important crop species.

Micropropagation techniques ; its significance use , scop and limitations.

Seed pelleting and coating artificial seed production (synthetic seeds)

UNIT V : Major families of dicotyledons and monocotyledons

Flower structure , megasporangium , female gametophyte development .

Microsporangium , male gametophyte development .

Pollination , Autogamy , Allogamy

Polyembryony .

Apomixis

Testing for cultivar genuineness ; Objectives , General principles and methods .

Morphology of seeds for varity identification .

Variety descriptors ; importance in varity release

System, DUS system .

Grow out test in cotton .

General Introduction to plant breeding

Definition , history , nature , scope , objectives .

UNIT VI : Mode of reproduction in plants

Asexual ; Parts of plants used for propagation, apomixis

Sexual reproduction : Structure of flower , structure of floral parts _Heterostyly .

Pollination : self pollination and cross pollination ; agencies for cross pollination (air , insects, water and animals)

Fertilization : Germination of pollen grain, growth of pollen tube , fusion of egg and sperm nuclei , double fertilization

Sterility and incompatibility Definition of sterility,

Types of sterility cytoplasmic , genetic, cytoplasmic genetic .

Utility of male sterility in hybrid seed production .

Definition of incompatibility ,Morphological, enetic and bio-chemical basis of self incompatibility
 Utility of self incompatibility
 Use of chemical hybridising agents .

PRACTICALS

SEED DEVELOPMENT , SEED PHYSIOLOGY AND INTRODUCTION TO PLANT BREEDING .

1. Morphology of dicot seeds .
2. Morphology of monocot seeds
3. Seedling morphology and adult plant morphology in some major crops for identification in green house expt .
4. Phenol test in wheat and paddy .
5. Peroxidase test ,2-4D test .
6. GA test in wheat and other crops
7. Electrophoresis NaOH Test .
8. Factors affecting germination Temperature , Moisture Substratum light pattern of water absorption (starchy /protein and oil)
9. Dormancy behaviour and its release Hardseededness .
10. Seed leachate conductivity test .
11. Quick viability test .
12. Accelerated ageing test .
13. Invigoration treatments .
14. Meristem culture .
15. Cytological techniques for the study of chromosomes in plants.
16. Hybridization techniques .

PRACTICAL EXAMINATION

Distribution of marks

1. Identification and classification of seeds (monocot and dicot seeds)	7
2. Phenol test in wheat .	7
3. Seed test (Peroxidase test , GA test) any one .	7
4. Identify describe specimen A , B ,C , and D giving reasons . (Flower ,Pollination, Embryology slides or models) .	8
5. Submission of visit reports .	7
6. Specimen collection and viva voce .	7
7. Record book .	7
Total Marks	50

Books Recommended

1. The embryology of angiosperms , Bhojwani ,S .S. and Bhatnagar, S. P.Physiology of seeds Crocker,W and Barton, L .V.
2. Principles of seed science and Technology LO Copeland Business publishing Co .,USA
3. Viability of seeds EH Roberts .
4. Germination of seeds Mayer and Poljakoff Mayber .
5. Seed biology Vol. I and II . TT Kozlowski Academic Press .
6. Physiology and Biochemistry of seeds Bewley and Black .
7. Seed Technology R L Aggrawal Oxford IBH .
8. Allard ,R W .1960Principles of plant breeding John Willey and Sons INC, Newyork .
9. Chandrasekharan S N and Partha sarthy , S V.1960 Cytogenetics and plant breeding P. Vardachary andCo. Madras .
10. Choudhary H K 1971 Elementary principles of pant breeding. Oxford and IBH . Publishing Co New Delhi
11. Choudhary R C .1982. Introduction to plant breeding Oxford and IBH Publishing Co. New Delhi .

16. ZOOLOGY

There shall be following paper and practical for B.Sc.Part-I Semester One examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory Sessions and 25 practical sessions during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

		Marks
1) Paper-I: Life and diversity of Non-Chordata		
Theory (Written)	í í .	80
Internal assessments	í	20
2) Practical:	í í	50
Total :		150 Marks

1S-ZOOLOGY

LIFE AND DIVERSITY OF NON-CHORDATA

- UNIT-I :**
1. Classification of Non-Chordata.
 2. Phylum Protozoa: General characters.
 3. Type study: Plasmodium vivax: Structure, Life-cycle.
 4. Parasitic protozoan and human diseases: Malaria, Amoebiasis, Trypanosomiasis, Leishmaniasis .
- UNIT-II:**
1. Phylum Porifera: General Characters.
 2. Type study: Scypha: Habits and habitat, External features, cell types, spicules & Structure and significances of canal system.
 3. Phylum Coelenterata: General Characters,
 4. Type study: Metridium: Habits and habitat, External features, Gastro-vascular cavity, Mesenteries, Reproduction.
- UNIT-III:**
1. Phylum Platyhelminthes: General Characters.
 2. Type study: Fasciola hepatica: Habits and habitat, External features, Digestive, Excretory, Reproductive system and Life cycle.
 3. Phylum Aschelminthes: General Characters.
 4. Type study, Ascaris lumbricoides: Habits and habitat, External features, Digestive, Excretory, Reproductive system and Life cycle.
- UNIT-IV:**
1. Phylum Annelida: General Characters.
 2. Type study: Leech: External features, Digestive, Excretory and Reproductive system.
 3. Phylum Arthropoda: General Characters
 4. Type study: Cockroach: Habits and habitat, External features, Digestive system, Respiratory system, Reproductive system.
- UNIT-V :**
1. Phylum Mollusca: General Characters.
 2. Type study: Pila globosa: Habits and habitat, External features (Shell and Body), Digestive, Respiratory and Reproductive system.
 3. Phylum Echinodermata: General Characters.
 4. Type study: Asterias: Habits and habitat, External features, Digestive system, Water vascular system,
- UNIT-VI :**
1. Phylum Hemichordata: General Characters, Body organization of Balanoglossus, Affinities of Balanoglossus, with non-Chordata, and Chordata.
 2. Corals, coral-reefs.
 3. Parasitic adaptations in Helminthes: Morphological and

physiological

4. Larval forms and their significance: Amphiblastula, Planula, Trochophore, Bipinnaria, Brachiolaria,

LIFE AND DIVERSITY OF NON-CHORDATA

Practical : Two practical per week each of 3 period's duration. The Examination shall be of 4 hrs duration and of 50 marks.

I-Life and diversity of non-chordata

1. Observation, Classification up to classes and sketching of the following animals, (Specimens or Models):
 - Phylum Protozoa: *Plasmodium* trophozoite, *Euglena*, *Entamoeba histolytica*.
 - Phylum Porifera: Sycon, Bath sponge, *Euplectella*.
 - Phylum Coelenterata: *Obelia*, *Aurelia*, *Tubipora*.
 - Phylum Helminthes: *Taenia*, *Ascaris* (male & female).
 - Phylum Annelida: Nereis, Earthworm, Leech,
 - Phylum Arthropoda: Prawn, *Limulus*, *Aranea*, *Scolopendra*, *Julus*, Moth, Mosquito.
 - Phylum Mollusca: Chiton, Pila, Dentalium, Unio, Octopus.
 - Phylum Echinodermata: *Antedon*, *Holothuria*, *Echinus*, Sea star, Brittle star
 - Phylum Hemichordata: *Balanoglossus*
2. Study of Permanent slides:

L.S.Sycon, nematocyst, Ascaris egg, T.S. Ascaris through gonads, T.S.Leech through crop, Compound eye of insect, Radula, Gill lamella and Osphradium of *Pila*, Scolex and Gravid Proglottid of *Taenia*.
3. Anatomical Study through Computer Aided Techniques, Video Clipping Models, Photographs and other available resources :
 - a) Leech/Earthworm: Alimentary canal, Reproductive system, Nervous system,
 - b) Grasshopper/Cockroach: digestive system, Nervous system, Reproductive system
 - c) Culture of *Paramoecium* and *Volvox* (To be given to all students)
4. Mountings :
 - a) Mosquito (*Aedes*, *Culex* and *Anopheles*) : wings, legs, mouth parts
 - b) Housefly: Mouth parts, legs, wings
 - c) *Paramoecium* and *Volvox*

Distribution of Marks during Practical Examination: Time : 4 hrs.

i) Identification and comments on spots (1-8) - 4 specimens, 4 slides	12 Marks
ii) Labelling of Anatomical diagrams provided (Two)	10 Marks
iii) Permanent stained micro preparation	08 Marks
iv) Study tour diary - í í í í í	04 Marks
v) Permanent stained micro preparation Submitted by examinee í í í .	04 Marks
vi) Certified class record - í í í í	05 Marks
vii) Check list of 20 locally available invertebrate fauna í í í	02 Marks
viii) Viva- voce í í í í í ..	05 Marks
ô ô ô ô ô ô ô ô ô ô ô	
Total: - í í í 50 Marks	

Note:

- 1) One or two short excursion / study tours are compulsory for observation of animals in their natural habitat.
- 2) Candidates shall be required to produce at the practical examination the following.
 - Practical record book duly signed by the teacher in charge and Certified by the Head of the department as bonafide work of the Candidate.
 - Five permanent stained micro preparations.
 - Study tour report and field diary duly signed by the teacher.

Reference Books Recommended (All latest editions):

- 1) Hickman, C.P. Jr.F.M. Hickman and L.S.Roberts, Integrated principles of Zoology Mosby College publication St.Louis.
- 2) Ayyar, E.K. and T.N.Ananthakrishnan, Manual of Zoology Vol.I (Invertebrata), Part-I & II S. Viswanathan (Printers and Publishes) Pvt. Ltd. Madras.
- 3) Jordan, E.L. and P.S.Verma Invertebrate Zoology, S.Chand and Co., Ltd. Ram Nagar, New Delhi.
- 4) Parker and Haswell, Text book of Zoology, Vol. I (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi ó 110051.
- 5) Waterman, Allyn J. etal., Chordate structure and Function, Mac Millan and Co Newyork.
- 6) S.N.Prasad : Text Book of Invertebrate Zoology.
- 7) Vishwanathan : Invertebrate Zoology.

- 8) Majpuria : Invertebrate Zoology.
- 9) Dhami and Dhami : Non-chordate Zoology.
- 10) Bains Prasad: Indian Zoological memoir. Pila.
- 11) R.L.Kotpal : Modern Text Book of Invertebrate Zoology.
- 12) Malviya M.K. Invertebrate Zoology, by Rajdhool publications.
- 13) S.S.Lal, Practical Zoology, Invertebrate.
- 14) Bhamrah H.S.and Kavita Juneja A text book of Invertebrate Zool-ogy, Anmol Publication Pvt. Ltd., New Delhi.
- 15) Verma and Agarwal Practical Zoology, Invertebrate
- 16) - Barnes R.D. Invertebrate Zoology -(W.B. Saunders Co.)
- 17) P.G.Puranik and Thakur, Invertebrate Zoology.

17. INDUSTRIAL FISH AND FISHERIES

(vocational)

There shall be a following paper and practical for B.Sc.Part-I Semester One examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory periods and 25 practical during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

	Marks
1) Paper-I: FISH BIOLOGY	
Theory (Written) í í .	80
Internal assessments ..í ...	20
2) Practical: í í ..	50
<hr/>	
Total:	150 Marks

**1S- INDUSTRIAL FISH AND FISHERIES
FISH BIOLOGY**

- UNIT I** : 1. Taxonomy and its applications.
2. Taxonomic data and its collection methods.
3. Binomial nomenclature.
4. External morphology of commercially important species of, prawn, crab, lobster, bivalve, gastropod and cephalopods of India.
- UNIT II** : 1. External morphology of commercially important species of Elasmobranch, Teleost of India ,
2. Anatomy of Digestive system and associated structures.

3. Anatomy of Respiratory system
4. Accessory Respiratory organs.

UNIT III: 1. Anatomy of circulatory system..

2. Anatomy of excretory system..
3. Excretion & osmoregulation in marine & freshwater fish

UNIT IV: 1. Anatomy of nervous system and sense organs.

2. Lateral line receptors, Electric organs
3. Sound Producing organ.
4. Food and feeding habits of F.W.fish, Marine fish, prawn,crab, lobster, bivalve, gastropod and cephalopods.

UNIT V : 1. Sexual dimorphism.

2. Anatomy of Reproductive system.
3. Fecundity and its estimation; Fecundity in relation to length, weight, age and food supply.
4. Spawning and factors affecting spawning.
5. Types of eggs, pre-embryonic and post embryonic development in major carps.

UNIT VI : 1. Qualitative and quantitative estimation of food consumption: Experimental estimation of food consumption: Experimental studies and stomach content analysis.

2. Nutrition in fishes and utilization of food, seasonal changes in food, availability of food, food preference, feeding intensity.
3. Fish migration.
4. Social behavior of fish aggregation and shoaling.

PRACTICALS

1. External morphology and morphometrical study of a fish, prawn, crab, Lobster, bivalve and Cephalopod.
2. Methods of collections, handling, identification and preservation of above animals for taxonomic purposes.
3. Identification of commercially important F.W. and Marine fishes, prawns, crabs, bivalves and cephalopods of India.
4. Preparations of wet and dry mounts, wax and plaster castings of fish. Aizarine Preparations and study of skeleton of Teleosts.
5. * Dissections of
 - * Digestive, Nervous, Circulatory, Reproductive systems in type specimens of fish,
 - * Accessory Respiratory organs and gas bladder of fish.
 - * Dissections of prawn: - Digestive, Nervous system.
 - * Dissections of Crab: - Digestive, Nervous.

6. Permanent stained mounting of statocysts in prawn, scales, and intestinal parasite of fishes.
7. Sexual dimorphism in fishes.

Note: Study tour will be compulsory for observation and collection of fishes, prawns, crabs, mollusks during first semester which will be treated as a part of on the job training. Collection and field diary are to be submitted at the time of practical examination.

PRACTICALS EXAMINATION**Distribution of Marks.**

1. Identification and comments on given specimens 1 to 5	ô	10 Marks
2. Identification of a given species of fish by morphometric study.	ô	10 Marks
3. Dissection	ô	10 Marks
4. Permanent stained micro-preparation	ô	5 Marks
5. (a) Viva voce	ô	5 Marks
(b) Record book and Permanent slide submitted	ô	5 Marks
(c) Field diary	ô	3 Marks
(d) Collection	ô	2 Marks

Total : 50 Marks

18. BIOLOGICAL TECHNIQUES AND SPECIMEN PREPARATION (VOCATIONAL)

There shall be a following paper and practical for B.Sc. Part-I Semester one examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory periods and 25 practical during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

		Marks
1)	Paper-I: CAPTURE FISHERIES	
	Theory (Written)	í .. 80
	Internal assessments	í .. 20
2)	Practical:	í .. 50

Total: 150 Marks

1S - Biological Techniques and Specimen Preparation
Biological Techniques and specimen preparation (Animal)

- UNIT-I :** Description and use of Light microscope, phase contrast microscope and stereoscopic microscope, magnification and resolution. Ocular and stage micrometers and their use in measurement of micro- objects. Some common problems associated with light microscopes : Care of microscope, Cleaning of lenses, Replacement of rack and pinion, use of condenser, mirror position and types, Double demonstration eye piece, Pointer eye-piece, Focusing problems.
- UNIT-II :** Haemocytometer :Neubaur's chamber for RBC and WBC counting and other uses. Camera Lucida - Construction and functions.
 Collection and fixation of materials for permanent slides: Fixation, Types of fixatives. Culture of protozoan-Paramecium, Amoeba, Vorticella and Euglena. Decalcification of bones. Dehydration, Clearing, Embedding, Types of embedding techniques, Preparation of paraffin blocks, trimming, Section cutting, Spreading of ribbons & preparation of permanent slides. Microtome: rocking and rotary. Use and care of microtome.
- UNIT-III :** Preparation and use of different stains- Types of stains, Preparation of some common stains for Anatomical, histochemical & histological studies, staining techniques for micro- organisms and blood smears. Procedure of double staining method, mounting and storage of slides. Mounting media-Glycerine, Water, Canada balsam and DPX, sealing agents.
- UNIT-IV :** Broad classification of animals up to order.
 Identification of animals commonly used as specimens. Where and how to collect animals and preparation of museum specimens, Preservatives, Dissected animals as museum specimens and preparation of life cycles of specimens.
- UNIT-V :** Organs and tissues commonly used in the classroom, Scales of fishes (Placoid, Rhomboid, Cycloid and Ctenoid), Ampulla of Lorenzini, Oral hood of Amphioxus, Pecten in birds, skin,. Preparation of Skeletons,, (Fish/Amphibian/Reptile/Bird/Mammal). Preparation of liver, pancreas, tongue intestine, stomach, thyroid, kidney, gonads striated muscles, cartilage, squamous epithelium, Bone, of frog and rat.
- UNIT-VI :** Preparation of Medusa, Gills of Pila, Radula of pila, Nephridium of earthworm and leech. Parapodium of Nereis

and Heteronereis,
 Spiracles of cockroach, Mouthparts of insects (house fly, mosquito, honey bee, butter fly), Pedicellaria and larval forms of crustaceans,. Special staining method- Giant chromosomes and their staining; Staining for glycogen, and proteins, Silver staining.
 Taxidermy-stuffing of animals (fish, Reptile, Bird and a mammal). Preparation of resin embedded specimens. Alizarine preparation. Preparation of charts. Preparation of transparencies slides.

PRACTICALS

1. Use and maintenance of microscopes. Light compound and dissecting microscopes, Stereoscopic microscopes, Binocular microscopes.
2. Preparation of Stains: Eosin, Borax Carmine, Haematoxylin, Acetocarmine, Acid & Basic Fuschin, Methylene blue, Leishman stain, Safranin, Light green.
3. Fixatives and mounting media: Bouin's fluid (alcoholic/aqueous), Carnoy's fixatives, Glycerine, Canada balsam, DPX.
4. Hanging drop technique.
5. Micortomy: Preparation of Zoological permanent microslides (Histological)
6. Preparation of Sterile culture media : Solid/Liq. Cultures of some protozoans and their maintenance.
7. Counting of cells by Haemocytometer .growth curve.
8. Use of ocular and Stage micrometer scales for measurement of micro objects.
9. Preparation of zoological museum specimens: Including life cycles.
10. Preparation of Zoological whole mounts.
11. Collection and preservation of Zoological materials for anatomical & cytological studies.
12. Dissection and display of dissected specimen.

Practical Examination
Distribution of marks

		(50 Marks)
Q1.	Dissection and its display with proper labeling. .	10 marks.
Q2.	Permanent stained micropreparation	
	Or	
	Double stained preparation	8 marks
Q3.	blood smear by using nuclear stains.	7 marks

Q4.	Counting of blood cells by haemocytometer	10 marks
	Or	
	Measurement of micro-objects by coulometer	
Q5.	Submission of Zoological museum specimens, skeletons, Models, charts, (At least 3 different types) are to be Submitted at the time of examination.	5 marks
Q6.	Practical record	5 marks
Q7	viva voce	5 marks
Total :		50 Marks

19. STATISTICS

The examination in Statistics of First & Second semester will comprise of one theory paper each, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The Distribution of marks for practical will be as follows :

1.	Practical record -----	08 Marks
2.	Practical Viva Voce -----	12 Marks
3.	Practical problems -----	30 Marks

The following syllabi is prescribed on the basis of six lectures per week and six practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

The college imparting instructions in Statistics should provide 12 digit desk model electronic calculators to the every student for practical work.

1S STATISTICS

UNIT I : Introduction to Statistics:

- 1.1 Meaning of statistics as Science, its importance and limitations.
- 1.2 Scope of Statistics : In the field of Industry, Biological Sciences, Medical Sciences, Agricultural Sciences, Management Sciences, Education and Psychology.
- 1.3 Statistical Organizations in India and their functions : CSO, NSSO, IIPS, ISI.
- 1.4 Types of Data : Qualitative and Quantitative data, nominal and ordinal data, discrete and continuous data, frequency and non-frequency data.

- 1.5 Primary and Secondary Data and its major sources.
- 1.6 Types of Scales : Nominal, ordinal, ratio and interval.

UNIT II : Presentation of Data :

- 2.1 Classification : Rules of Classification and its types.
- 2.2 Tabulation : Meaning of Tabulation & its types, construction of tables with one or more factors.
- 2.3 Frequency Distribution : Discrete and continuous frequency distribution, cumulative frequency distribution, ogive curves.
- 2.4 Central Tendency : It's concept and its measures (A.M., weighted A.M., median, mode, G.M., H.M.) with its merits and demerits.
- 2.5 Properties of A.M., relation between mean, mode and median, relation between A.M., H.M., G.M.
- 2.6 Partition values : Quartiles, deciles and percentiles.

UNIT III : Measures of Dispersion, Skewness and Kurtosis :

- 3.1 Range, Quartile deviation, mean deviation and its coefficients.
- 3.2 Standard deviation, root mean square deviation, variance and various formulae for calculating variance, C.V.
- 3.3 Moments : Raw moments and central moments with its relationship, effect of change of origin and scale on moments.

UNIT IV : Theory of Probability :

- 4.1 Permutation and combination theory, Binomial theorem.
- 4.2 Algebra of Events.
- 4.3 Concept of probability, Definitions of (i) Random experiment, (ii) Trial and Events, (iii) Exhaustive event, (iv) Favourable event, (v) Equally likely event, (vi) Mutually exclusive event, (vii) Independent event & complementary event.
- 4.4 Classical and Statistical Probability with its limits, simple numerical problems on probability.
- 4.5 Sample space, discrete sample space (finite & countably infinite), Axiomatic probability, simple theorems on probability with additive and multiplicative law of probability.
- 4.6 Conditional probability, Independent events and Bayes theorem.

UNIT V : Random Variables and Mathematical Expectations:

- 5.1 Concept of random variable & its illustration by examples. Discrete and Continuous random variables.

- 5.2 Probability distribution of a r.v., discrete and continuous distribution function, properties of distribution functions, simple numerical problems on probability distribution .
- 5.3 Mathematics expectations and its properties. Numerical problems on expectations.
- 5.4 Expectation of discrete and continuous r.v., expectation of a linear combination of r.v., variance of a r.v. covariance and its properties.

UNIT VI : Generating functions & Bivariate Distributions :

- 6.1 Probability generating function, moment generating function, relation between p.g.f. and m.g.f., properties of m.g.f.
- 6.2 Cumulant generating function and their properties.
- 6.3 Bivariate probability distributions (discrete and continuous), joint, marginal and conditional probability mass functions.
- 6.4 Marginal distribution functions, joint density function, marginal and conditional density functions.
- 6.5 Stochastic Independence, numerical problems on bivariate, marginal and conditional functions.
- 6.6 Addition and multiplication theorem of expectation.

List of Practicals : (1S Statistics)

1. Presentation of data by frequency table.
2. Calculation of arithmetic mean, median and mode for grouped and ungrouped frequency distributions.
3. Calculations of harmonic mean and geometric mean for grouped and ungrouped data.
4. Calculations of partition values as deciles, quartiles and percentiles.
5. Calculation of range, mean deviation and quartile deviation with its coefficients.
6. Calculation of standard deviation and coefficient of variation for grouped and ungrouped data.
7. Problems on calculations of moments (upto third order)
8. Problems on skewness and kurtosis.
9. Evaluation of probabilities using addition theorem.
10. Evaluation of probabilities using multiplication theorem.
11. Problems on conditional probability.
12. Determination of probability distribution of discrete random variables.
13. Determination of mathematical expectation and variance for discrete and continuous r.v.
14. Computation of covariance between two variables.

Note : The practicals numbered 2, 4 and 6 may be performed on MSEXCEL.

References for 1S and 2S (Statistics)

- (1) Brase and Brase : Understandable Statistics.
- (2) J.Medhi : Statistical methods, an introductory text.
- (3) S.C.Gupta and V.K.Kapoor : Fundamentals of mathematical statistics, Sultan Chand and Sons.
- (4) Bhat B.R., Srivenkatramana T. and Rao Madhava K.S. (1997) : Statistics- A begineers Text Vol.-II, New Age International Pvt. Ltd.
- (5) Goon A.M., Gupta M.K., Das Gupta B. (1999) : Fundamentals of Statistics, Vol.-I & II, World Press, Calcutta.
- (6) D.N.Elhance : Fundamentals of Statistics
- (7) Spiegel M.R. (1967) : Theory and Problems of Statistics, Schaum's Publishing Series.
- (8) Croxton F.E., Cowden D.J., and Kelin S. (1973) : Applied general Statistics, Prentice Hall of India.
- (9) S.C.Gupta : Fundamentals of Mathematical Statistics, S.Chand Publication.
- (10) B.L.Agarwal : Programmed Statistics, New Age International Pvt. Ltd., New Delhi.

List of Equipments and Instruments required for a Batch of Students in U.G. Statistics Laboratory :-

(1) Twelve digit desk model electronic calculators	20
(2) Biometrica tables Vol.-I & II	02
(3) Seven figure logarithmic tables	10
(4) Statistical tables (compiled)	10
(5) Random Number Tables	10
(6) Personal Computer with Printer	05
(7) Statistical Poster and chart.	02

20. COMPUTER SCIENCE
OR
20. COMPUTER APPLICATION
OR
20. INFORMATION TECHNOLOGY

The examination in Computer Science will comprise One theory Paper and Practical examination for each semester. The theory paper will be of 3 Hours Duration and carry 80 marks. The Practical examination will be of 4 Hrs duration and carry 50 marks.

The distribution of marks in Practical examination is given as. :

- | | | |
|----|---|------------|
| 1) | Program writing / execution (on group A & B) | : 30 marks |
| 2) | Practical / Record | : 10 marks |
| 3) | Viva-voce | : 10 marks |

Total 50 marks

**1S : Computer Science or Computer Application or
Information Technology
Paper-I**

Computer Fundamentals and C Programming

UNIT-I : Introduction to Computers :

Characteristics, classification of Computers, block diagram of computer, memory and their types: Primary and secondary memory . Peripheral devices : Keyboard, mouse, scanner, printers : Impact, Non-impact, DMP, inkjet , Laser.

UNIT-II : Introduction to OS :

DOS : Booting process, formatting, directory structure, FAT. Internal DOS commands : REN, CD, MD, RD, DIR, DEL, COPY, TYPE, DATE, TIME, COPYCON, PROMPT External commands: FORMAT , XCOPY, CHKDSK, PATH, ATTRIB, AUTOEXEC. BAT, CONFIG.SYS Windows : Introduction, features, Windows Explorer Number system : Decimal, binary, octal, hexadecimal and their conversions, ASCII Code.

UNIT-III : Introduction to Internet : Direct, Types of Internet connection: Direct dial-up, broadband, Internet protocol : TCP/IP, FTP, HTTP, Domain name e-mail address, WWW, web browser : Internet Explorer. Netscape navigator, search engines.

UNIT-IV: Programming Concept : Algorithm flowcharting programming languages, assembler, interpreter, compiler programming process : program design, coding compilation, Execution, testing, debugging documentation structured programming : features and approaches.

UNIT-V : Elements of C : Introduction to C, History, features structure of C program, header file, character set, keywords, identifiers, constants, variables, basic data types, symbolic constants, typedef operators & Expressions : Arithmetic, Relational, logical assignment, Increment and decrement, precedence of operators.

UNIT- VI : I/O Operations :

Formatted I/O : Printf (), Scanf (), Unformatted I/O : getch (), getche (), getchar (), putchar (), putche (), putchar (), gets (), Puts (), Control structure : if , if... else, nested if, conditional operator , switch, goto, for, while, do..while, nesting of loops, break, continue.

Books Recommended :

- 1) Computer fundamental : B Ram, Nas Age publication
- 2) Fundamentals of Computer : V. Rajaraman, PHI Publication.
- 3) Computer Fundamentals : Preeti Sinha, BPB Publication.
- 4) Information Technology : Alexie and Mathews, Vijay Nikole Publication.
- 5) IT Tools and Applications : Alexie and Mathews, Vijay Nikole Publication.
- 6) Programming in C : E alaurusamy, TMH. Publications.
- 7) C Programming With C : Ravichandran.
- 8) Program with C : Byron Gottfried, schaum series Publication.

Practicals : Minimum 16 practicals based on

- A. Unit-II, III and MS-WORD, MSEXCEL (Minimum 8 Practical)
- B. Unit-IV to Unit-VI (Minimum 8 Practical)

21. COMPUTER APPLICATION (VOCATIONAL)

The examinations in vocational subject Computer Application will comprise of one theory papers and practical examination for each semester. The theory paper will be of 3 hours duration and carry 80 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The distribution of marks in the practical examination will be as follows

- | | | |
|----|------------------------------------|----------|
| 1) | Practical based on computer lab I | 15 Marks |
| 2) | Practical based on computer lab II | 15 Marks |

3)	Viva Voce (based on lab.I & II)	10 Marks
4)	Record/Practical Journal	10 Marks

Total	50 Marks
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Each unit of theory paper will carry two questions with internal options to solve any one question. Candidates are required to pass separately in theory and practical. The following syllabus is based in 8 theory periods and 4 practical periods (of 2 terms of 2 periods) per week.

**1S : Computer Application (Vocational) : Paper-I
Fundamentals of Computer Applications**

UNIT-I : Introduction to Computer : Characteristics, types of computers: micro, mini, main and super, Block diagram of computer, types of memories : RAM, ROM, PROM, EPROM, EEPROM, Cache Memory, Secondary Storage Devices : hard disk, CD, DVD, Pen drives.

I/O Devices : Keyboard, Mouse, Scanner, Touch Screen, light Pen, Printers : Impact and non-impact, Monitors : VDU, LCD & TFT, modem.

UNIT-II : Number System : Binary, Decimal, Octal and Hexadecimal and their inter-conversion.

Operating System : Definition, Types and Functions of O.S(Memory, File, I/O and Processor Management), Booting process. Windows XP : Introduction, Features and taskbars, Desktop, Customising Desktop, Icons.

UNIT-III : Internet : History, URL, Domain, Protocol(FTP,IPV4,IPV6), Wi-fi, Internet Accounts : Dial up, direct access and broadband. Web browsers: Internet Explorer , Opera, Search Engines.

E-mail: Using mail clients such as Microsoft Outlook & Web mail

Unit-IV : Programming Concept : Algorithm, flowcharting, types programming languages, Programming process : Program design, coding, compilation & Execution, testing & debugging, documentation.

Data Structure: Types of DS, operations on DS, Linear Array(Linear, Binary Search, Bubble Sort), STACK(Push,Pop), Introduction to QUEUE

UNIT-V : Structured Programming : History and advantages of C language, structure of C program, character set, identifiers, keywords, constants and variables, symbolic constants, qualifiers, type conversion.

Operators and Expressions : Types of Operators - Arithmetic, Relational, logical, assignment, increment & decrement, bitwise.

UNIT-VI : I/O Operations : Formated I/O : printf(), scanf() Unformatted I/O : getch(), getche(), getchar(), putchar(), puts(), gets(), puts().

Control structures : Branching -simple if, if-else, Conditional operator(? :), nested if, switch.

Looping - while, do-while, for statements, comma operator, goto label, break, continue, nested loops: while, do-while, for.

Books Recommended :

- 1) Computer Fundamentals & Networking-P.K.Sinha
- 2) Fundamentals of Computer - B.Ram
- 3) Internet Book - Clstenes
- 4) Information Technology - Alexies & Mathews - Vijay Nikole

Reference Books :

- 1) Fundamentals of Computer - V.Rajaraman
- 2) Computer Network-Andrew Tennenbaum
- 3) 3 Local Area Network - Keiser -TMH
- 4) I.T. tools and applications - Alexie & Mathews - Vijay Nikole
- 5) ABC of Internet - Christian Crumblish (BPB)

PRACTICALS :

Computer Lab.-I : Minimum 8 practical based on :

- 1) Windows 95/98/Me 2000/XP
- 2) M.S.Office (Word, Excel, Power Point)

Computer Lab.-II : Minimum 8 practical based on Unit-IV,V and VI.

Study tour : Study tour may be arranged to computer industry, software development organisations, institute, software technology park, I.T. park.

22. ELECTRONICS

General Provisions/Instructions

Part A

- (i) The Examination in Electronics of each semester shall comprise of one theory paper of 80 marks of three hours duration and internal assessment of 20 marks.
- (ii) Theory paper of each semester shall comprise of six units. Each unit shall be completed in maximum 15 teaching periods of 48 minutes duration.
- (iii) There shall six questions of twelve marks on each unit with alternate choice and One compulsory question (08 subquestions of 01 mark each) of 08 marks covering syllabi of all units (short answer type).

Part B

- (i) The Practical examination of each semester of the B. Sc. (Electronics subject) shall be of 50 marks of 4 hours duration and shall be held at the end of each semester at the places as decided by the university.
- (ii) Distribution of 50 marks assigned to practical for (Semester I to V) is as under-
- | | |
|--|------------|
| 1. Experiment
(Construction, testing and performance) | : 30 Marks |
| 2. Practical record | : 10 Marks |
| 3. Viva-voce | : 10 Marks |
- ô ô ô ô ô ô ô ô ô ô ô
- Total : 50 Marks**
- (iii) Project will be given to a group of not more than four students.
- (iv) Teacher may adopt any innovative practice for demonstration of practicals on the aspects given.
- (v) College/ Department may prepare laboratory manuals of experiments

Semester I
1S-Electronics
Basics of Electronics

Unit I : Passive Components and Network theorems

Introduction to Resistors, Capacitors, Inductors and Transformers, Concept of ideal dc voltage and current source, KVL, KCL, Thevenin ϕ , Norton ϕ , maximum power transfer, Millman ϕ theorem (statement, proof, simple numerical application for dc only).

UNIT II: Measuring Instruments :

Principles of voltmeter, ammeter, ohmmeter, Multirange DC voltmeter, ohm per volt rating, loading effect, Multirange DC Ammeter, Series & shunt type ohmmeter, Multimeter (uses & drawback). CRO Block diagram & explanation, CRT construction & working, uses of CRO (measurement of frequency, amplitude & phase.)

Unit III : Semiconductor Diode and Regulated power supply:

Operation and characteristics of PN junction diode, Avalanche and Zener breakdown mechanism, Half wave and full wave rectifiers (ripple factor, efficiency, PIV ratings), C, L and π filters, Concept of unregulated and regulated power supply, Zener diode voltage regulator, Three terminal IC regulator.

Unit IV : Bipolar Transistors:

NPN and PNP transistor (construction and working) CB, CE & CC configuration, leakage currents, Input and output

characteristics of CE mode, relation between α and β Load line and operating point, Amplification action of CE amplifier, biasing and stability, Self and fixed bias circuit.

Unit V : Switching and Optoelectronic devices :

Construction, working and characteristics of FET, MOSFET, UJT, SCR, relation of FET parameters, Construction, working & characteristics of LDR, LED, photodiode, photovoltaic cell (Solar cell).

Unit VI : Integrated Circuits:

Introduction to IC technology, advantages and disadvantages, Classification of ICs, Basic steps in fabrication of monolithic ICs, Fabrication of diode, resistor & transistor. Scale of integration upto V²LSI. Basic concept of Embedded systems.

Books Recommended:

- 1) Basic electronics by B.L. Thereja (S.Chand and Company)
- 2) Digital and Analog technique by Navneet, Kale and Gokhale
- 3) Element of electronics by Bagde and Singh (S.Chand and Company)
- 4) Principles of electronics by V.K.Mehta
- 5) Introduction to digital electronics by Mohinder Singh
- 6) Electrical and electronics measurement and Instrumentation by A.K. Sawhney
- 7) Text book of Electrical Technology by B.L. Thereja

Practicals: Minimum Ten experiments at least one on each of the following aspects.

1. Active and Passive components.
2. Network theorems, voltmeter, Ammeter, ohmmeter multimeter and CRO.
3. Regulated power supply, rectifiers, filters, IC regulators.
4. Bi-polar devices and its applications.
5. Uni-polar and optoelectronic devices and its applications.
6. IC testing, IC know how, IC connection, simple IC circuits, mounting of IC on PCB and checking of voltage at each pin.

23. BIOCHEMISTRY

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 to 8 hours duration in one day and shall carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has

been divided into 6 units. There shall be one question on every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

The distribution of marks in practical shall be as follows:

A)	Any five tests for section 6I	-	15 marks
B)	Any one experiment from sec-II	-	10 marks
C)	Any one Experiment from sec.-III	-	10 marks
D)	Viva Voce	-	8 marks
E)	Class Work & Practical Record	-	7 marks

 Total - 50 marks

1S Biochemistry

Biomolecules And Nutrition.

UNIT- I : Carbohydrates:

Defination,classification, asymmetric carbon, optical isomerism, D & L isomerism, Epimerism, ring structure of pentoses & hexoses, α & β anomers, mutarotation

Reactions of aldehyde, ketone groups & hydroxyl groups, amino sugars, deoxy sugars, types of glycosidic bonds, structure, occurrence & biological importance of polysaccharides like starch, glycogen, cellulose & mucopolysaccharides like heparin, hyaluronic acids, chondratin sulphates.

UNIT-II: Lipids:

Defination & classification. Fatty acids: introduction, nomenclature, structure & properties of saturated & unsaturated fatty acids, cis & trans isomerism, positional isomerism, triacylglycerols; nomenclature, structure & characterization of fats (hydrolysis, saponification value, acid value, rancidity of fats, iodine number) biological significance of fats, structure & functions of lecithins, cephalins, phosphoinositides & spingomyelins, glycolipids-cerebrosides, gangliosides & steroids (properties & functions of ergosterol, cholesterol, bile acids)

UNIT- III: Proteins:

Defination, classification based on solubility, shape composition & function. Amino acids: classification, structure & isomers of standard amino acids, Zwitter ionic structure

Physiochemical properties, glucogenic & ketogenic amino acids, non proteinous amino acids (ornithine, citrulline & β alanine) Peptides: structure of peptide bonds, important peptides

(structure & functions).

Protein structure: Levels of structure, forces stabilizing the tertiary & quaternary structure of proteins, Denaturation & renaturation of proteins, salting in and salting out of proteins, structure & biological functions of fibrous proteins (keratins, collagen, elastins), globular proteins (hemoglobin & myoglobin) catalytic proteins.

UNIT-IV : Nutrition, Balanced diet & Minerals:

- Energy value & nutritional importance of carbohydrates, lipids & proteins, essential amino acids, essential fatty acids, complete & incomplete proteins, calorie malnutrition, obesity and fatty liver.
- Balanced diet, dietary standards, infants diet, diet during pregnancy & diet for old persons, RQ, BMR & SDA.
- Importance of minerals like Na, K, Fe, Cu, Mg, Ca, P, Co, I, & Mn in nutrition.

UNIT- V : Nucleic Acids & Porphyrins:

- Nucleic acids: Structure of nitrogenous bases, nucleosides, nucleotides, structure of DNA & RNA. denaturation & annealing of DNA, evidence that DNA is genetic material, gene, genome, chromosomes.
- Chemistry of porphyrins nucleus: Classification, important, metalloporphyrins (hemoglobin, cytochromes, chlorophyll) Bile pigments: chemistry & physiological role.

UNIT-VI : Vitamins & Hormones:

- Vitamins: Chemistry, sources, daily allowances function & deficiency of water soluble & fat soluble vitamins.
- Hormones: Defination, classification, mode of action & target sites, chemistry & function of hormones of pituitary, thyroid, parathyroid, adrenal, pancreas, gonads & corpus luteum.

PRACTICAL

Section I : Qualitative Tests and Biochemical Preparations.

- Qualitative tests for carbohydrates.
- Qualitative tests for proteins, lipids and amino acids.
- Preparation of buffer of different pH.
- Measurement of pH of given sample by Universal indicator solution, pH strip and pH meter.

Section II: Titrometry

- Determination of acid value of fat.
- Determination of Saponification number of oil.

- c) Estimation of Glycin by Formal titration.
- d) Estimation of ascorbic acid by Dye method.

Section III: Colorimetry

- a) Verification of Beer's Lambert's law.
- b) Estimation of Protein by Biuret method.
- c) Estimation of Protein by Lowry's method.

24. MICROBIOLOGY

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of atleast 4 hours duration in one day and shall carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question on every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

1S-Microbiology

Fundamentals of Microbiology and Microbial Physiology

UNIT I : A. History of Microbiology:

- a. Discovery of microscope- Leeuwenhoek, Robert Hook.
- b. Controversy over Spontaneous, generation, Contributions of Aristotle, Redi, Needham, Schulze and Schwann, Schroder & Vandsuch, Louis Pasteur, John Tyndall
- c. Germ theory of diseases- Joseph Lister, Koch postulates, River postulates.
- d. Pure culture concept- Joseph Lister, Koch, DeBarry.

B. Scope of Microbiology as a modern Science.

- a. Industrial Microbiology, Environmental Microbiology, Medical microbiology, Food and Dairy Microbiology, Genetic engineering and Biotechnology.
- b. Different types of Microorganisms (outline)
- c. Distribution of Microorganisms in nature, and their beneficial and harmful activities.

UNIT II : A. Microscopy:

- i) Definitions- Magnification, Resolving power, numerical aperture, focal length, Working Distance Aberrations,
- ii) Objectives- Functions, low and high power objectives, Oil

Immersion objectives,

- iii) Ocular- Functions, Huygenian, Ramsden, Hyperplane and compensating.
- iv) Condensor- Functions, Abbe, parabolic
- v) Iris diaphragm

B. Principles, construction, ray diagram and applications:

- i) Compound Microscope,
- ii) Darkfield Microscope,
- iii) Phase Contrast microscope
- iv) Fluorescent Microscope,
- v) Electron Microscope.

C. Staining:

Dyes and Staining,- Definitions, auxochromes, Chromophore, mordents, chromogens, Leucostains, Principles and Methods of the following techniques:

- i. Simple staining
- ii. Differential- Gram, Acid fast,
- iii. Structural-Endospore, flagella.

UNIT III : Classification of Microorganisms:

A. Bacterial Classification:

- i. Definition- Taxonomy, Classification, Taxonomic rank, Identification, Nomenclature,
- ii. Bergey's manual of systematic Bacteriology, General characteristics enlisting all parts with major characters and examples(Vol.I to IV)
- iii. Methods of Classification: Intuitive, Numerical taxonomy, Genetic relatedness,

B. General characteristics of :

- i. Viruses,
- ii. Fungi (Including yeasts)
- iii. Actinomycetes,
- iv. Mycoplasma and Rickettsia
- v. Algae

UNIT IV: Structural Organization of Bacteria:

- a) Concept of prokaryotes and Eukaryotes; Comparison and Differences.
- b) Typical Bacterial cell
- c) Shape, Size and Arrangement of Bacteria
- d) Structure and functions of following:

- i. Capsule and slime layer
- ii. Cell wall- Gram positive and Gram negative bacteria.
- iii. Cytoplasmic membrane- fluid mosaic model
- iv. Flagella- Arrangement, Mechanism of flagellar movement.
- v. Pili-Arrangement and function
- vi. Ribosomes- Procaryotic and Eucaryotic
- vii. Plasmid- Definition, General characters, classes
- viii. Bacterial chromosome
- ix. Endospors- Structure and arrangements.

UNIT V: A. Microbial Nutrition:

- i. Basic Nutritional Requirements: Sources of C, N, O, P, S, Energy, Macronutrients, Growth factors, water etc.
- ii. Media; Synthetic, Nonsynthetic, Liquid and Solid, Semi-solid, Differential, Enriched, Selective media. Role of beef extract, yeast extract, peptone, agar and gelatin.
- iii. Determination of nutritional requirements: Auxanographic technique, Replica plating technique.
- iv. Nutritional classification; on the basis of source of carbon and energy

B. Pure Culture Techniques:

- i. Definition- Pure and Mixed culture:
- ii. Methods of Isolation of Pure culture, Serial dilution, Streak plate, pour plate, spread plate, Enrichment culture, and Single cell isolation method.
- iii. Methods of preservation of pure culture- Agar slants, Saline suspension, Overlaying with oil, Freeze drying.

UNIT VI: Reproduction and Growth of Bacteria:

- a) Reproduction: Binary fission, Budding, Fragmentation, Sporulation,
- b) Growth rate and generation time- Definition, mathematical expression.
- c) Bacterial growth curve
- d) Synchronous culture: Definition, methods of isolation (Helmstetter- Cummings Technique) and application.
- e) Continuous culture: Definition, method (chemostat, and Turbidostat Techniques) and Application.
- f) Measurement of Growth:
 - i. Cell number measurement- Breed method, Colony count

- ii. Cell mass measurement- Dry weight and Turbidity measurement.
- iii. Cell activity measurement- Biochemical activity
- iv. Factors influencing bacterial Growth- Temperature, pH, Gaseous.

Microbiology Practicals

1. Microscopy:
 - i. Different parts of compound microscope
 - ii. Use and Care of compound microscope
2. Construction, operation and utility of Laboratory equipments;
 - i. Autoclave
 - ii. Hot air oven
 - iii. Bacteriological Incubator
 - iv. pH meter
 - v. Centrifuge
 - vi. Colorimeter/ spectrophotometer
 - vii. Anaerobic Jar
 - viii. Bacteriological filters
 - ix. Laminar air flow
 - x. Air sampler
 - xi. BOD incubator
3. Preparation of Nutrient media:
 - i. Nutrient broth
 - ii. Nutrient agar
 - iii. PDA
4. Demonstration of bacteria from; Soil, Water, Air, Milk, Skin
5. Microscopic Examination of bacteria
 - i. Monochrome staining
 - ii. Gram ϕ staining
 - iii. Acid fast staining
 - iv. Negative staining
 - v. Endospore staining
6. Hanging drop technique to demonstrate Bacterial motility
7. Measurement of size of bacteria
8. Cultivation and Demonstration of
 - i. Yeast- *Saccharomyces cereviceae*, *Candida albicans*.
 - ii. Molds- *Mucor*, *Rhizopus*, *Penicillium*, *Aspergillus*

9. Demonstration of
 - a) Protozoa-E.histolitica, Paramoecium
 - b) Algae ó Anabena , Nostoc, Spirogyra
10. Isolation of Pure culture by
 - i) Streak plate ii) Pour plate iii) Spread plate .
11. Enumeration of bacteria in the given sample by standard plate count
12. Demonstration of Replica plate technique / auxanography.

Distribution of Marks

Ist Semester Microbiology Practicals

1.	Major Experiment	-	15 Marks
2.	Minor Experiment	-	10 Marks
3.	Viva ó Voce	-	10 Marks
4.	Spotting	-	10 Marks
5.	Laboratory Journal	-	05 Marks

Total 50 Marks

List of Books Recommended For 1S and 2S Microbiology

- 1) General Microbiology : Stainer, Roger et. al.
- 2) General Virology : Luria, S.E.
- 3) Handbook of Genetics : Esser, K.
- 4) Fundamentals Principles of bacteriology : A.J. Salle.
- 5) Microbiology : Pelczar, Chan, Krieg.(TMH)
- 6) Fundamental of Microbiology : Frobisher
- 7) General Microbiology Vol. I & II : Power & Dagainawala. (Himalaya Publication)
- 8) Zinsser Microbiology : W.K. Joklik
- 9) General Microbiology : W.G. Walter
- 10) Elements of Microbiology : M.J. Pelozar & E.C.S. Chan
- 11) Essays in Microbiology : J.N. Norris & M.H. Richmond
- 12) Microbiology (Essentials & Applications) : L. Mckane & J. Kandel
- 13) Basic Microbiolgy : Volk
- 14) Chemical Microbiology : Rose
- 15) Microbiology (Introduction to Health of Professional) : Paul A. Ketchum.

- 16) Molecular Biology of the gene : J.D. Watson.
- 17) Molecular Genetics : Taylor J.H.
- 18) Gene Expression Vol. I, II III, IV : Lewin
- 19) Elementary Microbiology Vol. I & II : Modi (Akta Prakashan)
- 20) Basic experimental Microbiology : Ronald M., Atlas, & Alfred Miller E.Brown, Kenneth W. Dobra, Lionas (1986) (Prentice Hall - 316 PP)
- 21) General Microbiology : Robert F.Boyd (1984) times mirror / mosby college, Pub. 22 PP.
- 22) Fundamentals of Biostatistics (Biometry) : Satguru Prasad, Emkay Publications, Delhi.
- 23) Text Book of Microbiology : Dubey & Maheshwari (S.Chand, Publication)
- 24) Introduction to Computer by : Shrivastav (Macmillan)
- 25) Fundamentals of Computer : Rajaraman (PHL)
- 26) Office automotion : Bajaj (Macmillan)
- 27) Computer made simple : Taxilli.

List of Books For PRACTICALS

- 1) Microbes in Action : Seely, Wander Mark Tarporewala, Bombay
- 2) A Mannual of Microbiology Methods : A.J. Salle.
- 3) Medical Microbiology Vol. II : R. Cruickshank
- 4) Microbiology Methods : Collins
- 5) Difco manual
- 6) Bacteriological Techniques : F.J.Baker
- 7) Introduction to Microbial Techniques : Gunasekaran
- 8) Biochemical methods : Sadashivam & Manickam
- 9) Laboratory Fundamentals of Microbiology : Alcamo, I.E., Jones and Bartlett Publishers.

25. FOOD SCIENCE

The examination in Food Science of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 6 to 8 hours duration and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

The distribution of marks in practical shall be as follows:

A)	Two short experiment	-	20 marks (10 Each)
B)	One long experiment	-	15 marks
C)	Viva voce	-	10 marks
D)	Practical Record	-	5 marks

Total - **50 marks**

1S FOOD SCIENCE

BASIC CHEMISTRY OF FOODS

UNIT - I Concept of Food Science :

Introduction and Definition of Food Science.

Unit Operation: Definition of SI Unit of length, Weight, Volume.

Composition, formula and definition mole, atomic weight, equivalent weight and molecular weight.

Temperature (Conversion of Celsius Scale to Fahrenheit Scale).

pH and buffer :Definition, ionization of acid (weak and strong acid, measurement of pH, pH value of some common food substances)

Important Terminologies (Definition and Relevance, Melting point, Boiling point, Smoking point, Surface Tension, Sol, Gel, viscosity, Emulsion & foam.)

Physical and chemical properties Melting point, Boiling point, Smoking point, Surface Tension, Sol, Gel, viscosity, Emulsion & foam.

UNIT - II Introduction and Terminology :

- a) Food, Nutrition, Nutrients, Calories, Health, Malnutrition. Balanced Diet, Basic food groups.

Recommended Dietary Allowances of All Age Group.

S.D.A. of Protein

Determination of Energy value of food stuff, calorimetry etc.

Concept of BMR

Factors affecting BMR : Age, body size, body composition and health.

UNIT – III Carbohydrates:

Definition, Composition, Classification, Food Sources, Functions of monosaccharide, disaccharides and polysaccharides.

Sugar: Sources of Sugar, Classification of Sugar, Properties of Sugar. Polysaccharides, Classification.

Starch: Structure, Amylose and Amylo Pectin.

Pectic Substances: Occurrences and Uses, biological importance.

Energy value and nutritional importance of carbohydrates.

Role of fiber in diet.

UNIT – IV Proteins :

Definition, Composition, Classification and Food Sources of Protein (good and poor sources).

Classification of Amino Acids, Essential and Non-Essential Amino Acids, Food Sources of Essential Amino Acids.

Function of Protein, Properties of Protein.

Denaturation of Protein, Factor Affecting Denaturation of Protein.

UNIT – V Fats and Lipids :

Definition and Formulas of Fats and Lipids.

Definition of Saturated and Unsaturated of Fatty Acids.

Food Sources of Fats, Oils, Saturated and Unsaturated Fatty Acids.

Properties of Fats and Lipids.

UNIT – VI Vitamins and Minerals:

History, Introduction, Definition of Vitamins and Minerals.

Formula and Food Sources of vitamins and minerals.

Classification of vitamins and minerals.

Requirement of vitamins and minerals in different age groups.

Practical

1. Preparation of Samples .
2. Preparation of Standard Solutions.

3. Identification of ash value of Food Stuff.
4. Moisture content of Food Stuff.
5. Determination of acidity and pH of Food.
6. Qualitative test for Carbohydrate
7. Qualitative test for Protein
8. Estimation of Total hardness of water using EDTA
9. Detection of presence of Starch by Iodine Test.
10. Estimation of Fat by Soxhelt Apparatus.

26. INDUSTRIAL MICROBIOLOGY

The examination in Industrial Microbiology of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 5 hours duration in one day and carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

The distribution of marks in practical shall be as follows:

A) Two short experiment	-20 marks (10 Each)
B) One long experiment	-15 marks
C) Viva voce	-10 marks
D) Industrial Study Tour Report	-03 marks
E) Practical Record	-02 marks

Total - 50 marks

1S INDUSTRIAL MICROBIOLOGY

Fundamentals of Industrial Microbiology

UNIT-I : Introduction to Industrial Microbiology

- a) Definition, basic concepts of Microbiology
 - (i) Discovery of Microorganism
 - (ii) Distribution of micro organisms in nature.
 - (iii) Beneficial and harmful activity of micro organisms.
 - (iv) Basic and applied branches of microbiology.
- b) Development and scope of Industrial Microbiology
 - (i) Definition, basic concepts of fermentation

- (ii) Products-curd and yoghurt, pickles
 - (iii) Contemporar y fermentations ó organic acids-vin-egar and citric acid, antibiotics, enzymes, vitamins.
- c) Study of Industrially Important Microorganisms
 General characteristics, Structures, Modes of reproduction and industrial importance of : Yeast, Bacteria, Actinomyces, Fungi, and Algae.

UNIT-II : Microbial Growth :

- a) Microbial growth characteristics and its significance in fermentation
 - i) Batch cultures - phases of growth and measurement of growth
 - ii) Continuous cultures ó characteristics and maintenance
 - iii) Diauxic, synchronous and fed batch cultures
- b) Effect of environmental factors on growth of microorganisms: Temperature, osmotic pressure, hydrostatic pressure, surface tension, UV light, pH and heavy metals.

UNIT-III : Production strain in Industries :

1. Screening of industrial microorganisms
 - a) Primary Screening of - i. Antibiotic producers, ii. Organic Acid producers
 - b) Secondary screening
2. Methods of Stock pure culture isolation, Culture Maintenance

UNIT-IV : Fermentation media and Inoculum Preparation :

- a) Basic components ó water, sources of energy, carbon, nitrogen, minerals
- b) Special ingredients ó growth factors, buffers, precursors, inhibitors, inducers, antifoam agents, oxygen requirements, redox potential
- c) Types of media used- synthetic, natural ó industrial and agricultural wastes
- d) Raw materials ó Ideal characters and types of raw materials used in industry.
 Inoculum Preparation : Inoculum build up technique.

UNIT-V : Types of Fermentation :

1. Concepts of axenic and mixed cultures in fermentations,
2. Types of Fermentations- Batch and continuous fermentations, Dual and multiple fermentations

UNIT-VI :Industrial Sterilization :

- (a) Introduction
- (b) Principles of Sterilization
- (c) Sterilization of Equipments
- (d) Sterilization of Production Media
- (e) Sterilization of Air by Filtration

Practicals :- Semester-I

1. Study of laboratory equipments:
 - a) Optical compound microscope b) Incubator
 - c) Hot air oven d) Autoclave
 - e) Centrifuge f) Membrane filter
 - g) Colorimeter h) pH meter
2. Preparation and sterilization of media suitable for the growth of:
 - a) Bacteria ó Nutrient agar/soil extract agar/soybean casein digest agar
 - b) Fungi ó Potato dextrose agar/Czapek Dox agar
 - c) Yeasts ó Glucose yeast extract agar/ Sabouraudø agar
 - d) Actinomycetes ó Glycerol Asparagine agar/coconut water agar
 - e) Lactic acid bacteria ó Neutral red chalk lactose (NRC L) agar atypical peptone tryptone (APT) agar
 - f) Algae ó Geitlerø medium
3. Isolation and cultivation of microorganisms from appropriate sources on the media described above and their microscopic examination.
 - a) Bacteria ó From soil, monochrome and Gram staining
 - b) Fungi ó Aspergillus and Penicillium from soil, lactophenol mounting
 - c) Yeasts ó Saccharomyces cerevisiae, monochrome staining
 - d) Actinomycetes ó from soil and cultivation using coverslip/ slide/agar cylinder methods and direct microscopic observation
 - e) Lactic acid bacteria ó from curd or buttermilk, gram staining
 - f) Algae ó from appropriate sources, direct microscopic observation
4. Effect of temperature, pH and osmotic pressure on growth of bacteria

27. BIOTECHNOLOGY (REGULAR/ VOCATIONAL)

The examination shall comprise of two theory papers, one in each semester and one practical in each Semester. Each theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of atleast 4 hours duration in one day and shall carry 50 marks.

The following syllabi is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question on every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

1S BIOTECHNOLOGY**Cell Biology & Biomolecules****UNIT-I : Evolution of Cell & Introduction to Biotechnology**

Cell as a Basic Unit of Living Systems, The cell theory and Exceptions to the cell theory.

Precellular evolution: Formation of first cell, properties, RNA world, Oparin Haldane concept, Miller experiment and Endosymbiont Theory.

Prokaryotic and Eukaryotic cells, Evolution of Multicellular Eukaryotes.

A detailed classification of cell types within organisms and Cell Diversity.

Biomolecules to Biotechnology : Definition, origin, historical background and scope.

UNIT-II : Biomolecules –I Carbohydrates & Lipids

Scope and Importance of Biomolecules, Nature of Biological materials, General Properties of Organic and Inorganic compounds, Hydrophilic and Hydrophobic groups in Biomolecules.

Carbohydrates: Classification, Properties, Structure and Biological Importance.

Lipids: Classification, properties, structure and Biological Importance

UNIT-III : Biomolecules –II Nucleic Acids and Proteins

Nucleic Acids: Nitrogenous bases, nucleosides, nucleotides, structure and function of DNA, mRNA, rRNA, tRNA.

Proteins: Classification of amino acids and proteins, Peptide Bond, Biological importance, Level of Organization of Protein

Structure.

Enzymes: Nomenclature and Classification, Effect of Temperature, pH, Substrate concentration and enzyme concentration on enzyme activity.

Applications of enzymes in Industries, Food processing, Medicines and Diagnostics.

UNIT-IV : Structure and Function of Cell Organelles

Plant cell wall, Cell Membrane (Models of Membrane i.e. Danielli Davson, Robertson, Singer Nicholson), Mitochondria, Chloroplast, Lysosome, Golgi complex, Vacuoles, Endoplasmic reticulum (Types), Peroxisome, Ribosome, Nucleus.

UNIT-V : Cell Transport and Fractionation

Cell Transport across membrane (Active, Passive, Diffusion, Osmosis, Transporters, Ion channels).

Density Gradient centrifugation, Differential Centrifugation, Cell lysis methods (enzymatic, Chemical, physical, Mechanical). Identification of Sub-cellular fractions (Mitochondria, Chloroplast, Nucleus, Lysosome, Peroxisome).

UNIT-VI : Cytoskeleton, Cell Division and Stem Cells

Cytoskeleton (Microtubules, microfilament and intermediate filament) and cell locomotion.

Cell Division, Cell cycle and Cancer.

Cell-cell signaling, Cell-cell adhesion, Cell junction.

Stem cells : Properties and applications.

Practicals.

1. Cell diversity in plant tissue and animal tissue.
2. Test for carbohydrates (Molisch, Fehling, Benedicts, Iodine, Barfoad, Osazone etc).
3. Test for fats/lipids (Saponification, Emulsification, Formaldehyde ó H₂SO₄ test).
4. Test for proteins (Biurete, Ninhydrin, Millon, Xanthoprotic, Coagulation, Precipitation).
5. Quantitative determination of sugar in urine and blood sample.
6. Estimation of Proteins.
7. Estimation of RNA and DNA.
8. Chromatographic methods for separation of Biomolecules.
9. Demonstration of Osmosis.
10. Demonstration of Diffusion.
11. Cell lysis methods

12. Density gradient centrifugation.
13. Differential centrifugation.
14. Identification of sub cellular organelle (any one)
15. Mitosis.
16. Meiosis.

Distribution of Practical Marks :-

(1)	Major Experiment	12 Marks
(2)	Minor Experiment	08 Marks
(3)	Spotting	10 Marks
(4)	Viva	10 Marks
(5)	Practical Record	05 Marks
(6)	Study Tour/Visit	05 Marks

Total 50 Marks

Reference Books :- (Fir Sem-I)

- (1) Cell Biology ó C.B.Powar, Himalaya Publishing House.
- (2) Cell and Molecular Biology ó P.K.Gupta, Rastogi Publication Meerut.
- (3) Biochemistry - C.B.Powar.
- (4) Biochemistry ó Lehninger
- (5) Essentials of Biochemistry ó Dr.U.Satyanarayana, Books and Allied Pvt. Ltd.
- (6) Cell & Molecular Biology ó Lodish.
- (7) Cell Biology ó Cooper.
- (8) Cell and Molecular Biology ó D.Robertis.
- (9) Biochemistry ó J.L.Jain.
- (10) An Introduction to Practical Biochemistry ó David Plummer.
- (11) Laboratory Manual in Biochemistry ó Jayraman.

28. BIOINFORMATICS

1S Bioinformatics

Elementary Mathematics & Statistics

UNIT I : Types of functions, d-neighbourhood of point, Limit of function, Continuity of function, Theorems on Limits and Continuity of functions.
Differentiation of function. Its physical significance. Differentiation of Sum, Difference, Product, Ratio of Functions. Derivative of Trigonometric, Exponential, Logarithmic, Inverse trigonometric, Polynomial, Implicit functions. Increasing and

Decreasing functions. Maxima and Minima. Derivative as a rate of change.

UNIT II : Integration of a function , Finding a function from its derivative, Integration of Sum, Difference and Product of two Functions . Integration by substitution. Integration by partial Fractions . Definite integral . Definite integral as limit of sum. Calculating Areas and Volumes of bounded regions.

UNIT III : Differential equation, its Formation. Its general solution and particular solution. Order and degree of differential equation. First order differential equation. Variable separable method.

UNIT IV: Representation of data. Discrete data, continuous data, Histogram, PolyGram, Frequency curves, Mean, Variability of data- the standard deviation, Median, quartiles, percentile, Skewness, Box and Whisker diagrams. Regression and Correlation, Scatter diagrams, Regression function, Linear correlation and regression lines, Product moment correlation coefficient.

UNIT V : Probability : Experimental probability, probability when outcomes are equally likely, subjective probabilities, Probabilities law. Probability rules for combined events, conditional probability and independent events, Probability trees. Bayes theorem.

UNIT VI : Random Variables and Distributions : Discrete and Continuous Random Variables, Cumulative distribution function, Probability mass function and Probability density function, Expectation of random variables ó Experimental Approach and theoretical.

Practical-I : Elementary Mathematics and Statistics :-

1. Measures of dispersion- Range, Quartile deviation and mean deviation.
2. Computation of rank correlation coefficient.
3. Simple problems on probability- Law of addition, Law of multiplication.
4. Large sample test.
5. Application of Chi-square distribution.
6. Random Sampling- SRSWOR and SRSWR.
7. Fitting of binomial distribution.
8. Fitting of normal distribution.
9. Problems on Mean and Mode.
10. Problems on order and degree of differential equation.
11. Standard deviation and coefficient of correlation.

12. Handling of different formula / function.

Distribution of Practical Marks :-

(1)	Two Major Experiments	40 Marks
(2)	Class Record	05 Marks
(3)	Viva-voce	05 Marks

Total **50 Marks**

Books Recommended :

- 1) Binmore : "Mathematical Analysis", Cambridge University Press.
- 2) Edward Batschelet : óIntroduction to Mathematics for Life Sciencesö 3rd Edition(1992).
- 3) Edwards , J:öDifferential Calculas for Beginnersö, MacMilan and Co.ltd (1963).
- 4) Edwards , J:öIntegral Calculas for Beginners ö, AITBS Publishers & Distributors(1994).
- 5) GorakhPrasad :ö Differential Calculas ö, Pothishala Pvt Ltd, Allahabad
- 6) GorakhPrasad :ö Integral Calculas ö, Pothishala Pvt Ltd, Allahabad.
- 7) S.Dobbs and J.Miller, (2002), "Statistics (Advanced Level Mathematics) : Cambridge.
- 8) Narayanan, S. and Manicavachaagam Pillai, T.S. (1993) öCalculus, Vol. I and IIö; Vishwanathan Printers and Publishers.
- 9) Veerarajan, T. (2003) öEngineering mathematicsö; Third Edition, Tata McGraw Hill Publishing Co. Ltd, New Delhi.
- 10) Veerarajan, T. (2003) öTrigonometry, Algebra and Calculusö; Third Edition, Tata McGraw Hill Publishing Co. Ltd, New Delhi.
- 11) Sharma, A.K. (2005) öText Book of Integral Calculusö, Discovery Publishing House.
- 12) Grewal, B.S. (2000) öHigher Engineering Mathematicsö; Thirty seventh edition, Khanna Publishers, New Delhi.
- 13) E. Horowitz and S. Sahani, öFundamentals of Data structuresö, Galgotia Booksource Pvt. Ltd., (1999)
- 14) Ellis Horwitz, Sartaz Sahani and Sanguthevar Rajasekaran, (1999), öComputer Algorithmsö, Galgotia Publications
- 15) T.H. Cormen, C. E. Leiserson, R.L. Rivest (2001) öIntroduction to Algorithmsö, 3rd Ed PHI.

29. APICULTURE

The examination in Apiculture will comprise of one theory paper to each semester of 100 marks each which include 80 marks for theory and 20 marks for internal assessment and practical of 50 marks. Each theory paper shall be of 3 hours duration and practical of 6 hours duration. The syllabi is based on 6 theory periods and 6 practical periods per week.

1S-APICULTURE (Fundamentals of Bee Keeping)

- UNIT-I:** A) Fundamental requirement of bee keeping, knowledge of bees, bee plants, equipment and products.
B) Apis, species, identification of Apis, A florea, A dorsata, A. mellifera, A Cerena, subspecies, varieties and races.
- UNIT-II :** Estimation of stocking capacity and estimation of yield per hive, migration routes of colonies, native residents, reception to beekeeping ó tribal population, collecting information of cultivated crop.
- UNIT-III:** Beekeeping Equipment :- Types of hives, its components, dimension, equipment for protection, feeding. Bee management equipments, was extraction & honey extraction equipment & manufacturing of comb foundation sheet.
- UNIT-IV:** Apiary Management ó Method of handling recognition of queen, its age, health, egg laying behaviour. Brood food condition. Drone breeding, queen cells formation, laying workers, feeding, uniting, dividing, closure of queen gates etc. Sanitation, Routine forage and other activities, cleaning.
- UNIT-V:** Establishment of Apiary :- Choice of site, climatic condition, topography, availability of water, flora. Optimum number of hive in relation to available of flora within foraging range over stocking.
- UNIT-VI:** Individual Colony Records :- Colony number, strength, food storage, honey yield. Pollen income.

Semester-I Practical-I

Practicals :-

- (1) Study of Identification features of honey bees :-
A. mellifera, A. Carana, A. Dorsata, A. Florea, A. Trigona.
- (2) Study of mouth parts of Bees.
- (3) Study of bee string.
- (4) Study of bee hives (Carana, Melifera)
- (5) Study of hive tools.
- (6) Study of Castes of honey bees.

- (7) Study of honey extraction machine.
- (8) Study of wax extraction machine.
- (9) Manufacturing of comb foundation sheet.

Field Study :-

1. Inspection of bee colonies.
2. Counting of pollen load.

Distribution of Marks :-

Duration : 4 Hours

- | | |
|--|----|
| 1. Identification and comments on honey
bee types (Any four) 16 | 09 |
| 2. Mounting of bees mouth parts | 10 |
| 3. Bee hives & bee equipments. | 05 |
| 4. Practical Record | 05 |
| 5. Field diary | 05 |
| 6. Viva-voce | 05 |

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Total 50

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(Note : List of Reference Books and Required equipments is given at the end of syllabi of Semester-II, Apiculture.)

30. Forensic Science (Effective from session 2015-16)

The examination in Forensic Science of First semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 to 6 hours duration and carry 50 marks.

The following syllabus is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

B.Sc. Part- I (Semester- I) 1S Forensic Science (Basics of Forensic Science)

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit I : Developmental Growth of Forensic Science 14L

Introduction to Forensic science ó nature, need and function.
Laws and Principles, basics of Forensic Science. Historical

development and scope of Forensic Science in India. Investigating officers and their assigned role and duties. Global perspective in the field of forensic science: history, development, education and training. Organizational setup of forensic science lab and other national & international agencies. Ethical issues in Forensic Science.

Unit II : **14L**

A) Forensic Science Laboratories and Facilities [5L]

Growth of Forensic Science Laboratories in India ó Central and State level Laboratories. Services and functionalities provided by various FSLs. Various divisions in the FSL.

B) Recognition of Bloodstain Patterns [9L]

History of Bloodstain Pattern interpretation, properties of human blood, target surface considerations, Size, Shape and Directionality of bloodstains, Spattered blood, other Bloodstain Patterns, interpretation of Bloodstain on clothing and footwear, Documentation and Photography for Bloodstain Pattern Analysis.

Unit III: Crime and Crime Scene management 14L

Criminals, criminal behavior, Crime Scene survey, physical evidence, collection preservation types and importance of criminal investigations. Components of Crime Scene Management ó Information management, manpower, technology & logistics management, role of crime scene managers and first responding officers. Crime Scene Reconstruction: defining crime scene reconstruction, nature & stages of crime scene reconstruction.

Unit IV : Impressions and Prints 14L

Finger prints: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.

Footprints: Importance, Gait Pattern, Casting of footprints in Different medium, Taking Control samples.

Tire Marks/prints and Skid marks, taking control samples, Forensic Significance.

Lip Prints: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.

Bite Marks: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.

Ear Prints: Nature, Location, collection and evaluation, taking control samples, Forensic Significance.

UNIT V : Forensic Documents 14L

Various types of forensic documents: genuine and forged

documents, classification of forensic documents: Specimen writings, admitted writings, Handling, preservation and marking of documents, natural variation and disguise in writing, Principle of Handwriting Identification, general and individual characteristics, Basic Tools needed for forensic documents examination and their use. Functions of a Forensic Document Examiner.

Unit VI: Forensic Medicine 14L

Global Medical Jurisprudence, Legal Procedure in India, Documentary evidence: Medical certificates, medical reports, dying declaration. Determination of time since death, including by histopathological methods. Medico legal investigation of sexual offences, including examination of victims and suspects. Medico legal aspects of death: causes of death such as asphyxia, electrocution, thermal trauma, heat burns, starvation, natural death, sudden death, death by accident. Medico legal aspects of wounds: medical and legal definition of wounds, types of mechanical and regional injuries, aging of wounds.

Semester- I

1S Forensic Science (Basics of Forensic Science)

Total Laboratory sessions: 21

Marks: 50

List of Practicals

1. Collection and Handling of Petroleum samples.
2. Collection and Handling of murder case samples.
3. Collection and Handling of fire crime scene samples.
4. Sketching and Photography of various type of crime scene.
5. Document and Fingerprint Photography.
6. To take Plain and Rolled inked fingerprints and to identify the patterns.
7. To develop Latent fingerprints with Powder method.
8. Lifting of Fingerprints.
9. Detection of forgeries including traced and stimulated forgery and built up documents.
10. Examination of security features of Currency Notes and Indian Passports.
11. Report writing and interpretation.
12. Scientific Report Writing.
13. Blood Spatter Analysis.
14. Identification of Handwriting General and individual characteristics.
15. Detection of various type of forgery.

16. Identification of Indented and Invisible writing.
17. Identification of typescripts and printing matter.

Distribution of Marks for Practical Examination.

Time: 4 – 6 hours

Marks: 50

Exercise- I	í í í ..	12
Exercise- II	í í í ..	12
Exercise- III	í í í ..	12
Viva-Voce	.í í í .	07
Record	.í í í .	07
	ô ô ô ô ô ô ô ô ô ô	
	Total:	50

Books Recommended:

1. Introduction to Forensic Science in Crime Investigation By Dr.(Mrs.) Rukmani Krishnamurthy.
2. Forensic Biology by Shrikant H. Lade.
3. Crime Scene Processing and Laboratory Work Book by Patric Jones.
4. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. by Stuart H. James.
5. Crime Scene Management with Special Emphasis on National level Crime Cases by Dr. Rukmani Krishnamurthy under publishing.
6. Forensic Science: An Introduction to Scientific and Investigative Techniques By S.H James, J J Nordby.
7. Advanced Crime Scene Photography by C.D. Duncan.
8. Scientific Examination of Questioned Documents by Ordway Hilton.
9. Questioned Documents by Albert S. Osborn.
10. Suspect Documents their scientific examination By Wilson R. Harrison.
11. Speculation in Fingerprint Identification By Chatterjee S. K.
12. Criminal Investigation, Practical Fingerprinting by Briges B. C.
13. Forensic Science in India: A vision for the twenty first century Nanda, B.B. & Tewari,R.K.(2001)New Delhi.
14. Forensic Science: An introduction to scientific and investigative techniques, James, S. H. and Nordby, J. J. (2003) CRC Press, USA.

**31. Renewable Energy
(Implemented from the Academic Session 2015-16)**

Semester-I

1S : Renewable Energy

Fundamentals of Energy Systems

- Unit-I :** Work and Heat: Definition of work, thermodynamic work, displacement work and other forms of work, Definition of Heat, Work and heat transfer as path function, comparison of work and heat, work done during various processes, P-V diagrams. First law of thermodynamics: Energy of a system, classification of energy, law of conservation of energy law applied to closed system under going a cycle, Joules experiment
- Unit-II:** First Law applied to flow processes: Steady state, steady flow process, mass balance and energy balance in steady flow process, steady flow energy equation and its application to nozzles and diffusers, turbine and compressor pumps, heat exchangers, Throttle valve etc. work done and Heat transfer during steady flow processes.
Second Law of thermodynamics , Kelvin-Plank and Clausius statements, reversible and irreversible processes, Carnot cycle, two propositions regarding the efficiency of Carnot cycles. The thermodynamic temperature scale. Reverse carnot cycle. COP of heat pump and refrigeration. Inequality of Clausius.
- Unit III : Fluid Properties and Classification of Fluid:** Viscosity, Newton's law of viscosity, Newtonian and Non- Newtonian Fluids, Ideal and real fluids, Steady & Unsteady Flow, Uniform & Non-Uniform Flow, Laminar & Turbulent Flow, Compressible & Incompressible Flow, Surface tension, Definitions, units and Dimensions
- Unit IV : Fluid Pressure & Its Measurement:** Definition of pressure, units and dimensions, Pressure at a point, Pascal's law, Hydrostatic pressure law, Absolute and Gauge pressure Measurement of pressure, Simple Manometer & Differential Manometer theory and problems, Mechanical Pressure Gauges.
- Unit V : Dynamics of Fluid Flow** Concept of Inertia force and other forces causing motion, Derivation of Euler's equation and, Modification of Bernoulli's equation, problem on Bernoulli's equation without and with losses, Flow through Orifices; classification, Hydraulic Co-efficient of an Orifice and relation between them,
- Unit VI : Energy Sources & World Energy Status :** Energy Sectors: Domestic, Transportation, Agriculture, Industry Sector, Energy Scenario, World Energy Present Situation, Availability of

Conventional & Non Conventional Energy Resources.

Conventional Energy Sources : Fossil Fuel, Hydro Resources, Nuclear Resources, Coal, Oil, Gas, Thermal Power Stations, Comparison of various conventional energy systems, their prospects and Limitations, Advantages and Disadvantages of Conventional Energy Sources.

Non-Conventional Energy Sources : Solar Energy, Wind Energy, Energy from Biomass & Biogas, Ocean Thermal Energy Conversion, Tidal Energy, Geothermal Energy, Hydrogen Energy, Fuel Cell, Magneto Hydro-Dynamics Generator, Advantages & Limitations of Non-Conventional Energy Sources.

Books Recommended Text Books :

- 1) Engineering Thermodynamic - by P.K.Nag.
- 2) Thermodynamics Volume: I & II; R. Yadav;
- 3 Basic Engineering Thermodynamics - by Reyner Joel
- 4) Thermodynamics - by C.P. Arora.
- 5) Fundamentals of Classical Thermodynamics - by G.J. Vanwylen.
- 6 Engineering Thermodynamics; P. Chattopadhyay; Oxford
- 7) Engineering Thermodynamics; Gordon Rogers, Yon Mayhew; Pearson
- 8) Energy for a sustainable world: Jose Goldenberg, Thomas Johansson, A.K.N.Reddy, Robert Williams (Wiley Eastern).
- 9) Energy policy for : B. V.Desai (Weiley Eastern),
- 10) Modeling approach to long term demand and energy implication : J.K.Parikh.
- 11) Energy Policy and Planning : B.Bukhootsow.
- 12) TEDDY Year Book Published by Tata Energy Research Institute (TERI),
- 13) World Energy Resources : Charles E. Brown, Springer2002.
- 14) -International Energy Outlookø-EIA annual Publication
- 15) Heat and Thermodynamics ó M.W. Zemansky (McGraw Hill Publication)
- 16) Heat and thermodynamics ó D.S.Mathur
- 17) Text book of Heat ó J.B.Rajam
- 18) Heat and thermodynamics ó Rajam & Arora
- 19) Heat ó Rajkumar & Sharma
- 20) Non-Conventional Energy Sources, G D. Rai, Khanna Publication.
- 21) Non-Conventional Energy Resources, B. H. Khan, The McGraw Hill
- 22) Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, S. K. Kataria & Sons
- 23) Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Prakashan

- 24) Theory and Applications of Fluid Mechanics by K. Subramanya, TMH outline series, Tata McGraw Hill Publishing Company Lt

List of Experiments

- 1) Study of the processes of Heat Engine
- 2) Study Layout of Thermodynamics laboratory
- 3) To investigate the first law of thermodynamic using heat Engine
- 4) To investigate the Second law of thermodynamic using heat Engine
- 5) To investigate the relation between pressure and temperature of Saturated Steam
- 6) To determine the flow rate using convergent nozzle.
- 7) To determine the nozzle thrust.
- 8) To determine the efficiency of nozzle
- 9) Study of heat exchangers
- 10) Determination of efficiency of pumping system
- 11) Determination of viscosity of liquid by Poiseuille's method.
- 12) Determination of viscosity of liquid by Stoke's method.
- 13) To determine surface tension of liquid by Jaeger's method.

32. Animation

**(Implemented from the Academic Session 2015-16)
Semester I**

1S : Animation

Computer Fundamentals and Animation

- Unit-I :** Introduction to computer, relevant hardware and software, their list and general-purpose utility in actual practical application, connection diagrams with each other (simple block diagrams expected).
- Unit-II :** Introduction to different operating systems (OS) like **Windows, Linux**, etc. (their names and general idea should be given), requirements, etc. (brief idea and simple explanation only).
- Unit-III :** Basic idea of networks with block diagrams and definitions only (general-purpose networks like WAN, MAN and the LAN topologies and sub-topologies of LAN), their applications (brief idea and simple explanation only).
- Unit-IV :** Basic idea of memory, RAM, ROM, PROM, EPROM, etc. their definitions with description (brief idea and simple explanation only)
- Unit-V :** Using internet explorer, different browsers, email, attachment techniques, using compression utilities, search engine techniques (brief introduction), downloading, etc. introduction to POP and SMTP mail server configurations techniques.

Unit-VI: History of animation. Different types of animations and its applications.

(Types : 2D animation , 3D animation , Stop motion animation, etc. & Applications : Entertainment, Education, Computer/ Mobile Gaming, Special Effects, etc.)

Practicals : Minimum eight experiments based on above contents are to be performed.

Recommended Books :

1. Recommended Text Books: Computers & Common Sense by Roger Hunt, John Shelley, Published by Prentice-Hall of India, Edi.2004.
2. Reference books: Fundamentals of Computers by Rajaraman, Published by Prentice-Hall of India, Edi.2004.
3. Digital Computer Fundamentals by Bartee, Edi.2001.
4. Computer Fundamentals and Information Technology by Ramesh Bangia, Edi.2008.

The Concerning teachers are also suggested to use other relevant material available on the net, to update the knowledge of the students

Following are the recommended links, for further search-

- 1) www.tatamcgrawhill.com
- 2) www.books.google.co.in
- 3) www.penguinbooksindia.com
- 4) www.bookcafe.in
- 5) www.newindianbooks.com
- 6) www.newasiabooks.org

**Syllabus Prescribed for B.Sc. Part-I Semester-II
(Implemented from the A.S.2015-2016)**

7. MATHEMATICS

2S Mathematics Paper-III

(Differential Equations: Ordinary and Partial)

Unit-I : Degree and order of a ordinary differential equation, linear differential equations and differential equations reducible to the linear form. Exact differential equations. Differential equations of first order and higher degree, differential equations solvable for p and y, differential equations in Clairaut's form. Orthogonal trajectories.

Unit-II: Second order linear differential equations with constant coefficients, homogeneous linear ordinary differential equations, equations reducible to homogeneous differential equations.

Unit-III: Reduction of order, transformation of the equation by changing the dependent variable and independent variable, normal form, method of variation of parameters. Ordinary simultaneous differential equations.

Unit-IV: Formation of partial differential equations, partial differential equations of the first order, total differential equation (Pfaffian). Lagrange's method, some special types of equations which can be solved easily by methods other than the general method.

Unit-V : Compatible differential equations. Charpit's general method of solution, partial differential equations of second and higher orders. Homogeneous and non-homogeneous equations with constant coefficients.

References :

- 1) Ayres F Jr. : Differential equations, Schaum's outline series, McGraw Hill, 1981.
- 2) Ayres F.Jr. : Calculus, Schaum's Outline series, McGraw Hill, 1981.
- 3) Birkhoff G : Ordinary Differential equations, John Wiley and Sons, and Rota G.C.1978.
- 4) Coddington : An Introduction to Ordinary Differential Equations, E.A.Prentice Hall of India, 1998.
- 5) Karade T.M., Bendre M.S.: Lectures on Calculus and Differential and Equations, Sonu-Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
- 6) Murray D.A.: Introductory course in Differential Equations, Orient Longman(India), 1967.

- 7) Erwin, Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 1999.
- 8) Piaggio HTS: Differential Equations, CBS Publishers & Distributors, Delhi, 1985.
- 9) Siminons G.F. : Differential Equations, Tata McGraw Hill, 1972.
- 10) Karade T.M., Maya S. Bendre : Integration and Differential equations, Sonu- Nilu, 5, Bandu Soni layout, Gayatri Road Parsodi, Nagpur.
- 11) T.M.Karade, Lectures on Differential Equations, Sonu Nilu Publication, Nagpur.
- 12) A.R.Forsyth. A Treatise on Differential Equations. Macmillan and Co.Ltd.London.
- 13) Ian N., Sneddon, Elements of Partial Differential Equations. McGraw-Hill Book Company, 1988.
- 14) Jane Cronin. Differential equations, Marcel Dekkar, 1994.
- 15) Frnak Ayres. Theory and Problems of Differential Equations. McGraw Hill Book Company, 1972.
- 16) Richard Bronson, Theory and Problems of Differential Equations. McGraw Hill Inc, 1973.

Semester II

2S Mathematics Paper-IV

(Vector Analysis and Solid Geometry)

- Unit-I** : Scalar and vector product of three vectors, product of four vectors, vector differentiation and vector integration.
- Unit-II** : Space curve t, n, b vectors, fundamental planes, curvature, torsion, Frenet-Serret formulae.
- Unit-III** : Gradient, divergence and Curl, directional derivative, line integral (existence and evaluation), work done, Greens theorem.
- Unit-IV** : Sphere: Different forms of sphere, section of a sphere by a plane, sphere through a given circle, intersection of sphere and a line, orthogonal sphere and condition of orthogonality.
- Unit-V** : Cone : The equation of a cone with a guiding curve, cone with vertex and origin, right circular cone. Cylinder: equation of right circular cylinder.

References :

- 1) Murray R. Spiegel, Theory and problems on Advanced Calculus, Schaum Publishing Company, New York.
- 2) Murray R. Spiegel, Vector Analysis, Schaum Publishing Company, New York.

- 3) N.Saran and S.N.Nigam , Introduction to vector Analysis Pothishala Pvt.Ltd.Allahabad.
- 4) Erwin Kreyszig Advanced Engineering Mathematics, John Wiley & sons, 1999.
- 5) Shanti Narayan, A Text Book of Vector Calculus, S.Chand & Co. New Delhi.
- 6) S.L.Loney, The elements of Co-ordinate Geometry Macmillan and Company, London.
- 7) Gorakh Prasad and H.C.Gupta, Text Book on Co-ordinate Geometry, Pothishala Pvt.Ltd.Allahabad.
- 8) T.M.Karade, Maya S. Bendre, Lectures on Vector analysis and geometry, Sonu Neelu Publication, Nagpur.
- 9) R.J.T.Bell, Elementary Treatise on Co-ordinate Geometry of Three Dimensions, Macmillan India Ltd., 1994.
- 10) P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Two Dimensions, Wiley Eastern Ltd., 1994.
- 11) P.K.Jain and Khalil Ahmad, A Text Book of Analytical Geometry of Three Dimensions, Wiley Eastern Ltd, 1999.
- 12) N.Saran and R.S.Gupta, Analytical Geometry of three dimensions, Pothishala Pvt.Ltd.Allahabad.

8. Physics

2S-Physics

(Kinetic theory, Thermodynamics and electric currents)

- UNIT I** : Ideal Gas - Kinetic theory of Gases (Assumption, equation without derivation), deduction of Boyle's law, interpretation of temp.; Estimation of RMS speed of molecule; Estimation of Avagadro's number; degrees of freedom; equipartition of energy; specific heat of monatomic gas; extension to di & tri-atomic gases.
- Real Gas- Vander Waals gas equation of state, Comparison with experimental P-V curves, the critical constants; nature of Vander-Waals forces.
- Transport Phenomena in gases: Molecular Collision, mean free path, Brownian motion and collision cross section. Transport of mass, momentum and energy and interrelationship, dependence on temperature and pressure.
- Numericals
- UNIT II** : The laws of thermodynamics - The zeroth law, P-V indicator diagrams, work done by and on the system; First law of thermodynamics, internal energy as a state function and other applications; Reversible and irreversible changes; Carnot Cycle

and its efficiency for perfect gases, The Second law of thermodynamics; different versions of second law, Carnot theorem; Entropy, S-T diagram; Principle of increase of Entropy; The thermodynamic scale of temperature; its identity with the perfect gas scale. Impossibility of attaining the absolute zero, third law of thermodynamics. Numericals.

UNIT III: Liquefaction of Gases - Joule-Thomson effect, Joule's coefficient,

Boyle and inversion temperature; Principle of regenerative cooling and Cascade Cooling, Liquefaction of hydrogen and helium

Thermodynamic relationships- Thermodynamic Variables, Extensive and intensive, Maxwell's general relationship; application to Joule-Thomson cooling and adiabatic cooling in a general system. Clausius-clapeyron heat equation, thermodynamic Potentials and equilibrium of Thermodynamical systems, relation with thermodynamical variables.

UNIT-IV: Motion of Charged Particles in Electric and Magnetic fields: (Note: The emphasis should be on Mechanical aspects, and not on the details of the apparatus mentioned which indicated as applications of principles involved.)

E as an accelerating field, electron gun, case of discharge tube, linear accelerator (linac), E as a deflecting field, Transverse magnetic field, Mass spectrograph, velocity selector, curvatures of tracks for energy determination of nuclear particles, Principle of cyclotron. Mutually perpendicular E and B fields, velocity selector, its resolution. Numericals

UNIT-V : Network theorem: Thevenin's theorem, superposition theorem(mesh current analysis), Maximum power transfer theorem, some applications.

Ballistic galvanometer (theory, charge sensitivity, effect of damping), Application of B.G: Determination of capacitance and high resistance by method of leakage

Varying Currents: Steady currents, current density J, non steady current and continuity equation, Kirchoff's laws and analysis of multi-loop circuits, Rise and decay of currents in LR, Rise and decay & charge in CR circuits, and in LCR circuit, resonating frequency. Numericals

UNIT-VI : Alternating Currents : A.C. currents, complex numbers and

their applications in solving A.C. circuits using J operator, pure R, L, C and their combinations, reactance and impedance, series and parallel resonance, Q-factor, power consumed by A.C. circuit, power factor. Self and mutual inductance, theory of transformer and energy losses in transformer.

Numericals

Practical : (Every student will have to perform at least 10 experiments from the following list. At the time of examination, each student will have to perform 1 (one) experiment.)

1. Heating efficiency of electrical Kettle with varying voltages.
2. Determination of α by Callendar and Barne's method.
3. C_p/C_v by Clement and Desormes' method.
4. Thermal conductivity of an insulator by Lee's disc method.
5. Determination of charge sensitivity of ballistic galvanometer.
6. Measurement of low resistance by Carey-foster Bridge.
7. Measurement of low resistance by potentiometer.
8. Measurement of inductance by phasor diagram method.
9. Measurement of capacitance by phasor diagram method.
10. Study of frequency resonance of series LCR circuit and determination of Q-factor.
11. To study behavior of R-C.circuit as a filter.
12. To determine high resistance by leakage method.
13. C_1 / C_2 by De-Sauty's method.
14. Verification of laws of capacitances.
15. Study of transformer.
16. Verification of Kirchoff's law, using electrical network.
17. Verification of Maximum power transfer theorem.
18. Verification of Thevenin's theorem.
19. Verification of Norton's theorem.
20. Verification of Milliman's theorem.

Reference Books:L : Semester 2S-PHY

1. Heat and thermodynamics ó D.S.Mathur
2. Text book of Heat ó J.B.Rajam
3. Heat and thermodynamics ó Rajam & Arora
4. Heat ó Rajkumar & Sharma
5. Electricity & Magnetism ó Chakraborty P.
6. Foundations of Physics Vol. I & Vol. II ó Gambhir R.S.
7. Electromagnetics ó Laud B.B.
8. Electromagnetic field & waves ó Sarwate V.V.

9. Electricity and Magnetism Vol. II ó Berkley Physics Course
10. Electricity and Magnetism ó D.N. Vasudeva
11. Electricity and Magnetism ó Brijlal & Subramaniam
12. Electrodynamics ó S.L. Gupta & R. Singh
13. Electricity & Magnetism ó Reitz & Millford
14. Electricity & Magnetism ó A.S. Mahajan & A.A. Rangawala (TMH)
15. Principle of electricity & Magnetism ó Panofsky & Philips
16. Electricity & Magnetism ó S.S. Atwood
17. Electromagnetic waves & radiating systems ó E.C. Jordan

9. CHEMISTRY

2S Chemistry

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit I

14L

- A] Polarisation-Definition, polarising power, polarizability, effect of polarization on nature of bond. Fajan's rules of polarisation and its applications. **[4]**
- B] Covalent bonding-Directional nature of covalent bond. Hybridisation, types of hybridisation to explain geometries of NH_4^+ ion, PCl_5 , SF_6 and IF_7 . **[4]**
- C] **Acids and Bases**-Theory of solvent systems and Lux-Flood concept of acids and bases. Hard and soft acids and bases. Pearson's HSAB or SHAB principle with important applications. **[6]**

Unit II

14L

- A] **P-Block Elements**-Comparative study of 16th and 17th group elements with reference to electronic configuration, ionization energy and oxidation states. Oxidising properties of halogens with reference to oxidation potential. Interhalogen compounds, structure and bondings. Introduction to fluorocarbons. **[6]**
- B] **Noble Gases**-Inertness of noble gases. Compounds of noble gases- only structure and bonding in XeF_2 , XeF_4 , XeF_6 , XeO_3 and XeO_4 **[2]**
- C] **Nonaqueous Solvents**-Requirements of a good solvent. Water as an universal solvent. Physical properties of solvents namely liquid range, dielectric constant, dipole moment, heat of vaporisation and solubility behaviour. Classification of solvents. Acid base, precipitation, redox, solvolysis and complexation reactions in liquid ammonia. Merits and demerits of liquid ammonia as a solvent. **[6]**

[6]

Unit III

14L

- A] **Alkyl Halides:** Synthesis of vinyl chloride from acetylene and allyl chloride from propylene, Reactions of both with aqueous and alcoholic KOH, Comparison of reactivity of vinyl and allyl chloride. **[4]**
- B] **Aryl Halides:** Synthesis chlorobenzene from benzene, phenol and benzene diazonium chloride, Synthesis of benzyl chloride from toluene and benzyl alcohol, Reactions of both with aqueous KOH, NH_3 and sodium ethoxide, Comparison of reactivity of chlorobenzene and benzyl chloride. Benzene intermediate mechanism. **[4]**
- C] **Alcohols:** Dihydric alcohols: Ethylene glycol- Preparation from ethylene, ethylene chloride and ethylene oxide, Reactions- with Na, PCl_5 , CH_3COOH , ZnCl_2 , conc. H_2SO_4 and dehydration with heat. Trihydric alcohols: Glycerol- Preparation from propylene, Reactions- with Na, HCl, PCl_5 , HNO_3 and KHSO_4 . Pinacol- pinacolone rearrangement (mechanism). **[6]**

Unit IV

14L

- A] **Phenols:** Methods of formations a) from aniline b) from cumene. Acidic character, Reaction of Phenols- a) Carboxylation (Kolb's reaction), b) Fries Rearrangement, c) Claisen Rearrangement and d) Reimer ó Tiemann reaction. **[6]**
- B] **Ethers:** Diethyl ether- Preparation by Williamson's synthesis and continuous etherification process, Reactions- with cold and hot HI. **[4]**
- C] **Epoxides:** Synthesis of ethylene oxide from ethylene and styrene oxide from styrene. Ring opening reactions of both catalysed by acid and alkali. **[4]**

Unit V - Physical Properties and Molecular Structure

14L

A] Electrical Properties:

- (i) Polar and non-polar molecules. Dipole moment.
- (ii) Induced polarization and orientation polarization. Clausius-Mossotti equation (only qualitative treatment).
- (iii) Measurement of dipole moment by temperature and refractivity methods.
- (iv) Applications of dipole moment for the determination of molecular structure. i.e. percentage ionic character of covalent bonding, molecular geometry, cis-trans isomers, ortho, meta and para isomers of a disubstituted benzene. **[7]**

B] Magnetic Properties:

- (i) Paramagnetic and diamagnetic substances, origin of paramagnetism, diamagnetism, ferromagnetism and antiferromagnetism.
- (ii) Volume, specific, mass and molar susceptibility. Relationship between molar magnetic susceptibility and magnetic moment.
- (iii) Relationship between magnetic moment and number of unpaired electrons.
- (iv) Gouy's balance method for determination of magnetic susceptibility.
- (v) Application of magnetic moment in the determination of molecular structure.
- (vi) Numericals. [7]

Unit VI - Chemical Kinetics

[7]

14L

Explanation of terms like rate of reaction, order of a reaction and molecularity. Definition with one example of zero, first and second order reaction. Half life period of a reaction.

Derivation of rate equation for first and second order reaction with equal initial concentration and different initial concentration of a reactant. Characteristics of first and second order reaction. Examples of first and second order reaction and their kinetics study with modified rate equation viz. the reactions (i) decomposition of H_2O_2 , (ii) reaction between $K_2S_2O_8$ and KI, (iii) hydrolysis of methyl acetate catalyzed by acid, (iv) saponification of ethyl acetate by NaOH and (v) inversion of canesugar.

Determination of order of a reaction by integration, graphical, equifractional change, vant Hoff's differential method and Ostwald's isolation method. Effect of temperature on reaction rates. Arrhenius equation, activation energy and its determination using Arrhenius equation. Numericals. [14]

Semester II**2S Chemistry Practicals****Total Laboratory Sessions: 26****Marks: 50****Exercise I: Organic Qualitative Analysis****16 Laboratory Sessions**

Complete analysis of simple organic compounds containing one or two functional groups and involving following steps:

- 1) Preliminary examinations
- 2) Detection of the elements

- 3) Detection of functional groups
- 4) Determination of m.p./ b.p.
- 5) Preparation of derivative and its m.p./ b.p.
- 6) Performance of spot test if any.
 - 1) Acids : Oxalic acid, Benzoic acid, Salicylic acid, Phthalic acid.
 - 2) Phenols : Resorcinol, α -naphthol, β -naphthol.
 - 3) Aldehydes : Benzaldehyde, Glucose.
 - 4) Bases : Aniline, *p*-Toluidine
 - 5) Nitro compounds: *m*-Dinitrobenzene.
 - 6) Amides : Benzamide, Urea, Acetamide.
 - 7) Hydrocarbons: Naphthalene, Anthracene.
 - 8) Halogen compounds : Chloroform, Chlorobenzene.

Exercise II: Physical Chemistry Experiments**10 Laboratory Sessions**

- 1) To determine surface tension of a given unknown liquid by Stalagmometer (Density measurement is must).
- 2) To determine coefficient of viscosity of unknown liquid by Ostwald's viscometer (Density measurement is must).
- 3) To compare cleaning power of detergent samples by Stalagmometer.
- 4) To determine parachor value of $-CH_2-$ group by Stalagmometer.
- 5) To determine unknown percentage composition of given ethanol-water mixture by viscometer.
- 6) To determine activation energy of a reaction between $K_2S_2O_8$ and KI.
- 7) To determine heat of solution of KNO_3 .

Distribution of Marks for Practical Examination

Time: 6 hours (One Day Examination)		Marks: 50
Exercise-I	í í í ..	18
Exercise-II	í í í ..	18
Viva-Voce	.í í í .	07
Record	.í í í .	07
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		Total: 50

Books Recommended:

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia- S. Naginchand & Co., Delhi.
2. Text book of Inorganic Chemistry by A.K. De, Wiley East Ltd.
3. Selected Topics in Inorganic Chemistry by Malik, Tuli and Madan- S. Chand & Co.

4. Modern Inorganic Chemistry by R.C. Agrawal, Kitab Mahal.
5. Instrumental Methods of analysis by Chatwal and Anand, Himalaya Publishing House.
6. Concise Inorganic Chemistry by J.D. Lee, ELBS.
7. Inorganic Chemistry by J.E. Huheey- Harper & Row.
8. Fundamental concepts of Inorganic Chemistry by E.S. Gilreath, McGraw Hill book Co.
9. Modern Inorganic Chemistry by W.L. Jolly, McGraw Hill Int.
10. Chemistry Facts, Patterns & Principles by Kneen, Rogers and Simpson, ELBS.
11. Theoretical Principles of Inorganic Chemistry by G.S. Manku, Tata McGraw Hill.
12. Inorganic complex compounds by Murmann, Chapman & Hall.
13. Text book of Inorganic Chemistry by K.N. Upadhyaya, Vikas Publishing House, Delhi.
14. Advanced Practical Inorganic Chemistry by Gurdeep Raj, Goel Publishing House, Meerut.
15. Co-ordination Chemistry by D. Banerjee, TMH Publication.
16. Text book of Inorganic Chemistry by Marathe, Bhadange, Mopari and Kubade.
17. Organic Chemistry by R.T. Morrison & R.T. Boyd, 6th edition, PHI.
18. Organic Chemistry by Pine, 5th edition.
19. Organic Chemistry Vol. I, II and III by Mukharjee, Singh and Kapoor-Wiley Eastern.
20. Organic Chemistry by S.K. Ghosh.
21. Reaction Mechanism in Organic Chemistry by S.M. Mukharjee and S.P. Singh.
22. Spectroscopy of Organic Compounds by P.S. Kalsi.
23. Stereochemistry and mechanism through solved problems by P.S. Kalsi.
24. Organic Chemistry by TWG Solomons, 4th edition, John Wiley.
25. Hand Book of Organic Analysis by H.J. Clarke, Arnold Heinmen.
26. Text book of Practical Organic Chemistry by A. I. Vogel.
27. Text book of Organic Chemistry by Jamode, Ganar, Makode, Waghmare, Mahajan, Toshniwal.
28. Text book of Organic Chemistry by P.S. Kalsi published by Macmillan India Ltd., 1999, Delhi.
29. Practical Organic Chemistry by F.G. Mann, B.C. Saunders, Orient Longman.

30. Comparative Practical Organic Chemistry (Qualitative Analysis) by V.K. Ahluwalia and Sunita Dhingra, Orient Longman.
31. Comprehensive Practical Organic Chemistry (Preparation and Qualitative Analysis) by V.K. Ahluwalia and Renu Agrawal, Orient Longman.
32. Physical Chemistry: Walter, J. Moore, 5th edn., New Delhi.
33. Physical Chemistry: G.M. Barrow, McGraw Hill, Indian Edn.
34. Principles of Physical Chemistry: Maron and Prutton.
35. Principles of Physical Chemistry: Puri and Sharma.
36. Physical Chemistry: P.W. Atkins, 4th Edn.
37. Text book of Physical Chemistry: P.L. Sony O.R. Dhurma.
38. Physical Chemistry: Levine.
39. Practical Physical Chemistry: Palit and De.
40. Practical Physical Chemistry: Yadao.
41. Practical Physical Chemistry: Khosla.
42. Laboratory Manual of Physical Chemistry: W.J. Popiel.
43. Practical Chemistry: Dr. S.B. Lohiya, Bajaj publ., Amravati.
44. Text book of Physical Chemistry: Satpute, Kabra, Raghuvanshi, Wankhade, Jumle and Murarka.
45. Text book of Chemistry, B.Sc.-I, Second Semester, Bokey Prakashan, Amravati

**LIST OF EQUIPMENTS / APPARATUS REQUIRED FOR THE
CHEMISTRY PRACTICALS FOR B.Sc.**

1. Abbe's Refractometer	02 nos./batch
2. Viscometer	10 nos./batch
3. Stalagmometer	10 nos./batch
4. Melting Point Apparatus	10 nos./batch
5. Thermometer 0-360°C	20 nos./batch
6. Thermometer 0-110°C	20 nos./batch
7. Analytical balance	15 nos./batch
8. Weight box	15 nos./batch
9. Density Bottles	20 nos./batch
10. Kipp's Apparatus	02 nos./batch
11. Quick fit Distillation Assembly/ Multipurpose assembly	10 nos./batch
12. Sintered Glass Crucible	20 nos./batch
13. Silica Crucible	20 nos./batch
14. Vacuum Suction Pump	02 nos./Lab.

15. Potentiometer	02 nos./batch
16. Metzer Electronic one pan balance	01 nos./Lab.
17. Filtration flask with Buckner Funnels	
100ml	10 nos./batch
250ml	05 nos./batch
500ml	02 nos./batch
18. Desiccators	10 nos./batch
19. Magnetic Stirrer	10 nos./batch
20. Water Suction	10 nos./batch
21. Conductometer with Conductivity Cell	04 nos./batch
22. Colorimeter	02 nos./batch
23. pH Meter	02 nos./batch
24. Chromatographic Jar	05 nos./batch
25. Separating funnels 250ml, 500ml	05 ECH/batch
26. Hot Air Oven	02 nos./Lab.
27. Hot-Cold Air Blower	01 no./Lab.
28. Centrifuge machine (Electrically Operated)	02 nos./Lab.
29. Deioniser/ Water Still (Electrically Operated)	01 no./Lab.
30. Hot Plate/ Heating Mentle	05 nos./batch
31. Models of Elements (Seven Cryst, types and their symmetry)	
32. Flame Photometer	01 no./batch
33. Spectrophotometer	02 nos./batch
34. Shaking Machine	01 no./batch
35. Polarimeter	02 nos./batch

10. INDUSTRIAL CHEMISTRY (REGULAR/VOCATIONAL)

2S Industrial Chemistry (Regular/Vocational)

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

UNIT-I

[14]

- A) Distillation: Introduction, Flash distillation, Differential distillation, Steam distillation, Azeotropic distillation, Continuous distillation with rectification and stripping, Plate column, Packed column, Overall material balance.
- B) Evaporation: Introduction, Single and multiple effect evaporation, Short tube evaporator, Long tube evaporator, Forced circulation evaporater, Falling film evaporator, Cilmbing film evaporator (Upward flow

evaporator) ,Agitated film evaporator, Evaporator capacity. Evaporator economy, Boiling point elevation.

UNIT-II

[14]

- A) Extraction: Introduction, Selection of solvent, Single stage and multistage extraction, Spray column, Packed column, Mixer settelers, Rotating disc column, Centrifugal extractor.
- B) Leaching: Introduction, Single stage leaching, Percolation tank, Counter current multiple contact (Shankø system), Continuous counter current decantation, Agitated vessels, Rotocel, Kennedy extractor.

UNIT-III

[14]

- A) Crystallization: Introduction, Solubility, Saturation, Supersaturation, Nucleation, Crystal growth, Agitated tank crystallizer, Vacuum crystallizer, Swenson-Walker crystallizer, Oslo cooler crystallizer.
- B) Drying: Introduction, Free moisture, Bound moisture, Moisture content on wet and dry basis, Equilibrium moisture content, Critical moisture content, Constant rate period, Falling rate period, Drying Equipments- Tray dryer, Drum dryer, Fluid bed dryer, Spray dryer, Rotary dryer, Rate of drying, Heat transfer in dryers, Drying of porous solids.

UNIT-IV

[14]

- A) Size Reduction: Necessity of size reduction, Energy and power for size reduction, Crushing efficiency, Rittenzerø law, Kickø law, Bondø law, Types of size reduction equipments- Jaw crusher, Smooth roll crusher, Ball mill, Hammer mill.
- B) Mechanical Separation: Screening-Types of screening equipments, Grizzlyø screens, Trammelø screens, Ideal and actual screens, Capacity and effectiveness of screens. Filtration-Types of filtration, Constant pressure filtration, Constant rate filtration, Filter media filter cake, Pressure filters, Plate and frame filter press, Rotary drum filter, Cenrifugal filtration.

UNIT-V

[14]

Mixing and Agitation: Mixing of liquid with liquid, Mixing of gases with liquids, Mixing of solids with liquids, Impellers, Propellers, Turbines, Paddles, Flow pattern in agitated vessels, Unbaffeled tanks, Prevention of swirling and portex formation, Baffeling, Banbury mixer, Pung mill, Ribbon blenders, Tumbling mixer, Double arm kneoder.

UNIT-VI**[14]**

- A) Surface Chemistry: Adsorption, Mechanism of adsorption, Types of adsorption, Adsorption isotherms, -Langmuir, BET and Freundlich isotherm, Factors affecting adsorption, Applications of adsorption, Sols and their preparations, Coagulation, Emulsions, Gels, Miscelles, Surfactants.
- B) Catalysis: Introduction, Types of Catalysis - Homogeneous and heterogeneous, Mechanism, Characteristics of catalysts, Catalyst deactivation, Autocatalysis, Negative catalysis, Activation Energy, Enzyme Catalysis.

Books Recommended:

- 1) Unit Operation II ó K.A. Gavane
- 2) Unit Operations of Chemical Engineering- McCabe and Smith
- 3) Mass Transfer Operations- Robert E. Treybal
- 4) Unit Operations- George Granger Brown, CBS Publications.
- 5) Catalysis: Heterogeneous and Homogeneous- Delmon and Janner
- 6) Catalysis Science and Technology- Anderson J.
- 7) Surface Chemistry- J.J. Bickermann, Academic Press
- 8) Physical Chemistry- Puri and Sharma

2S Industrial Chemistry Practical**List of Experiments****UNIT – I**

1. Crystallization of Benzoic acid by using water as a solvent.
2. Determination of Benzoic acid by using mixture of water and alcohol as a solvent.
3. Determination of amount of oil in given oil seed sample.
4. To study the yield of crystallization with and without seeding for copper sulphate crystals.
5. Extraction and isolation of Nicotine from tobacco leaves.
6. To establish Freundlich and Langmuir isotherm for adsorption of Oxalic (or Acetic) acid on activated charcoal.
7. Separation of two-component mixture of miscible liquids by simple distillation.

UNIT – II

1. Separation of three-component mixture of miscible liquids by fractional distillation.
2. Preparation of charcoal.

3. Coagulation of suspended solid particles in a given water sample by using alum.
4. Decolourization of Raw Sugar by using Charcoal.
5. To determine critical moisture content of a given material.
6. To construct ternary diagram for acetic acid- Water- Benzene System.
7. Determination of total acid content in lemon juice.

Distribution of Marks for Practical Examination.**Time: 6 – 8 hours (One Day Examination) Marks: 50**

UNIT ó I:	Exercise No.1 (Numericals)	í í í ..	06
	Exercise No.2 (Practical Expt.)	í í í ..	12
UNIT ó II:	Exercise No.2 (Practical Expt.)	í í í ..	12
	Viva-Voce	í í í ..	10
	Record	í í í ..	10

Total: 50**11. PETROCHEMICAL SCIENCE****2S Petrochemical science****Total Lectures: 84 Marks: 80**

Note: Figures to the right hand side indicate number of lectures.

UNIT I (14)

Overview of Petrochemical industry
 Definition of Petrochemical, World Petrochemical industry, History and Development of petrochemical industry in India, Role of MGCC, IPCL, HBJ gas line, TNC, Fertilizer in India.

UNIT II (14)

Petrochemical feedstock
 Feed stock for petrochemical from Natural gas and Petroleum, Most common impurities present in gases, Water vapor, Mechanical, Chemical, and other suspended impurities, how to remove them.

UNIT III (14)

Separation of gases (From Natural gas and Petroleum) in to individual constituents
 Various process:- Absorption Desorption, Compression Liquefaction, Low temperature fractionation, Adsorption, and special technique.

Introduction to separation techniques of Aromatic:- azeotropic separation, Extractive Distillation, Crystallization.

UNIT IV (14)

Steam reforming

Definition of reforming, Types of reforming, (Thermal and catalytic only introduction)

Steam reforming, various steam reforming reaction, Reactivity of hydrocarbons, Role of steam hydrocarbon ratio

UNIT V (14)

Production of synthesis gas

Various processes:- Natural gas steam reforming, Naphtha steam reforming, Partial oxidation hydrocarbon process, Scheme for CO and H₂ production, Coal gasification process, Lurgi process

UNIT VI (14)

Uses of synthesis gas

Various uses of synthesis gas, Methanol production with physical properties, Chemical reaction, Process flow and uses.

Oxo synthesis process, Production of propionaldehyde and propanol, Chemicals based on carbon monoxide

Semester – II

2S Petrochemical Science Practical

List of Experiment

- Flash point and Fire point of petroleum sample by various method
- API gravity of given petroleum sample
- Smoke point of Given Petroleum sample
- Aniline point of given petroleum sample
- Diesel index of given petroleum sample
- Viscosity by redwood viscometer
- Melting point by melting point apparatus

Distribution of Marks for Practical Examination.

Time: 6 hours (One Day Examination) Marks: 50

Exercise No.1 (Practical Expt.)	í í í .	15
Exercise No.2 (Practical Expt.)	í í í ..	15
Viva-Voce	í í í ..	10
Record	í í í ..	10

Total:		50

List of book:-

- Petroleum Refining and Petrochemical. N.K. Sinha, Umesh Publication Delhi
- Advance Petrochemical, Dr. G.N. Sarkar, Khanna Publication, Delhi
- A text on Petrochemical, Dr.B.K. Bhaskararao, Khanna publication, Delhi
- Introduction to petrochemical, Sukumar Maiti,
- Fuels and Combustion, Samir Sarkar, Orient Longman Ltd. Hyderabad
- Catalyst and Chemical Process, Ronald Pearce and William R. Patterson, Leonard Hill, Glasgow
- Systematic Experimental Physical chemistry, S.W. Rajbhoj; Dr. T.K. Chondhekar; Anjali Pub. Aurangbad
- Advance Petroleum Refining, G.N. Sarkar, Khanna pub. Delhi
- Petroleum Refining Technology, Dr. Ram Prasad, Khanna pub. Delhi
- Unit operation II, K.A. Gavhane, Nirali Prakashan, Pune
- Modern Petroleum Refining Process, Dr. B.K. Bhaskararao
- Basic Organic Chemistry, Part 5, Industrial product, J.M. Tedder, A.Nechvatal, & A.H. Jubb, John Wiley, London
- Industrial Organic chemistry, K. Weissmermel & H.J. Arpe, Veriag, chemie, New York
- Chemical from Petroleum, A.L. Waddams, Murray, London
- An introduction to industrial organic chemistry, P. Wiseman, Applied Science, London
- Modern Petroleum Technology, G.D. Hobson, Jhon Wily, Chichester
- Chemical from Synthesis gas, R.A. Sheldon, B.Reidel publishing Company, Dordrecht

LIST OF APPARATUS AND EQUIPMENTS FOR A BATCH OF 20 STUDENTS FOR B.SC. I (Semester I & II) PETROCHEMICAL SCIENCE

1. Burette	20 Nos.
2. Pipette 10ml, 25ml	20 Nos. each
3. Mohr pipette 2ml, 5ml	10 Nos. each
4. Conical flask with stopper	50 Nos.
5. Standard volumetric flask	20 Nos.
6. Density Bottle	20 Nos.
7. Balance (Electronic/Digital)	02 Nos.
8. Aniline Point Apparatus	01 No
9. U-tube viscometer of different capillary size	02 Nos.

10. Thermometer (0 to 110oC I P Grade)	10 Nos.
11. Thermometer (0 to 360oC I P Grade)	10 Nos.
12. Test tube (20 and 50 ml with rubber cork)	50 Nos.
13. Smoke Point Apparatus (I P Grade)	01 No.
14. Abel Flash Point apparatus (I P Grade)	01 No.
15. Pensky Marten's Flash Point apparatus	01 No.
16. Cleveland Open Cup Flash point Apparatus	01
17. Porcelaine dish	10 Nos.
18. Constant Temperature bath	02 Nos.
19. Hot Plate	01 No.
20. Air condenser	20 Nos.
21. Glass tubing 6mm, 10mm	20ft. Each
22. Glass rod 4mm, 8mm	20 ft. Each
23. Stop watches	04 Nos.
24. LPG Cylinder with regulator	01 No.
25. Refractometer	01 No.
26. Refrigerator	01 No.
27. Water Distillation Plant	01 No.
28. Beaker 250 ml	20 Nos.
29. Beaker 50, 100, 500, 1000 ml	07 Nos.
30. Hot Air Oven	01 No.
31. Heating Furnace	01 No.
32. Karl Fisher Auto Titrator	01 No.
33. Dean and Stark Apparatus	01 No.
34. Flame Photometer	01 No.
35. Colorimeter	01 No.
36. Bomb Calorimeter	01 No.
37. Spectrophotometer	01
38. Oxygen Cylinder with pressure regulating valve	01 No.
39. Vacuum Pump	01 No.
40. Air source	01 No.
41. Air Flow meter	01 No.
42. Dessicators	06 Nos.
43. Water Suction	04 Nos.
44. Filtration Flask with Buckner Funnel 100, 250ml, 500ml	20 Nos.
45. Heating Mantle	06 Nos.
46. ASTM Distillation apparatus	01 No.

47. Viscometer and Constant temperature bath	01 Set of viscometer
48. Apparatus for oil determination in given sample as per I P norm	01 No.
49. Reid Vapor Pressure Apparatus with constant temp. Bath	01 No.
50. Ductility measuring meter	01 No.
51. Penetrometer	01 No.
52. Copper Corrosion Test Apparatus	01 No.
53. Crankcase Oil Dilution Apparatus	01 No.
54. Redwood Viscometer No. I & II	01 No. each

12. GEOLOGY

2S – GEOLOGY

- UNIT-I :** Optical Mineralogy ó Nature of Light, Ordinary and plane polarized light, Reflection and Refraction, total internal reflection and critical angle, Double Refraction ó Nicol prism. Petrological Microscope ó Its parts & functioning, Optical properties under plane polarized light ó Colour, Pleochroism. Relief, Refractive Index and Becke line, Twinkling, Form & Cleavage. Properties under crossed Nicol ó Isotropism & Anisotropism, Extinction, Interference Colours and Colour chart, Twinning.
- UNIT-II :** Mineralogy ó Physical, Chemical, Optical Properties & Structure of following Mineral groups, Feldspar, Mica Pyroxene, Amphibole, Garnet & Olivine group
- UNIT-III :** Igneous Petrology :- Classification
a) Chemical, Silica based, Silica Saturation and CIPW.
b) Mineralogical Classification ó Colour Index.
c) Tabular Classification ;
Characteristic of Acidic, Alkaline & Basic Igneous Rock
Bowens Reaction Series. Continuous & Discontinuous.
- UNIT-IV :** Sedimentary Petrology - Structure, Texture and Classification of Sedimentary rocks.
Metamorphic Petrology-Textures, Structure & Classification of metamorphic Rocks. Stress & Anti Stress minerals. Products of Cataclastic metamorphism.
- UNIT-V :** Paleontology - Systematic Classification of organism, Morphological character, Classification, and geological history of Phylum Mollusca and Brachiopoda,

UNIT-VI: Stratigraphy ó Lithostratigraphic Classification of India. Classification, geographic distribution, lithological characteristic, fossil content and economic importance of Archean Super group, Dharwar Super group, Vindhyan ó Super group, and Cuddpah Super group. Stratigraphy of Maharashtra.

Practicals
(about 20-25)

1. Megascopic Identification of Mineral from the families as listed in Theory.
2. Megascopic identification of 20 ó 25 Igneous, Sedimentary & Metamorphic Rocks.
3. Study of about ten Minerals under thin section as listed in syllabus.
4. Study of about ten Rocks under thin section from Igneous / Sedimentary/ Metamorphic.
5. Identification of about ten fossils from families as listed in Theory.

Semester – II

The Practical Examination will be of 4 hours duration & carries 50 Marks. The distribution of Marks for Practical will be as follows.

A)	I	Megascopic Identification of Minerals	10 Marks
	II	Megascopic Identification of Rocks	12 Marks
	III	Optical Minerals	04 Marks
	IV	Rocks in thin Section	06 Marks
	V	Fossil	08 Marks
B)		Record	05 Marks
C)		Viva-Voce	05 Marks

Total 50 Marks

Reference Books for Sem I & II :

1. Text Book of Engineering Geology - Parbin Singh, Katson Publishing, Ludhiana.
2. Text Book of Geology - P.K.Mukerjee - World Press Pub., Calcutta.
3. Text Book of Geology - Santosh Garg - Khanna Publ., Delhi.
4. Dynamic Earth - Skinner Potter - Pub.John, Wiley.
5. Text Book of Physical Geology - G.B.Mahaptra- Pub. C.B.S., New Delhi.
6. Fundamentals of Geology - Vol. I, II, Borges, Gwalanietal - Pub. Himalaya Pub., Bombay.
7. Physical Geology - Datta A.K., Pub.Kalyani Pub.

8. Concepts in Geology - Chakranarya, Kulkarni, Pub.Scientific Publication, Pune.
9. Fundamentals of Mineralogy and Petrology - M.A.Koregave, Pub.Book World Enterpress- Bombay.
10. Fundamentals of Invertebrate Palaentology - M.A.Koregave, Pub.Book World Enterprises.
11. 1. G.W.Tyrell (1998) Principles of Petrology B.I.Publications Pvt.Ltd., New Delhi.
12. H.F.Read: Rutleyø Elements of Mineralogy.
13. Dana, E.S. and Ford, W.E.(1949) A Text Book of Mineralogy. Wiley Eastern Ltd.
14. Roger and Kerr: Optical Mineralogy.
15. Jensen, M.L.and Bateman, A.M.(1981) Economic Mineral Deposits. John Wiley and Sons, New York.
16. Deb, S. (1980) Industrial Minerals and Rocks of India. Allied Publishers, New Delhi.
17. Deshpande, G.G (1998) Geology of Maharashtra. Geological Society of India, Bangalore.
18. Henry Woods (1985) Invertebrate Palaeontology. CBS Publishers.
19. R.M.Black (1970) The Elements of Invertebrate Palaeontology, Cambridge University Press.
20. M.A.Koregave (1998) Fundamentals of Invertebrate Palaeontology, Book World Enterprises, Mumbai
21. Ravindra Kumar (1985) Fundamentals of Historical Geology and Stratigraphy of India. Wiley Eastern Ltd., New Delhi.
22. M.S.Krishnan (1982) Geology of Inida and Burma. CBS Publishers.
23. D.N.Wadia (1998) Geology of India. Tata McGraw Hill, India.

List of Equipments & Materials For B.Sc.

Perrology Practical :-

1. A set of 200, Rocks specimens for megascopic study (set should include all the types of rocks). As listed in practicals and their varieties.
2. A set of 100 rock slides for Microscopic study (Set should include all slides of all the rocks listed in practicals and their varieties).
3. A set of 50, rocks slides showing typical textures of Ingenous, Sedimentary and metamorphic rocks.

Mineralogy Practical :

1. A Set of 200, Rock forming Minerals specimen for Magascopic study. (Set should include all the minerals as listed in syllabus and their varieties).

2. A Set of 100 Minerals slides (thin sections) for microscope study. (Set should include all the minerals listed in practical and the scheme in different directions.
3. A set of 25 Oriented Minerals slides to demonstrate axiality, optic sign, pleochroism scheme Extinction etc.
4. Minerals sets demonstrating Hardness, Cleavage, Lusture, Streak and forms etc.

Ore Minerals.

A set of 100 one Minerals for megascopic study. (Set should be made with one Minerals as listed in Practicals an included in Indian Matallc deposit of Theory course).

A Part from this geological material following equipments are essential for megascopic and Microscope study.

- | | |
|--|---------|
| 1. Petrological slide, projector
(For Demonstration of this section) with screen | 1.No. |
| 2. Magnifiers 10x or more
(Table/Hand model with large view for Magascopic Study) | 20 Nos. |
| 3. Hand lens 10 x or 20 x | 20Nos. |
| 4. Pen knife | 20 Nos. |
| 5. Streak Plates | 20 Nos. |
| 6. Perrological ploarizing miscroscope | 20 Nos. |
| 7. Minocular microscope with point counter,
Camera Lucida and U. Stage fitting. | 1 Nos. |

Crystallography

1. A set 150 wooden crystallography models belonging Normal class of six major crystal system.
2. A set 25 wooden models showing twinning and the type and laws.
3. Contact Goniometer 5 Nos.
4. Set of transparant, Crystal models demonstrating axes planes and centre of symmetry of different Normal class of major system.
5. A set of atomic structure models demonstrating basic types.

Palaeontology

1. A set of 100 fossil as included in the practical syllabus and the phyllum mentioned in theory in course.
2. A set of 20 plant fossils as mentioned in practical course and their varieties.
3. A set of 25 Geomorphological models.
4. Index map of Survey of India.

Cermorphology

- | | |
|---|--------|
| 1. Toposheet of survey of India on 1:50.000 scale covering Entire Vidarbha. | |
| 2. Degree sheets of survey of India on 1.25,000 scal covering entire, Vidarbha. | |
| 3. Rotarameter | 5 Nos. |
| 4. Planimeter | 5 Nos. |
| 5. Tracing table (large size) | 1 Nos. |

Photogeology

- | | |
|--|---------|
| 1. Lens Steroscope | 10 Nos. |
| 2. Mirror Stereoscope | 10 Nos. |
| 3. Aerial Photographs (Stereopairs) | 10 Nos. |
| a) A set of 10, demonstrating different types of Lithologies, Structure etc. | |
| b) Aerial photographs and Land sat imageries covering Vidarbha for geological & Geomorphological and ground water studies. | |
| 4. A set of about 50 Structural models demonstrating various types of Primary and Secondary geological structure. | |

Structural Geology

- A) Every department should have adequate copies of outcrop maps and geological maps, so as to cover atleast 20 outcrop map and 20 section maps for every academic session, covering different geological situation from simplest to comples. In addition about 20-25 problems are to be taken on dip, strik, thickness, three points problem, borehole problem.
1. Large scale geological map in India.
 2. Geological maps of various states or Geological sheet atlas of India.
 3. Tectonic map of India.
 4. Hydrogeological map in India.
 5. Geological map of various geological systems and the type area.

Charts

As for as possible maximum no of charts should be present for demonstration of symmetry elements, crstallographic system. Morphology of various phyllum, structural diagram, geodynamics, geological works performed by natural agencies. Mineralogical, petrological and optical variation in rocks and minerals etc. Minimum 100 charts of basic data should be available.

Field Work.

- | | |
|---|---------|
| 1. Geological Hammer 1000 gm. | 10 Nos. |
| 2. Harver Sack | 20 Nos. |
| 3. Field camera (Plntax) with zoomlens and flash guns | 1 Nos. |
| 4. Water bottle | 2 Nos. |
| 5. Steel tapes 5 Mtr., 10 & 50 Metrs. | 2 Each. |
| 6. Clinometer compass | 15 Nos. |
| 7. Bruten compass | 5 Nos. |

In addition of these following additional equipments if kept will help to improve teaching and practical demonstration techniques related to course.

- | | |
|---|--------|
| 1. Overhead Projector | 1 Nos. |
| 2. Epidio Scope | 1 Nos. |
| 3. Any geophysical instrument Resistivity/Seismic | 1 Nos. |
| 4. Water analysis kit | 1 Nos. |

- (Note: 1) Necessary arrangement should be made available to display these moels so that students can observe them as and when they like, Adequate no of trays, showcases should be made available.
2) As far as possible Geological Musium should be separate.)

13. BOTANY

2S – BOTANY

Gymnosperm, Morphology of Angiosperms and Utilization of Plants**UNIT-I : Palaeobotany (15)**

- 1.1. Process of plant fossilization and types of fossils
- 1.2. Geological Time Scale
- 1.3. Fossil Gymnosperms
 - 1.3.1. Pteridospermales: Lyginopteris oldhamia
 - 1.3.2. Bennettitales: Bennittites

UNIT-II : Gymnosperms (15)

- 2.1. Classification according to D. D. Pant
- 2.2. General account: morphology, anatomy, life cycle and taxonomic position of Pinus and Gnetum
- 2.3. Affinities with pteridophytes and angiosperms
- 2.4. Economic importance of Gymnosperms

UNIT-III : Morphology (15)

- 3.1. Diversity in Plants habits ó Annual, biannual,perennials
- 3.2. Roots ó Types of root : tap and adventitious, modification of root : for food storage, respiration, and supports.
- 3.3. Stem ó Types of Stem, Characteristic features, branching, modification of Stem ó Underground

and aerial

- 3.4. Leaf ó Parts of leaf, types of leaves ó simple and compound; Phyllotaxy; Venation; Stipule. Modification of leaves

UNIT-IV : Morphology (15)

- 4.1. Inflorescences ó Types: Racemose, Cymose and Special.
- 4.2. Flower ó Flower as modified shoot; Structure of flower ó Calyx, Corolla, Androecium and Gynoecium. Placentation; Types of Pollination.

UNIT-V : Morphology and Utilization of Plants (15)

- 5.1. Fruits ó Morphological types
- 5.2. Utilization of Plants
 - 5.2.1. Food Plants ó Wheat, Potato ó Morphology, varieties and economic importance.
 - 5.2.2. Fiber Plant ó Morphology, varieties and economic importance of Cotton.
 - 5.2.3. Oil yielding Plant ó Morphology, Varieties and economic importance of Ground nut.

UNIT-VI :Utilization of Plants (15)

- 6.1. SpicesóGeneral account and economic importance of Black pepper, Clove, Cinnamon and Cardamom
- 6.2. General account and sources of firewood, timber and Bamboos.
- 6.3. Essential oils ó General account, economic importance of Eucalyptus.
- 6.4. Pharmacognosy and Phytochemistry with respect to following medicinal plants ó
 - 6.4.1. Aloe vera
 - 6.4.2. Adathoda vasica
 - 6.4.3. Asparagus racemosa
 - 6.4.4. Azadirachta indica
 - 6.4.5. Catharanthus roseus
 - 6.4.6. Chlorophytum borivillianum
 - 6.4.7. Emblica officinalis
 - 6.4.8. Ocimum sanctum
 - 6.4.9. Rauwolfia serpentina

- 6.4.10. *Vitex negundo*
6.4.11. *Withania somnifera*

LABORATORY EXERCISE

- I. Gymnosperms: Morphology and anatomy of the following members
 - ó
 - a. *Pinus*
 - b. *Gnetum*
- II. Preparation of double stained permanent mount of *Pinus* stem, needle and *Gnetum* stem and leaf.
- III. Study of fossil slides of *Lyginopteris* and *Bennettites*
- IV. Detailed morphological study of types of root, stem and leaf with its modifications
- V. Forms of corolla
- VI. Types of placentation
- VII. Morphology of fruits
- VIII. Morphology of plant parts used and medicinal plants prescribed in syllabi
- IX. Utilization of plants: Spices, fiber yielding plants and food plants prescribed in syllabi

BOOKS RECOMMENDED

- 1) A.C. Dutta : Text Book of Botany.
- 2) Andrews A.N. : Studies in Paleobotany.
- 3) Arnold C.A. : Introduction of Paleobotany.
- 4) Bhatnagar S.P. and Moitra A., 1996 : Gymnosperms, New Age International Limited, New Delhi.
- 5) Bhojwani & Bhatnagar : Embryology of Angiosperms.
- 6) Coulter M.J. & Chamberlain C.J. : Morphology of Gymnosperms.
- 7) Cutter E.G., 1971 : Plant Anatomy Experiment and Interpretation Part-II, Organs, Edward Arnold, London.
- 8) Cutter, E.G. 1969 : Part-I, Cells and tissues, Edward, Arnold, London.
- 9) Davis P.H., and Heywood V.H., 1993 : Principles of Angiosperm Taxonomy: Oliver and Boyd, London.
- 10) Eames E.J. : Morphology of vascular Plants.
- 11) Gangulee & Kar : College Botany Vol.II
- 12) Gangulee Das and Dutta : College Botany, Vol.I
- 13) Gifford E.M. and Foster A.S., 1988 : Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.
- 14) Hartmann H.T. and Kestler D.E., 1976 : Plant Propagation Principles and practices, 3rd edition, prentice Hall of India Pvt.Ltd. New Delhi.

- 15) Heyhood V.H. and Moore D.M. (Eds) 1984 : Current concepts in plant Taxonomy. Academic Press, London.
- 16) Jeffrey C., 1982 : An introduction to Plant Taxonomy, Cambridge University Press, Cambridge, London.
- 17) Maheshwari P. : Introduction of Embryology of Angiosperms.
- 18) Pande B.P. : A Text Book of Angiosperms.
- 19) Proctor M. and Yeop, 1973 : The Pollination of Flowers, William Collins Sons, London.
- 20) Radford A.E., 1986 : Fundamentals of Plant Systematics, Harper and Row, New York.
- 21) Rendle A.B. : Classification of flowering plants, Vol.I & Vol.II.
- 22) S. Sundar Rajan : College Botany, Vol.II & Vol.III.
- 23) Saxena and Sarabhai : A Text Book of Botany, Vol.II
- 24) Sharma O.P. : Gymnosperms.
- 25) Shukla & Mishra : Paleobotany.
- 26) Singh and Jain : Taxonomy of Angiosperms.
- 27) Singh, 4. 1999, Plant Systematics - Theory and Practices, Oxford and IBH Pvt. Ltd., New Delhi.
- 28) Sporne K.R. : Morphology of Gymnosperms.
- 29) Sporne K.R., 1965: The Morphology of Gymnosperms, Hutchinson & Company, (Publisher) Ltd. London.
- 30) Stace C.A., 1989: Plant Taxonomy and Biosystematics (2nd Edition) Edward Arnold, London.
- 31) Stewart W.N., 1983 : Paleobotany and Evolution of Plants, Cambridge University Press, Cambridge.
- 32) Thomas P., 2000 : Trees - Their natural history, Cambridge University Press, Cambridge.
- 33) Trivedi B.S. & Sharma B.B. : Introductory Taxonomy.
- 34) Tyagi & Kshetrapal : Taxonomy of Angiosperms.
- 35) Vasistha P.C. : Gymnosperms.
- 36) Vasistha P.C. : Taxonomy of Angiosperms.
- 37) Vyas Purohit Garg : A Text Book of Gymnosperms.
- 38) Walton : An Introduction & Study of fossil.
- 39) Modern Practical Botany, Volume-I, Dr.P.B.Pande, S.Chand Pub., N.W.
- 40) Modern Practical Botany, Volume-II, Dr.P.B.Pande, S.Chand Pub., N.W.
- 41) Modern Practical Botany, Volume-III, Dr.P.B.Pande, S.Chand Pub., N.W.
- 42) A Text Book of Botany óPaleobotany, Gymnosperms, Morphology and Utilization of Plants (2014), Dr.P.W.Deotare, Dr.M.A.Shahezad, Dr.Mrs.U.G.Malode, Dr.U.S.Patil, Dr.Mrs.P.S.Kokate,

Dr.Mrs.S.P.Khodke, Published by Nabh Prakashan, Amravati.

- 43) Morphology of Angiosperms and Utilization of Plants, Dr.Shubhangi Ingole, Published by Paygun Publishers, Amravati.

Semester – II
Practical Schedule

Time : 4 hours	Marks : 50
Q1. Preparation of double stained permanent mount of given Gymnospermic material and identification with reasons	10
Q2. Comments on given Morphological specimens	12
i. Root	
ii. Stem	
iii. Leaf	
iv. Inflorescence	
v. Flower	
vi. Fruit	
Q3. Comment on given medicinal plant with reference to morphology, part used and medicinal importance (Any two)	10
Q4. Spotting (02 marks each)	08
a) Palaeobotany	
b) Gymnosperms	
c) Utilization of Plant (food, fibers, spices) (2 Materials)	
Q5. Practical record	5
Q6. Viva voce and Excursion report	5

14. ENVIRONMENTAL SCIENCE
2S ENVIRONMENTAL SCIENCE
ECOLGY AND ENVIRONMENT

- UNIT I**
- a) Introduction to Ecology- Definition, principles and scope of ecology. Ecological factors- climatic, biotic, topographic.
 - b) Biogeochemical cycles- Definition, types. Gaseous (carbon, oxygen, and nitrogen). Sedimentary (phosphorous and sulfur)
(Lectures-14)
- UNIT II**
- a) Population Ecology- Definition, characteristic (natality, mortality, age structure, growth curve, dispersal, population size and density, biotic potential and life tables.
 - b) Interspecific relationship- Positive and negative. Positive- mutualism and commensalism. Negative ó Parasitism and predation. (Lectures-14)

UNIT III: Community Ecology: Definition, characteristics ó species diversity, growth form, structure and dominance.

Characters used in community structures-

Analytical-a)Qualitative- frequency, abundance, density, basal area, dominance. b) Quantitative ó Physiognomic, phenology stratification abundance vitality, life form.

Synthetic- i) presence and Constance, ii) fidelity iii) Dominance and other synthetic characters.

Methods of study of community- Quadrat.

(Lectures-14)

UNIT IV a) Ecosystem- Definition, components and structure, food chain, food web, ecological pyramids, energy flow in ecosystem, energy flow model (Y- shaped).

b) Ecosystem types: Terrestrial- forest, grassland, desert and cropland; Aquatic- marine and fresh water.

(Lectures-14)

UNIT V a) Productivity of ecosystem- Concept of productivity, types (primary, secondary), net productivity. Biomass-concept, definition and study methods.

Methods of measurement of productivity- Chlorophyll, O₂, CO₂ and radioactive.

b) Ecological succession ó Definition, causes, types. General process of succession. Hydro sere, xerosere as a succession models. Ecological niche, Ecotone.

(Lectures-14)

UNIT VI a) Biodiversity ó Definition, types,. Biodiversity loss, global diversity. India as mega diversity nation. Indian Biodiversity hot spots.

b) Bio-indicators - climatic, soil and pollution and their role in environment.
(Lectures-14)

NOTE :- Should visit to different Environmental ecosystems for the study of various components, interactions and ecological indicators.

BOOKS FOR REFERENCE:

1. A Text book of Ecology and Environment by P.C. Joshi and Namita Joshi, Himalaya.
2. Fundamentals of Ecology by E.P. Odum.
3. Principles of Environmental Biology-P.K.G. Nair, Himalaya Publ.
4. Ecology and Environment- P.D. Sharma , Rastogi Publ.
5. Plant Ecology and Soil Science- R.S. Shukla, P.S. Chandel, S Chand & company.

6. Fundamentals of Ecology- M.C. Dash, Tata McGraw Hill Pub.
7. Communities and Ecosystem- Witalkar.
8. Environmental Science - Van Cunningham, Tata McGraw Hill Pub.
9. Manual of Field Ecology- R. Mishra.
10. Concept of Ecology- E.J. Koromondy, Principal Hall.
11. Modern Concept of Ecology- H.D. Kumar.
12. Text book of Plant Ecology- R.S. Ambusth.
13. Elements of Ecology- Brijgopal and Bharadwaj.
14. Elements of Ecology- P.L. Kochar.
15. Environmental Biology- K.C. Agrawal.

PRACTICAL II

PRACTICAL COURSE FOR B.Sc. PART-I, SEMESTER-II (ENVIRONMENTAL SCIENCE)

- A) Experiments on vegetational community structure.**
1. Determination of minimum size of quadrat by Species Area-Curve method.
 2. Determination of minimum number of quadrat to be laid down in the field under study.
 3. To study community characters ó density, frequency, abundance by quadrat or line transect method.
 4. To study vegetation of given area by Physiognomic / Biological Spectrum Method.
 5. To compare the biomass of ungrazed and grazed grassland.
 6. To determine Importance value Index (IVI) of vegetation.
- B) Experiments on Ecosystems.**
1. Measurement of Primary productivity in aquatic ecosystem by light and dark bottle method.
 2. To study abiotic components ó pH, temperature, turbidity and light penetration in pond ecosystem.
 3. To study biotic components of pond ecosystem.
 4. To study biotic components of forest ecosystem.
 5. Qualitative and quantitative estimation of planktons in fresh water.
 6. To study the abiotic components of forest ecosystem.
 7. To study the ecological adaptations in Flora and Fauna.
- C) Spotting- Observation and comments on –**
1. Mutualism- Lichens, Rhizobia, Mycorrhizae.
 2. Commensalism- Lianas, Epiphytes.
 3. Parasitism- Cuscuta, Orobranchie, Loranthus.
 4. Predation- Nepenthes, Drosera and Utricularia.

DISTRIBUTION OF PRACTICAL MARKS Time : 4 hrs.

Q.1	Any two Experiments on community structure -----	20
Q.2	Experiments on Ecosystem -----	10
Q.3	Spotting (any four) -----	08
Q.4	Tour Diary -----	03
Q.5	Practical record-----	04
Q.6	Viva-voce -----	05

TOTAL 50

15. SEED TECHNOLOGY (VOCATIONAL)

2S-SEED TECHNOLOGY

PLANT BREEDING METHODS FOR CROP IMPROVEMENT AND SEED PRODUCTION .

UNIT I : Genetic basis of crop improvement ó Mendelian principles of inheritance of characters (Segregation , independent assortment).
Laws of probability , Gene interactions . Gene and Environment , Inheritance of quantitative traits .
Methods of plant breeding ó Plant exploration, introduction and acclimatization
Exploration- Centres of origin, Centers of Genetic diversity, methods of survey , field study, agroclimatology herbarium preparation, collection of material, plant parts .
Definition of introduction acclimatization, objectives of introduction , Types of introduction (Primary and Secondary) Plant introduction agencies in India and World. Procedure for introduction (Procurement, quarantine, evaluation)
Acclimatization.
Merits and demerits of introductions .
Achievement in field crops, flowers, fruits vegetables and other plants.
Pureline selection ó Definition of pureline, Characters of pureline and its importance, Field techniques of pureline selection, Advantages and limitations.
Clonal selection ó Definition of a clone, Characters of clone, Source of clonal variation , Importance of clonal selection, Field techniques of clonal selection, Advantages and limitations , Achievement through clonal selection in some crop spp.

UNIT II: Mass selection Definition, Procedure of mass selection , Merits and demerits, Differences between pureline selection, clonal selection and mass selection.

Hybridization followed by selection in self pollinated crops - pollinated crops - History , definition and types of hybridization, Application and objectives Hybridization techniques in self pollinated crops, Heterosis in self pollinated crops, Advantages and limitations, Handling of segregating population (Pedigree method, Bulk method mass pedigree backcross method , multiline varieties, F1 hybrids)

Hybridization procedure in cross pollinated crops ó development of inbred lines, Effect of self pollination (selfing) ,Development of single cross and double cross hybrids, Development of synthetic and composite varieties , Achievement in field crops, vegetables and fruit crops.

Mutation in crop improvementô Definition of mutation, mutagen, mutant etc.

Classification of mutation (point mutation, chromosomal, somatic mutation, spontaneous and induced mutation macro and micro mutation).

Artificial induction of mutation, Mutagens (physical, chemical, radioactive isotopes) .

Mechanism of action of mutagens. Dosimetry.

Procedure for mutation breeding, Significance of induced mutation in crop improvement

Achievements through induced mutations.

UNIT III : Polyploid breedingô Occurrence of polyploidy in crop plants, Classification of polyploidy, Effects of aneuploidy and euploidy, Techniques of production of haploids, aneuploids, triploids, tetraploids etc. Evolution of crop plants through polyploidy , Achievements through polyploidy breeding.

Breeding for disease resistance- Definition and history, Nature of disease resistance, Causes of disease resistance, Methods of breeding for disease resistance, Scope and application.

Distant hybridizationô Barriers in distant hybridization, Methods to overcome the barrier: Embryo rescue, Embryo culture. Methods used for hybridization : Protoplast fusion. Advance techniques in plant breeding :Anther culture, Tissue culture, Soma clonal variation.

Organisation for crop improvement in Indiaô History of systematic crop improvement in India, Setting up of council of Agricultural Research, Crop Research Institutes.

UNIT IV: General introductionô Seed definition- differences between seed and grain, Seed as a basic input in agriculture. Role of high quality seeds in increasing and sustaining crop production Seed quality concept, quality control in seed production. Characteristic of sowing quality seed. Mode of reproduction in relation to seed production-Classification of crop plant in relation to mode of reproduction and choice of methods for seed production .Development and testing of varieties ó System of breeding and testing of crop varieties and hybrids in self, often, and cross pollinated crops. System of release and notification of varieties for general cultivation. Varietal purity and its maintenanceô Genetic purity of varieties-concept. Life span of varieties and factors responsible for their deterioration. Methods of maintenance of genetic purity and techniques of maintenance breeding. Generation system of seed multiplication. System and methods of production of nucleus, breeder, foundation and certified seed.

Flowering and seed productionô Flowering in crop plants , its modification for hybrid seed production. Factors affecting seed set-temperature, relative humidity, day length, wind velocity and direction, duration of flowering, anthesis, pollen viability, stigma receptivity, nutrition and irrigation. Male sterility and self incompatibility--male sterility, its genetics and use in hybrid seed production. Self incompatibility, its genetics and use in hybrid seed production.

UNIT V : Pollination and seed production

Improvement of pollination in seed production of forage legumes, tripping process and vegetables. Improvement of pollination for hybrid seed production.

Hybrid seed productionô Feasibility of hybrid seed production by the use of hand emasculation and pollination, supplementary pollination detaseling- male sterility, gametocides and self incompatibility.

Areas of seed productionô Choice of area of seed production, Factors affecting the choice of area of seed production-soil type, climate ,nutrition and weed status, insect pest and disease incidence.

Compact area approach in seed production. Seed village concept generation system of multiplication.

UNIT VI : Agronomic management in seed production- selection of land for seed production. Previous crop effect.

Effect of environment before and after harvest on seed quality.
Special agronomic management .

Benovalent, monovalent effect on germination quality
.Harvesting and threshing of seeds factors affecting time of
harvesting and threshing, precautions at these operations
especially in high value seeds-care at post harvest handling of
seeds.

Seed Production Systems and Management.

Systems of seed production in India , Agencies responsible for
seed production , Seed production planning , Indian and
International seed industry. Planning ,organizing and managing
a seed production programme.

Seed production procedure Detailed seed production
procedure in following crops with reference to land and isolation
requirement, special agronomic management, rogueing ,
harvesting and threshing in wheat ,Rice, Sorghum, Bajara,
Maize, Chick pea ,Lentils ,Cowpea, Mung , Urdbeans,
Soybeans, Groundnut, Rapeseed, Mustard, Sasame , Sunflower,
Forages, Potato, seed plot technique of potato multiplication,
production of hybrid Potato seeds.

PRACTICALS.

PLANT BREEDING METHODS FOR CROP IMPROVEMENT AND SEED PRODUCTION.

- 1 Preparation of slides for the study of mitosis and meiosis.
- 2 Hybridization techniques.
- 3 Studies on segregation using mixture of coloured seeds
- 4 Studies on independent assortment.
- 5 Studies on gene interactions.
- 6 Embryo rescue and media preparation for cultures
- 7 Visit to research farms.
- 8 Preparation of agroclimatic maps (India and States) for soil, crops
and climatic conditions
- 9 Identification of different crop seeds.
- 10 Seed production planning-for hybrid and varieties, Computation of
area and seed requirements for seed production of certified class.
- 11 Study of inflorescence and flower structure of self and cross polli-
nated crops.
- 12 Study of pollination and fertilization, insect pollinators- their iden-
tification, management of insect pollinators especially honey bee

isolation distance.

- 13 Study Of seed production practices of cereals, pulses, oilseed, and
fibre crops in relation to planting, weed control, rogueing, harvest-
ing and threshing.
- 14 Visit of nucleus, breeder seed plots and study of maintenance of
varieties.
- 15 Visit of foundation and certified seed plots and study of the tech-
niques of seed production.
- 16 Seed planning cost of seed production.

PRACTICAL EXAMINATION

Distribution of marks.		Marks
1	Prepare temporary squash/smear of the given material and Identify two stages .	7
2	Problem based on segregation/ Independent assortment Gene interaction chisquare test using coloured seeds .	7
3	Identify and describe specimens A, B, C and D giving reasons (Inflorescence , Pollination, crop seed seeds)	8
4	Identification and classification of seeds on the basis of seed production practices (any two)	7
5	Submission of visit report .	7
6	Submission of seed specimens and viva voce.	7
7	Record book.	7
Total Marks		50

BOOKS RECOMMENDED

- 1 Seed Technology- R. L. Agrawal Oxford IBH.
- 2 Choudhary R. C. 1982 Introduction to plant breeding oxford and IBH,
Publishing co, New Delhi.
Singh , B. D. 1990, Plant breeding Principles and methods kalyni pub-
lisher, New Delhi.
- 3 Simmonds, N. W. 1979 , Principles of crop improvement Longman,
Newyork.
- 4 Strickberger N W. 1985 Genetics, Mc Millan publishing co. Newyork.
- 5 Gupta , P. K. 1991, Genetics Rastogi Publication co ,Meerut.
- 6 Frankel, R. and Galun, E. 1977. Pollination mechanisms, Reproduc-
tion and plant Breeding, Springer-Veriag, Berlin.
- 7 Poehlman, J. M. and Borthakur, D 1972 Breeding Asian Field Crops.

- Oxford and IBH publishing co . NewDelhi.
- 8 Chopra, V. L. 3Year plant breeding theory and practice. Oxford and IBH publishing co . NewDelhi.
 - 9 Agrawal , P. K. and Dadlani, M. 1990. Techniques in seed science and Technology. South Asian publisher Newdelhi.
 - 10 Fertilizer, W. P. 1975 Ed cereal seed Technology. Food and Agriculture Organisation of United Nation, . Rome.
 - 11 Fertilizer ,W. P. (1982) , Ed Technical guidelines for maize seed technology. Food and Agriculture Organizatin of the United Nations , Rome.

16. ZOOLOGY

There shall be following paper and practical for B.Sc.Part-I Semester Two examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory Sessions and 25 practical sessions during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which, 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

	Marks
1) Paper-II: Cell and Developmental Biology	
Theory (Written)	í í . 80
Internal assessments	í ... 20
2) Practical:	í í . 50
Total :	150 Marks

2S-ZOOLOGY

CELLAND DEVELOPMENTAL BIOLOGY

- UNIT-** 1. General organization of Prokaryote and Eukaryote Cell.
2. Ultra structure and functions of, Plasma membrane
3. Ultra structure types and functions of, Endoplasmic reticulum
- UNIT-II:** 1. Ultra structure and functions of, Golgi complex
2. Ultra structure and functions of Ribosome
3. Ultra structure and functions of Mitochondria.
4. Ultra structure and functions of Lysosomes.
- UNIT-III:** 1. Ultra structure and functions of nucleus and nucleolus.
2. Chromosome and its general organization.

3. Structure of Polytene and Lamp brush Chromosome.
- UNIT-IV:** 1. Mitosis and its significance
2. Meiosis and its significance.
3. Gametogenesis: Spermatogenesis and oogenesis
4. Fertilization: Types of fertilization, Mechanism of fertilization,
- UNITV:** 1. Cleavage, and development up to coelome formation in amphioxus
2. Cleavage, Blastulation and gastrulation up to the formation of three germ layers in Frog, Fate map.
3. Cleavage, Blastulation and gastrulation up to the formation of three germ layers in chick.
4. Extra embryonic membranes in chick: Development and significance.
- UNIT-VI:** 1. Placentation in mammals; Types and Functions of Placenta.
2. Parthenogenesis: Types and, Significance,
3. Regeneration in invertebrates and vertebrates.
4. Elementary idea of, sources, types and use of Stem cells.

CELLAND DEVELOPMENTAL BIOLOGY

I) Cell Biology:-

1. Use, care and maintenance of microscope.
2. Bacterial Culture, Gram staining.
3. Permeability tests using erythrocytes.
4. Preparation of Polytene chromosome in Chironomous or Drosophila larva.
5. Preparation of various stages of mitosis in Onion root tip.
6. Preparation of various stages of meiosis in insectø testis.

II) Developmental Biology.

1. Study of stages of Gametogenesis in rat/frog, (Permanent Stained Slides)
2. Study of different of types animal eggs
3. Study of developmental stages (Life Cycle) of Cockroach, Housefly, mosquito, Butterfly, Moth, Frog (Any Four).
4. Sperm in physiological saline using phase contrast optics.
5. Demonstration of developing chick through available resources.
6. Developmental stages of frog: Cleavage, blastula, gastrula, neurula, and tadpoles through available resources.
7. Permanent slides of chick embryos at 24, 36, 48, 72 hrs of incubation.
8. Study of different types of placenta with suitable histological slides or visual diagrams.

Distribution of Marks during Practical Examination: Time : 4 hrs.

i) Identification and comments on spots (1-8)	16 Marks
6 4 Cytological, 4 Embryological	
ii) Cytological Preparation	10 Marks
iii) Comments on given Life Cycle	10 Marks
iv) Certified class record -	05 Marks
v) Submission of photographs of any three crop pests	04 Marks
viii) Viva- voce	05 Marks

Total:- 50 Marks

Reference Books Recommended (All latest editions):

- 1) C.B.Pawar ;Cell Biology :
- 2) Alberts Bray, Lewis, Raff, Roberts and Watman Molecular Biology of the cell (Garland)
- 3) Balinsky, An introduction to Embryology, (CBS College Publishers)
- 4) Grant: Biology of developing system (Halt, Reihart and Winston.)
- 5) Gilbert: Developmental Biology (Sinauer)
- 6) Puranik P. G., A Text Book of Embryology S. Chand & Co.
- 7) Browder L.W. Erickson C.A. & Williams Developmental Biology, 1992 3rd edition, R.J. Saunders // . College, Publications, London
- 8) Tyagi, Verma and Agrawal: Chordate embryology.
- 9) Dr.R.A.Malu, et.al Text Book of Cell Biology and Developmental Biology - Shivneri í .. Publishers, Amravati.
- 10) Korak Kanti Chaki, Gautam Kundu, and Supriti Sarkar: Introduction to General Zoology Vol. 1 and Vol.2
- 11) De Robertis Cell and Molecular biology

List of necessary Equipments / Apparatus required for the Zoology Practical.

1. Compound Microscope	-	16
2. Dissecting Microscope	-	16
3. Dissection Box	-	02
4. Dissecting Trays	-	25
6. Phase contrast microscope	-	01
7. Computer set with LCD.		
8. Glass aquarias	-	3
9. Dissection Accessories.		
10. Scale reader		

11. Hot air oven.
12. Weighing Balance (Single Pan Balance)
13. Refrigerator

17. INDUSTRIAL FISH AND FISHERIES (vocational)

There shall be a following paper and practical for B.Sc. Part-I Semester Two examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory periods and 25 practical during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

Marks

1)	Paper-II: CAPTURE FISHERIES	
	Theory (Written)	í í . 80
	Internal assessments	í ... 20
2)	Practical:	í .. 50

Total : 150 Marks

2S- INDUSTRIAL FISH AND FISHERIES CAPTURE FISHERIES

- UNIT I**
1. Capture fisheries. Potential, estimates and significance.
 2. Biological aspects of fishery management.
 3. Principles of conservation, Development and Management.
 4. Population dynamics
- UNIT II.**
1. Concept of recruitment and yield
 2. Problem of overfishing MSY, MEY and OSY.
 3. Important river systems of India and their fisheries.
 4. Cold water fisheries: Resources Development and Management
- UNIT III.**
1. Fisheries of trout, Mahaseer and other cold water species.
 2. Lacustrine fisheries.
 3. Origin, distribution and classification of Lakes.
 4. Salient physico-chemical features and fisheries of Kodaikanal lake, Yer caud Lake, Ooty lake, Logta Lake.
- UNIT IV.**
1. Reservoir fisheries in India.
 2. Marine fishery Resources in India.

3. Problem of inshore fishery.
4. Sampling technique adapting for estimating marine fish landing.
5. Pattern and growth of marine fishery exploitation. Under exploited and unexploited resources of the Exclusive Economic Zone (EEZ).

- UNIT V.**
1. Pelagic fishery Resources of India.
 2. Fishery of oil sardine and other sardines mackerel, ribbon fish, Tunnies, seer fishes carangids and cephalopods.
 3. Midwater and dimersal fisheries.
 4. Fishery of Elasmobranch, Bombay duck, Catfishes, Silver bellies, Pomprets, Prawn, Crab, Lobsters, mussels and Clams.

- UNIT VI.**
1. Estuarine fisheries; Definition, origin and classification of Estuarine fisheries.
 2. Major Estuaries of India and their fisheries.
 3. Brackish water lakes and their fishery
 4. Chilka Lake and Pulicat Lake
 5. Indian backwater and their fisheries.

Practicals:

1. Study of food and feeding habits of fishes - Analysis of stomach content qualitative and quantitative methods.
2. Estimation of growth rate and ageing by indirect methods- (Using scales and otoliths, length weight relationship & ponderal index.)
3. Plankton analysis: qualitative and quantitative, permanent stained preparations of planktons.
4. Estimation of relative conditions factors, gonad somatic index and fecundity.
5. Study of spawning habits based on ova diameter polygons.
6. Identification of egg hatching spawn, fry and fingerlings of Indian major carps.
7. Study of larval stages of crustacean and molluscs.
8. Study of various types of external and internal fish tags.
9. Field visits -
 - (1) Visit to fish catching, center to assess catch compositions species
 - (2) Study of crafts and gears in inland water
 - (3) Fish market statistical data.
 - (4) Visit to a polluted water body to assess its impact on fishery.
 - (5) Visit to fish farm.

PRACTICALS EXAMINATION

Distribution of Marks.

- | | |
|---|-----------------|
| 1. Identification and comments on given spots, 1 to 5 | 15 Marks |
| 2. Identification of a given species of fish by morphometric study. | 7 Marks. |
| 3. Estimation experiment Plankton analysis or determination of/ Feeding habit of fish by stomach content analysis | 8 Marks. |
| 4. Permanent stained micro preparation of Any planktonic organism. | 6 Marks. |
| 5. (a) Viva voce | 5 Marks |
| (b) Record book | 5 Marks |
| (c) Field diary | 4 Marks |
| Total | 50 Marks |

List of Equipments

- 1) Microscopes common and Inverted.
- 2) Fish measuring Boards.
- 3) Dissection sets.
- 4) Scale reader
- 5) Hot air oven.
- 6) Weighing Balance (Single Pan Balance)
- 7) Otolith cutter and grinder
- 8) Bone cutters.
- 9) Oculometer and stage micrometer
- 10) Microtome
- 11) Camera lucida
- 12) Projection microscope
- 13) Centrifuge (Electrically operated)
- 14) Sedgwick Rafter Cells.
- 15) Tissue homogenizer
- 16) Catheters
- 17) Refrigerator
- 18) Water analysis kit (Digital), Spectrophotometer, Colorimeter
- 19) pH meter, Oxygen analyzer.
- 20) Autoclave
- 21) Phage-Contrast microscope
- 22) Aluminum and wooden frames for fabrication of aquarium.
- 23) Acrylic and glass sheets.

- 24) Magnifying glasses.
- 25) Breeding Hapa, Hatching Hapa, drag net, hand net,
- 26) Plankton net, sieves for soil texture analysis.
- 27) Beakers, droppers.
- 28) Enamel trays.
- 29) Facility for tissue block making staining and mounting
- 30) Glassware for analysis of CO₂
- 31) Petri dishes, test tubes etc.
- 32) Glass troughs
- 33) Earthen ponds.
- 34) Cement custemes
- 35) Millpore filters
- 36) Pressure cookers
- 37) Drilling Machines.

References for Fish Biology(Sem I and II)

1. Ichthyology, Lagler, K.F.J.E. Bardach and R.R. Miller. 1962. Wiley International. New York.
2. History of fishes. Greenwood P.H. 1963. Ernest Benn Ltd.. London.
3. Fishes : An Introduction to Ichthyology movie. P.B. and J.J. Cech. 1982. Prentice-Hall Inc U.S.A.
4. The Biology of Fishes. Kvale. H.M.T.F.H. Publication. Hong Kong.
5. The life of Fishes. Marshall. N.B. 1965. Weidenfeld and Nicolson, London.
6. The Marine and Freshwater Fishes of Ceylon. Munro. I.S.R. 1982. Soni Reprints Agency New Delhi
7. Inland Fishes of India and Adjacent Countries. Vol. I and II Talwar. P.K. and A.G. Jhingran. 1991. Oxford and IBH Publishing Co. Pvt. Ltd.. New Delhi
8. Commercial Sea Fishes of India. Talwar. P.K. and R.K. Kacker. 1984 Zoological survey of India Calcutta.
9. FAO Species Identifications Sheets for Fishery Purposes. Western India Ocean Fishing Area 51. Vol I to V and Eastern Indian Ocean Fishing Area 57 and Western Central Pacific Fishing Area 71. Vol I to III.
10. Handbook of Museum Techniques. Aivappan A and S.T. Satyamurthy 1960 Govt. of Madras.
11. Fisheries Ecology Pitcher T.J. and P.J.B. Hart. 1982. Croom Helm. London.
12. Introduction to the Pacific of fishery Science. Rovce. W.F. 1984

Academic Press.

13. Fish Stock Assessment: A manual of basic methods. Gullad. J.A. 1983 FAO. Rome.
14. Manual of Methods of Fisheries Biology Fishicule 9. Research on Fish stocks. Laevastu T. 1965 Food and Agriculture Organization of the United Nations. Rome.
15. Fishery Science: Its Methods and Application. Rounsfell G.A. and W.H. Everhart 1953 John Wiley & Sons New York.

18. Biological Techniques And Specimen Preparation (vocational)

There shall be a following paper and practical for B.Sc. Part-I Semester Two examination. The syllabus is based on 6 theory periods and six practical periods per week (Total 75-80 theory periods and 25 practical during the complete semester). There shall be one compulsory paper of 3 hours duration, in theory as stated below and practical examination extending for four hours. Every examinee shall offer the following paper of 100 marks, (Out of which 80 marks will be for written examination and 20 marks for internal assessments) and practical examination of 50 marks. Candidates are required to pass separately in theory and practical examination.

	Marks
1) Paper-II: BTSP (Plant)	
Theory (Written)	í í . 80
Internal assessments	í ... 20
2) Practical í ,í í í í í í	í í 50

Total : 150 Marks

2S- Biological Techniques and Specimen Preparation (Vocational)

BIOLOGICAL TECHNIQUES & SPECIMEN

Preparation (Plant)

UNIT-I Systems of classification, Classification of plants up to family by Bentham and Hooker's system. Broad idea about rules of plant nomenclature and Botanical names of plants which are locally available from following families and showing economical uses. Annonaceae, Papaveraceae, Cruciferae, Malvaceae, Rutaceae, Anacardiaceae, Papilionaceae, Mimosae, Curcubitaceae, Umbelliferae, Compositae, Apocynaceae, Solanaceae, Liliaceae and Graminae.

UNIT-II Plants used as cereals, Pulses, Fruits, vegetables, fiber plants, species of medicinal value. Ethno botanical plants of nearby locality.

Tissue system in Angiosperms and special features of anatomical sections commonly used in the classrooms. Preparation of stains and single and double staining methods.

Preparation of permanent slides & storage of slides. Methods of permanent staining e.g. Algae,

UNIT-III Bryophytes & pteridophytes. Mitosis and meiosis of plant cell and its comparison with animal cell. Collection of material for cell division and its preservation for marketing. Preparations of permanent slides showing stages of cell division. Use of chemicals to arrest cell division. Special stains for chromosomes and their preparation.

UNIT-IV Preparation and maintenance of plant herbarium. Where and How to collect the plants, Knowledge about instruments required for collection of plants and precautions during plant collection, Preparation of dry specimens of herbarium sheets. Processes of storage of herbarium and precautions during storage. Type of specimens, its importance.

UNIT-V Preparation of dry plant specimens for display boxes. Preparation of museum specimens. Important herbaria of the world and in India. Brief knowledge about Indian Botanical survey of India. Modeling materials-Plaster of Paris, epoxy resin and fiber glass. Characteristics of teaching models, preparations, durability, attractiveness, innovations.

UNIT-VI Preparation of media for fungal and bacterial culture, solid and liquid medium used for cultural purposes. Sterilization methods. Autoclave and its maintenance, Inoculation techniques. Isolation of fungal organisms and preparation of pure cultures. Identification of common fungal and bacterial forms from culture. Cultural Study - Measurements, use of micrometers. Use of colony counter in culture study. Storage and maintenance of stock cultures. Study of pathogenesis by Koch's postulate methods. Hanging drop culture. Staining and preparation of permanent slides of bacteria and fungi.

PRACTICALS

1. Preparation of herbarium sheet: 20 sheets.
2. Preparation of botanical museum specimens: Including life cycles.
3. Preparation of display boxes of dry plant., & Plant products.
4. Preparation of Botanical whole mounts.
5. Collection and preservation of Botanical materials for anatomical & cytological studies.

6. Preparation of alizarine stained preparation.
7. Plate and colony counting. (Bacteria/fungi)..
8. Taxidermy.
9. Preparation of resin embedded specimen, preparation of teaching models of plaster of Paris, Epoxyresin and fiber glass.
10. Preserving materials for class work use.
11. Preparation of Sterile culture media: plants-Culture of bacteria, fungi, algae, and their maintenance.
12. Study and use of Camera Lucida.
13. Microtomy: Preparation of Botanical permanent micro slides (Histological)

Practical Examination

Distribution of mark (50 Marks)

Q1.	Microchemical/Phytochemical test	10 marks
Q2.	Permanent stained micro preparation	
	Or	
	Double stained preparation	10 marks
Q3.	Squash/smear of root tip/anther	8 marks
	Or	
	Mounting of bacteria/fungi/algae.	
Q4.	Camera Lucida drawing of the given slide/material	7 marks
Q5.	Submission of herbarium, Botanical museum specimens Models, charts, Alizarine stained preparation; Doubled stained preparation, stuffing of animals (At least 3 different types) are to be submitted At the time of examination. ..í ..í í	5 marks
Q6.	Practical record ..í ..í í .	5 marks
Q 7	Viva voce í íí .	5 marks
Total :.....		50 Marks

Books recommended for Paper PAPER-1S and 2S-BTSP

1. Microscopy: J.K. Soneja, Pub.: Soneja Brothers, Agra.
2. Techniques in Microscopy and Cell Biology: V.K.Sharma, Tata McGraw Hill Pub. Co.Ltd., New Delhi.
3. Zoological Microtechniques: Weissman W.B. Saunders & Co.1 Philadelphia.
4. Text book of Microtechniques and Environmental Biology: Dr. R.R.

- Dhande, Dr. G.N.Wankhede & Dr. S.R. Akarte, Bajaj Publications, Amravati.
5. Botanical Microtechniques: John E.Sass, Balckwell Scientific Publications Oxford, London.
 6. Text book of Histology: Bailey, Blackwell Scientific Publications Oxford, London.
 7. A Manual of practical Zoology, Vol. I, II & III: K.P.Achar, Pub.:Himalaya Publishing House.
 8. A manual of practical zoology (Invertebrates) : P.S.Verma S.Chand & Co.Ltd.
 9. A manual of practical zoology (Chordates) : P.S.Verma S.Chand & Co.Ltd.
 10. Cell Biology: C.B. Powar, Himalaya Pub.Co.
 11. A text book of Fungi, Bacteria and viruses: Dubey H.C.
 12. Taxonomy of Angiosperms: P.C.Vashishta
 13. Taxonomy of Angiosperms: V.N.Naik, Tata McGraw Hill.
 14. Taxonomy of Angiosperms: P.C.Vashishta, Pradeep Publi. Jalandar.
 15. Cytology, Histochemistry and Anatomy of Angiosperms: V.Venkateswarlu, S.Chand & Co.
 16. Angiosperms: Chopra G.L., S.Nagin & Co.
 17. Plant Taxonomy: O.P.Sharma, Tata McGraw Hill.
 18. An Introduction to Plant Anatomy: Eames A.J., Tata McGraw Hill.
 19. Plant Anatomy: Esan K.A., Wiley Eastern Ltd.
 20. Plant Anatomy: Pandey B.P., S.Chand & Co.
 21. Introduction to the principles of plant taxonomy: Shivraja V.V., Oxford & IBH.
 22. Systematic Botany-Angiosperms: Mathur R.C., Agra Book Stall.
 23. Introductory Mycology: Alexopalar C.J., Wiley Eastern Ltd.
 24. Microscopy for the students of Biology: Phadnis B.A., Associated Book Centre, New Delhi.
 25. Outline of Microtechniques: Prasad M.K., Emakay Pub. Delhi.
 26. Staining techniques in Botany: Prasad D.M., International Books Distributor, Deharadun.
 27. Manual for Herbarium Collections: Rao R.R., B.S.I. Calcutta.
 28. Medical Laboratory Technology Vol.I, II & III: Kanai L. Mukharjee, Tata McGraw Hill Co. Ltd., New Delhi.

19. STATISTICS

2S-STATISTICS

The examination in Statistics of First & Second semester will comprise of one theory paper each, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The Distribution of marks for practical will be as follows :

- | | |
|-----------------------------|----------|
| 1. Practical record ----- | 08 Marks |
| 2. Practical Viva Voce----- | 12 Marks |
| 3. Practical problems----- | 30 Marks |

The following syllabi is prescribed on the basis of six lectures per week and six practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

The college imparting instructions in Statistics should provide 12 digit desk model electronic calculators to the every student for practical work.

UNIT I : Correlation and Regression Analysis :

- 1.1 Concept of correlation, scatter diagram and positive and negative correlation.
- 1.2 Karl Pearson's coefficient of correlation and its derivation, properties of correlation coefficient, coefficient of determination.
- 1.3 Rank correlation ó Spearman's and Kendall's rank correlation coefficient.
- 1.4 Intraclass correlation coefficient.

UNIT II : Regression Theory :

- 2.1 Concept of regression, lines of regression, two lines of regressions.
- 2.2 Coefficient of regression and its derivation, properties of regression coefficients.
- 2.3 Principle of least square, fitting of linear regression, polynomial and exponential curve.
- 2.4 Concept of Multiple regression, equation of plane of regression of three variables.
- 2.5 Definition of Partial regression.

UNIT III : Theory of Attributes :

- 3.1 Definition of attribute, notations, classes and class frequencies, order of class and class frequencies.

- 3.2 Consistency of data, conditions for consistency of data, simple numerical problems.
- 3.3 Independence of attributes, criteria for independence.
- 3.4 Association of attributes, Yule's coefficient of association, coefficient of colligation, relation between coefficient of association and colligation.

UNIT IV : Discrete Probability Distributions-I :

- 4.1 Discrete uniform distribution ó its definition, mean, variance.
- 4.2 Bernoulli distribution ó its definition, mean variance.
- 4.3 Binomial Distribution - its definition and derivation, mean variance, coefficient of skewness and kurtosis, moments and m.g.f., fitting of binomial distribution.
- 4.4 Negative Binomial Distribution ó Its definition, derivation, mean, variance, moments and m.g.f.

UNIT V: Discrete, Probability Distributions-II :

- 5.1 Poisson Distribution - its definition and derivation, mean variance, coefficient of skewness and kurtosis, moments and m.g.f., fitting Poisson distribution.
- 5.2 Hyper geometric Distribution - its definition and derivation, mean variance.
- 5.3 Geometric Distribution - its definition, mean variance, coefficient of skewness and kurtosis, moments and m.g.f.

UNIT VI: Continuous Probability Distribution :

- 6.1 Continuous Uniform Distribution - its definition, mean variance, moments and moment generating function.
- 6.2 Exponential Distribution - its definition, mean & variance through moment generating function.
- 6.3 Normal Distribution - its definition, mean, variance, median, mode & m.g.f., area property, chief characteristics and importance of normal distribution.
- 6.4 Beta & Gamma Distributions :- Definition, mean, variance.

List of Practicals : (2S – Statistics)

1. Problems on Correlation Coefficient.
2. Problems on Rank Correlation by Spearman's and Kendall's formulae.
3. Fitting of straight line and second degree parabola by least square method.
4. Fitting of exponential curve.
5. Problems on regression of two variables.
6. Problems on multiple and partial correlation coefficients in three variables.

7. Testing association of attributes by all four methods.
8. Calculation of mean, variance, coefficient of Skewness and Kurtosis for Binomial distribution.
9. Calculation of mean, variance, coefficient of Skewness and Kurtosis for Poisson distribution.
10. Calculation of mean, variance, coefficient of Skewness and Kurtosis for Geometric distribution.
11. Fitting of Binomial Distribution.
12. Fitting of Poisson Distribution.
13. Fitting of Normal Distribution.
14. Problems on Area property of normal distribution.

Note: The practicals numbered 1, 3 and 6 may be performed on MSEXCEL.

References for 1S and 2S (Statistics) :-

- (1) Brase and Brase : Understandable Statistics.
- (2) J.Medhi : Statistical methods, an introductory text.
- (3) S.C.Gupta and V.K.Kapoor : Fundamentals of mathematical statistics, Sultan Chand and Sons.
- (4) Bhat B.R., Srivenkatramana T. and Rao Madhava K.S. (1997) : Statistics- A beginners Text Vol.-II, New Age International Pvt. Ltd.
- (5) Goon A.M., Gupta M.K., Das Gupta B. (1999) : Fundamentals of Statistics, Vol.-I & II, World Press, Calcutta.
- (6) D.N.Elhance : Fundamentals of Statistics
- (7) Spiegel M.R. (1967) : Theory and Problems of Statistics, Schaum's Publishing Series.
- (8) Croxton F.E., Cowden D.J., and Kelin S. (1973) : Applied general Statistics, Prentice Hall of India.
- (9) S.C.Gupta : Fundamentals of Mathematical Statistics, S.Chand Publication.
- (10) B.L.Agarwal : Programmed Statistics, New Age International Pvt. Ltd., New Delhi.

List of Equipments and Instruments required for a Batch of Students in U.G. Statistics Laboratory :-

- | | |
|--|----|
| (1) Twelve digit desk model electronic calculators | 20 |
| (2) Biometrika tables Vol.-I & II | 02 |
| (3) Seven figure logarithmic tables | 10 |
| (4) Statistical tables (compiled) | 10 |
| (5) Random Number Tables | 10 |
| (6) Personal Computer with Printer | 05 |
| (7) Statistical Poster and chart. | 02 |

20. COMPUTER SCIENCE**OR****20. COMPUTER APPLICATION****OR****20. INFORMATION TECHNOLOGY**

The examination in Computer Science will comprise One theory Paper and Practical examination for each semester. The theory paper will be of 3 Hours Duration and carry 80 marks. The Practical examination will be of 4 Hrs duration and carry 50 marks.

The distribution of marks in Practical examination is given as. :

- | | | |
|----|--|------------|
| 1) | Program writing / execution (on group A & B) | : 30 marks |
| 2) | Practical / Record | : 10 marks |
| 3) | Viva-voce | : 10 marks |

Total 50 marks

2S : Computer Science or**Computer Application or****Information Technology****Data Structure and Advance C**

UNIT-I : Introduction to Data structure, type of data structures, list, array, stack and Queue; Algorithms of traversing, insertion and deletion operation on it.

UNIT-II: Linked list & its implementation, traversing, insertion, deletion algorithms, circular Queue.

UNIT-III : Tree : Binary, Binary search tree, tree Traversing : inorder, preorder and postorder, sorting and searching Techniques : Bubble sort, insertion sort and selection sort, linear search, Binary search.

UNIT-IV : Function : Definition, prototype, local & global variable, function parameter, function calling and return, return values and their types, function recursion Arrays : Declaration and initialization of one and two dimensional arrays, function with array.

UNIT-V : String Handling : Declaring and initialization of string variable , operations on string : String copy comparison, concatenation. Pointers : Declaration and initialization, pointer and address arithmetic , Pointer comparison, Pointer and array.

UNIT-VI : Structure : Definition and declaration , initialization, array of structure , nested structure Union File Handling : Definition and opening a file, closing a file , I/O Operations on file :

fgetc(), fputc(), fputs(), fgets(), fputs(), fscanf(), fprintf(), fread(), fwrite().

Practical : Minimum 16 Practical based on

- A. Data structure using C Language
- B. C language covering aspectus of syllabus .

Study Tour : Study tour may be arranged to computer industry or software development organisation or software technology Park Or IT park

Hardware :

- I) List of Equipment :
 - a) No. of Computers 10 Nos. Desirable configuration
 - b) Printer - Minimum 2 Nos.
- II) Accessories
 - 1) Pen. Drives 2 Nos.
 - 2) Printer Ribbon / Tonner
 - 3) Stabilizer / UPS
 - 4) Internet facility

- Legal Software for the syllabus .

- List of books.

- 1) Introduction to Data structure : Tremble, Sorenson.
- 2) Introduction to Data structure : Bhagat Singh , Mops.
- 3) Fundamentals of Comp Algorithm : Horowitz & Sahani.
- 4) Introduction to Data Structure in C : Pearson.
- 5) Programming in C : E Balguruswami : TMH Publication.
- 6) Programming with C : Venugopal K.R. TMH, Publication.
- 7) Programming in ANSIC : Ramkumar and Rakesh Agrwal
- 8) Programming with C : Byson Gottfried , Schaum Series Publication.

21. COMPUTER APPLICATION (VOCATIONAL)

The examinations in vocational subject Computer Application will comprise of one theory papers and practical examination for each semester. The theory paper will be of 3 hours duration and carry 80 marks. The practical examination will be of 4 hours duration and carry 50 marks.

The distribution of marks in the practical examination will be as follows

- | | | |
|----|------------------------------------|----------|
| 1) | Practical based on computer lab I | 15 Marks |
| 2) | Practical based on computer lab II | 15 Marks |
| 3) | Viva Voce (based on lab.I & II) | 10 Marks |
| 4) | Record/Practical Journal | 10 Marks |

Total 50 Marks

Each unit of theory paper will carry two questions with internal options to solve any one question. Candidates are required to pass separately in theory and practical. The following syllabus is based in 8 theory periods and 4 practical periods (of 2 terms of 2 periods) per week.

2S -Computer Application (Vocational)

Html and 'C' Programming.

UNIT-I : Introduction to HTML: HTML History, Hypertext and Hypertext Markup Language, Microsoft Front Page, HTML tags and attributes : Adding tags, include attributes <HTML>, <HEAD>, <TITLE>, <BODY>, <P>,
, <HR>, Heading tags, table tags, <A>, <LINK>, , <ROWSPAN>, <COLSPAN>, <MARQUEE>, <BLOCKQUOTE>, list tag, Attributes : alignment, background colour, text colour.

UNIT-II: Basic text: paragraphs, line breaks, headings, strong and emphasized text. Typography: changing the font size, colour. Lists: numbered lists, bulleted lists, and definition lists.

UNIT-III: Images: using graphics on Web pages, uploading graphics, adding photos, making them small. Links: creating and using links, both internal (bookmarks) and external. Plus image maps and how to create them.

UNIT-IV : Arrays & Strings : Arrays - Declaration and initialisation of one and two dimensional array. String - String functions, string operations

Structure - Definition, declaration, initialisation, array of structure, nested structure, union.

Pointers - Declaration, initialisation, pointers and address arithmetic.

UNIT-V: Functions in C : Introduction, definition of function, function prototype, function calling, call by value, call by reference, return value and their types, function parameters, local and global variable, functions with array, pointers and functions, pointers as function argument, pointer to functions, function returning, pointers, function recursion.

UNIT-VI : File Handling : Prototype of file, opening and closing of file, I/O Operations on file: fgetc(), fputc(), fgets(), fputs(), fscanf(), fprintf(), fread(), fwrite() and simple programs on these function.

Random Access : fseek(), ftell(), rewind() Error Handling : feof(), ferror().

Books Recommended :

- 1) HTML 4 for Dummies Mastering by Ed Tittel, IDG Publications.
- 2) HTML 4 Unleashed, Professional Reference Edition by Rick Darnell
- 3) Instant HTML Programmer's Reference, 2nd Edition, HTML 4.0 version by Steve Wright
- 4) XML unleashed, BPB Publications.
- 5) Teach yourself XML in 24 hours, BPB Publications.
- 6) C Programming - Byron Gottfried - Schaum Outline Series
- 7) Let Us C - Y.P. Kanetkar - BPB
- 8) Programming in C - E.Balagurusami
- 9) C-Dennis Ritche
- 10) Programming in C - V.Rajaraman
- 11) Programming in ANSI C - Ramkumar and Rakesh Agrawal - TMH

PRACTICALS

Computer Lab.-I : Minimum 8 practical based on Unit-I,II and III

Computer Lab.-II : Minimum 8 practical based on Unit-IV,V and VI.

Study tour: Study tour may be arranged to computer industry, software development organisations, institute, software technology park, I.T. park.

List of equipments- (Minimum requirement) For Vocational Computer Application for B.Sc. Part I, II, III

- I. Hardware
 - a) Computer/Laptop -10 Nos.
Desirable configurations: Pentium-V, 128MB RAM, 40GB HDD, colour monitor, KBD, modem
 - b) Printer -2nos.
 - c) Inkjet Printer -1no.
 - d) Multimedia kit -1no.
- II. Accessories:-
 - 1) Pen Drives, CD,DVD
 - 2) Printer ribbon(Cartridge)
 - 3) Printer stationary-5000sheet
 - 4) Stabilizer/UPS
 - 5) Internet facility
- III. Legal Software required as per syllabus.
- IV. Other accessories be available based on syllabus.

22. ELECTRONICS

The examination in Electronics of Second semester shall comprise of one theory paper of 80 Marks of three hour duration and internal assessment of 20 mark .

The Practical examination of 50 marks will be held at the end of second semester of four hours duration.

At the time of practical examination every student has to perform one experiment.

Distribution of marks is as under :

1. Experiment
(Construction, testing and performance) ----- 30 Marks
2. Practical record -----10 Marks
3. Viva Voce----- 10 Marks

Semester II 2S-ELECTRONICS Digital Electronics

Unit I : Binary Arithmetic & Logic gates :

Binary, Octal & Hexadecimal number system and their inter-conversion, Binary arithmetic (addition and subtraction using 1's & 2's compliment), multiplication & division. Binary codes : 8421 BCD, Excess-3 & Gray code.

NOT, OR, AND, NAND, NOR gates (definition and truth table). EXNOR & EXOR gates, Half adder, full adder , 4 bit binary full adder.

Unit II : Boolean Algebra & Logic families:

Boolean laws, De-morgans theorem, Simplification of Boolean equations using Boolean algebra, Fundamental products & sum terms, K-map (K-map upto 4 variable).

Classification of logic families, characteristics (Fan-in, Fan-out, Noise immunity, Propagation delay, Power dissipation), DTL, TTL & CMOS logic.

Unit III : Multivibrators and Flip Flops:

Construction & working of Astable, monostable and Bistable transistorised multivibrators, RS, CK-RS, D, JK, JKMS and T Flip Flops (Logic diagram, Truth table, construction & working), Concept of edge trigger Flip-Flop, Concept of preset & clear terminal.

Unit IV : Counters and Shift registers:

Asynchronous & synchronous Counter, Up-down counters (up to 4-bits), modified asynchronous counter (Mod -7 ,Mod-10, and Mod-13).

Types of shift registers, SISO, SIPO, PISO & PIPO, IC version of Mod -10 shift registers (Construction & working), IC version of shift register 67495, Application of shift register. Ring counter, Johnson's counter.

UNIT V : Combinational logic circuit:

Encoder: Binary to BCD, Decimal to BCD, IC 74147, Decoder: 2 to 4 line, BCD to decimal, BCD to 7 segment, IC 7447, Multiplexer: 4X1, 8X1, De multiplexer: 1X4, 1X8, (Definition, construction, operation and application of above)

Unit VI : Semiconductor Memories:

Concept of memory, primary and secondary memory, classification of memories, volatile and non volatile memories, memory Hierarchy, semiconductor memory: RAM, ROM, PROM, EPROM, EEPROM, flash memory.

Books Recommended:

1. Digital and analog technique by Navneet, Kale and Gokhale (Kitab mahal prakashan)
2. Introduction to digital electronics by Mohinder Singh
3. Digital principle and application by Malvino and Leach
4. Modern digital electronics by R. P. Jain
5. Pulse, digital and switching waveforms by Millman and Taub

Practicals: Minimum Ten experiments at least one on each of the following aspects.

1. Half adder, full adder, code converter, Identification and verification of logic gates, 4-bit binary full adder(IC versions)
2. DeMorgan's theorems, K-map, TTL and CMOS logic, knowing characteristics of logic families.
3. Transistorized Astable, Bistable and monostable multivibrator, JK and JKMS flipflops, Data Flipflop, RS , CK RS Flipflop.
4. 4-bit binary counter, modifying counter, ring and Johnson's Counters (Using ICs), SISO, SIPO, PISO and PIPO.
5. Decoder, multiplexer, IC74147 mounting and testing.
6. Study of memories.

List of optimum apparatus required to perform the practicals for a batch of 16 students for the subject electronics for B.Sc. –Semester I/II/III/IV/V/VI/VII/VIII.

Sr.No.	Name of Apparatus	Minimum Quantity
1.	VTVM/FET VOM	05
2.	CRO Single Trace	05
3.	CRO DUAL TRACE	02
4.	Function Generators	10
5.	Frequency Counter	01
6.	RF Generator	01
7.	Digital Multimeter	05
8.	Multimeters	15
9.	AC Millivoltmeter	01
10.	Voltmeters	
	a) 0 - 1 V	02
	b) 0 - 5 V	06
	c) 0 - 10 V	10
	d) 0 - 15 V	06
	e) 0 - 30 V	02
11.	Ammeters	
	a) 0 - 100 mA	02
	b) 0 - 250 mA	04
	c) 0 - 500 mA	04
	d) 0 - 1 mA	04
	e) 0 - 5 mA	04
	f) 0 - 10 mA	06
	g) 0 - 20 mA	06
	h) 0 - 50 mA	06
	i) 0 - 100 mA	06
	j) 0 - 250 mA	02
	k) 0 - 500 mA	02
	l) 0 - 1A	02
12.	Stabilised D.C. Power Supply - 1A	
	a) 0 - 9 V	05
	b) 0 - 12 V	10
	c) 0 - 30 V	03
	d) 0 - 5 stabilised	07 for 78xx series.
	e) +15 V and -15 V	04
13.	Dimmerstat	02
14.	Table Lamp	02

15.	Resistance Boxes	10
16.	Rheostates	05
17.	Soldering Gun & Desoldering pump	08
18.	Wire metal and paste	500 gm & 1 pack each.
19.	Stop watch, Continuity Tester	03
20.	Microprocessor kits	10
21.	PC (Pentium- 4 with Printer)	01
22.	Microprocessor unit 8086	01
23.	Experimental boards of each expt. as per syllabus	01 each.
24.	All electrical & electronic tools each	01 of each type.
25.	bread boards	12
26.	Patch chords & sockets as per req.	
27.	Wires, buttons, fuses & other materials	-ö-
28.	Linear & digital IC tester boards each	01

LIST OF LOOSE COMPONENTS

1.	Registers - 1W (Mixed)	50 (pieces of each)
2.	Capacitors - 30V (Mixed)	10 (pieces of each)
3.	Inductors - (Mixed)	2 (pieces of each)
4.	Transistors	
	a) AC 127/128	
	b) BC 147/148	
	c) SL/HL 100	
	d) BC 107/108	15 pieces of each
	e) others if necessary	
5.	Diodes (Mixed)	15 pieces of each.
6.	UJT/SCR/Diac/Triac	05 pieces of each.
7.	Potentiometers (Linear and non linear)	
	a) 0 - 500	05
	b) 0 - 1K	10
	c) 0 - 2K	10
	d) 0 - 5K	08
	e) 0 - 10K	05
8.	Step down transformers	03 pieces each.
9.	ICs 741/3085/555	each 05
	723/78XX/79XX 74XX series	
10.	Other Miscellaneous components as per requirements.	
	for designing & construction	

23. BIOCHEMISTRY**2S BIOCHEMISTRY****Biophysical and Biochemical techniques.****UNIT-I : Concept of Bioenergetics:**

Principles of thermodynamics & their applications in biochemistry, introduction, thermodynamic systems, Laws of thermodynamics, concept of free energy, standard free energy, determination of ΔG of reaction, relation between equilibrium constant & standard free energy changes, standard free energy change in coupled reactions. Biological oxidation-reduction reactions-introduction, redox potentials, relation between standard redox potentials & free energy change (derivation & numericals involved).

UNIT- II: Acids, bases, buffers & biomembranes:

- A) Acids, bases & buffers: Concept of water as biological solvent, weak acids & bases, pH, buffers, Henderson-Hasselbalch equation, Physiological buffers, Principles of glass & reference electrodes, measurement of pH by indicators (liquid & pH papers) & pH meter.
- B) Biomembranes: Structure & characteristics of biological membranes, active & passive transport, Donnan membrane equilibrium, Dialysis & osmosis, Sedimentation velocity, preparative & analytical ultra centrifugation.

UNIT III: Chromatography:

General Principles & applications of

1. Adsorption chromatography.
2. Ion Exchange chromatography.
3. Thin layer chromatography.
4. Molecular sieve
5. Gas liquid chromatography.
6. HPLC
7. Affinity chromatography.
8. Paper chromatography.

UNIT-IV: Electrophoresis:

Basic principles of agarose & paper electrophoresis, PAGE, SDS-PAGE, 2-D electrophoresis & its importance, isoelectric focusing, western, southern & northern blotting techniques.

UNIT- V: Spectroscopic techniques:

Beers Lambert's law, Light absorption & its transmittance,

determination & application of extinction coefficient principles & application of visible & UV spectroscopic techniques. Principles & application of NMR, ESR, Mass spectroscopy, Fluorometry & flame photometry.

UNIT- VI : Immunological techniques & other analytical techniques:

- A) Immunological techniques: Immunodiffusions, immunoelectrophoresis, RIA, ELISA, Immunofluorescence.
- B) Isotopic tracer techniques, autoradiography, biological hazards of radiations, PCR.

2S PRACTICAL (SEMESTER-II) :**Section I: Colorimetry**

- a) Estimation of Carbohydrate by Anthron method.
- b) Estimation of RNA by Orcinol method.
- c) Estimation of DNA by Diphenylamine method.

Section II: Isolation of biomolecules from natural sources.

- a) Starch from potato/sweet potato.
- b) Casein from milk.
- c) Glycogen from liver.
- d) Total lipid from egg yolk by Folch method.

Section III: Demonstration of Analytical Techniques.

- a) Amino acid separation by Paper Chromatography.
- b) Separation of Sugars by Paper/Thin Layer Chromatography.
- c) Flame photometry for estimation of Na & K.
- d) Separation of serum proteins by Paper Electrophoresis.

Distribution of Marks for Practical Examination :-

A) Any one experiment from Section-I	10
B) Isolation of any one compound from Section-II	10
C) Performance of any one Technique from Section-III	15
D) Viva voce	08
E) Class work and practical record	07

Total 50 Marks

BOOKS RECOMMENDED : (Common for Semester-I & II)

- 1) Lehinger's Principles of Biochemistry (2000) by- Nelson, Cox, M.M. Macmillan, New York.
- 2) Fundamentals of Biochemistry (1999) by Donald Voet, Judith Voet, Charlotte Pratt, John Wiley & Sons, N. Y.

- 3) Biochemistry 3rd edition (1994) by Lubert Stryer WH Freeman and Co. San Francisco.
- 4) Outline of biochemistry (1987), Conn, Stumpf, Bruening, Doi, John Wiley & Sons, N.Y.
- 5) Text Book of Biochemistry by Dr.O.P.Agrawal.
- 6) Fundamentals of Biochemistry by J.L.Jain.
- 7) Essentials of Biochemistry by Dr.M.C.Pant.
- 8) Principles of Biochemistry Lehinger.
- 9) Text book of Biochemistry by West and Todd.
- 10) Practical manual in Biochemistry by Jairaman.
- 11) Essentials of Food and Nutrition, Volume I & II by Swaminathan.
- 12) Advanced Text Book of Food and Nutrition Volume-I & II by Swaminathan.
- 13) Text book of Biochemistry by Sucheta Dandekar.
- 14) Text book of Biochemistry by U.Sattyanarayan.
- 15) Physical Biochemistry (2nd Ed. 1985) by Vantolde K.E., Prentice Hall, INC, New Delhi.
- 16) Biophysical chemistry by Upadhyay, Upadhyay and Nath.
- 17) Physical Biochemistry (II ed. 1983) by D.Friefelder, WH Freeman & Co., USA.
- 18) Chromatography : A Laboratory handbook of chromatography and Electrophoretic Methods (IIIrd 1975), BY Erich Haffman, Van Nostrand Reinhold, NY.

24. MICROBIOLOGY

2S MICROBIOLOGY

Microbiology, Biochemistry, Biostatistics & Computers

UNIT I : VIRUSES

- i) Discovery of viruses
- ii) Structure of viruses
- iii) Classification of viruses (LHT System)
- iv) Replication of viruses ó Lytic cycle (T4), Lysogeny (Lambda phage)
- v) Cultivation of viruses ó Embryo culture, Tissue culture method .
- vi) Interferon

UNIT-II : MICROBIAL CONTROL

- i) Definition and Terms- Sterilization, disinfection, Antiseptic, Sanitizer, Germicide, Microbiostatis, Antimicrobial agent.

- ii) Mechanism of cell Injury - Damage of cell wall, cell membrane, Inhibition of metabolic reactions.
- iii) Physical Control :- Temperature, osmotic pressure, Radiation, filtration.
- iv) Chemical Control ó Chemistry and mode of action of halogens, heavy metals and their derivatives, Alcohols, Detergents and Gaseous Sterilization.
- v) Chemotherapeutic agents.- Definition and mode of action of penicillin , tetracycline, Norfloxacin

UNIT-III APPLIED ASPECTS OF MICROORGANISMS IN -

- i) Agriculture ó Biofertilizers & Biopesticides.
- ii) Human and Animal Health ó Antibiotics, Vaccines
- iii) Industry (Food, Chemical & Pharamaceutical) ó List of Microbial products (and producing organisms)
- iv) Environmental ó Biodegradation and Bioremediation.

UNIT-IV BASIC BIOCHEMISTRY –

- i) Carbohydrates ó Classification, different types of Glycosidic linkages eg- Maltose sucrose, Lactose, starch
- ii) Lipids ó Classification, concept of saturated and unsaturated fatty acids, outline of conjugated & derived lipids
- iii) Proteins ó Classification of Amino acids, concept of peptide bond , elementary concept of protein structure.
- iv) Nucleic acid ó Purine & pyrimidine bases, nucleotides , & nucleosides , structure of DNA, structure of RNA (mRNA , tRNA, rRNA)

UNIT-V : BIostatISTICS

- i) Importance & application ó Tabulation & Classification of data, Frequency distribution & graphical distribution of data.
- ii) Measures of central tendencies ó Mean , Mode, Median & their Properties
- iii) Co relation & their Linear regression ó Coefficient of correlation, linear least square Fit method of regression.
- iv) Hypothesis testing- (chi square test) x2 test, t-test
- v) Different models of data presentation with special reference to Biological samples.

UNIT-VI COMPUTER CONCEPTS :-

- i) Components of computer system ó Hardware, input devices, CPU, output devices , Monitor, software.
- ii) Memory concept- Computer memory primary & second-

- ary memory in computers
- iii) Window Operating systems :- Introduction graphical user interface systems, desktop menus, launching a program through start menu.
 - iv) MS-Word- creating, saving operating editing, closing a document, entering & editing texts.
 - v) Using Internet explorer , MS power point, creating e-mails.

Microbiology Practicals

- 1) Demonstration of viruses ó By plaque formation / chick embryo cultivation.
- 2) Effect of salt & sugar concentration , PH & Temperature on bacterial growth
- 3) Demonstration of oligodynamic action (copper, silver)
- 4) Anaerobic culture method ó by Anaerobic Jar method / RCMM.
- 5) Slide culture techniques for fungi
- 6) Determination of antibiotic resistance of bacteria.
- 7) Industrial utilization of yeast for fermentation activity
- 8) Word processing
- 9) Use of MS- Excel
- 10) Creating e-mail
- 11) Use of Internet
- 12) Statistical data processing
- 13) Microbiological study tour to visit Research centre,/ Institutions / Industries

Distribution of Marks

IInd Semester Microbiology Practicals

1.	Major Experiment	-	15 Marks
2.	Minor Experiment	-	10 Marks
3.	Viva óVoce	-	08 Marks
4.	Spotting	-	07 Marks
5.	Laboratory Journal	-	05 Marks
6.	Study Tour Report	-	05 Marks

Total 50 Marks

Note : List of books same as Semester-I.

25. FOOD SCIENCE

2S FOOD SCIENCE

NUTRITIONAL BIOCHEMISTRY OF FOODS

Maximum Marks 80

- UNIT-I** Nutritional Aspects of Protein.
 Digestion and Absorption of Protein.
 Biological Function of Protein.
 Types of Protein.
 Evaluation of Protein Quality.
 Effects of Deficiency of Proteins.
 Oxidation of amino acid.
 Conversion of amino acid to carbohydrates and fat.
- UNIT-II** Nutritional Aspect of Carbohydrates:
 Utilization of Absorbed Carbohydrates in the body.
 Oxidation of Carbohydrates (TCA cycle).
 Effects of Deficiency and Excess Intake of Carbohydrates.
 Study of Digestive System of Carbohydrates.
 Energy yielding from Glycolysis.
 Conversion of carbohydrates to fat and amino acids.
- UNIT-III** Enzymes: Introduction of Enzymes,
 Classification of Enzyme.
 Characteristics of enzymes.
 Enzymatic activity: name and functions.
 Factor Affecting Enzymes Action.
 Enzyme specificity.
 Role of Enzymes in Digestion and Absorption of Nutrient.
 Role of enzymes in various organs and digestive system: -
 digestion in mouth (salivary secretion, composition of saliva,
 function of saliva.), digestion in stomach (activity of gastric
 secretion- hydrochloric acid, hypo & hyper acidity), intestinal
 digestion(amylases).
- UNIT-IV** Classification of Lipids
 Function of Fats, Fatty Acids.
 Nutritional Aspects of Lipids
 Effect of Deficiency Fatty Acids.
 Effect of Excess of Fats and Lipids in Digestion and Absorp-
 tions Process.
 Role of Fat in the Body.
 Oxidation of Fatty Acid.

- UNIT-V** Vitamins and Minerals.
 Functions and general function of Vitamins and Minerals.
 Role of Vitamin and Minerals in Digestion and Absorption Process.
 Deficiency Symptoms of Vitamins and Minerals.
 Requirements of Vitamins and Minerals in all Age.

- UNIT-VI** Water
 Importance of Water in body.
 Role of Water in body.
 Analytical Biochemistry: Homogenization, Chromatography, Calorimetry, Spectrophotometry, Electrophoresis, Elisa.

Practical

1. Estimation of Starch.
2. Estimation of Protein by Biuret methods.
3. Estimation of Protein by Kjeldhal's methods.
4. Chromatographic separation of Amino Acid in Food Stuff.
5. Estimation of Ascorbic Acids
6. Estimation of Iron.
7. Estimation of sugar by Layne Eynon method.
8. To determine Saponification value of Oil.
9. To determine Iodine value of Oil.
10. Estimation of Fiber.
11. Determination of Achronic point of salivary amylase.
12. Estimation of glycine by formal titration.

List of Books (Common for Semester-I & II)

1. Chemistry, 4th edition, John McMurry, Pearson Education
2. Food- Nutrition and Health, Vijaya Khader; Kalyani Publishers.
3. Food and Nutrition Volume I & II; Dr. M. Swaminathan; Bappco.
4. Nutrition Science; B. Srilakshmi; New Age International Publisher.
5. Fundamental of Biochemistry; Dr. A. C. Deb; Center Book Agency.
6. Fundamental of Biochemistry; J.L. jain, Sanjay Jain; C. Chand.
7. Textbook of Biochemistry; Dr. Mn Chatterjee, Dr. Rana Shinde; Jaypee Brothers.
8. Analytical Chemistry of Foods ; C. S. James; Blackie Academic & Professional.
9. Food Science; Sumati R. Mudambi, Shalini M. Rao; New Age Intertional (p) Limited .
10. Handbook of Analysis and Quality Control For Fruits and Vegetables 2nd Edition ; S. Ranganna.

11. Food Science & Nutrition; Sunetra Roday; Oxford University Press.
12. Food Facts & Principle; Shakuntala Manay, M. Shadaksharaswamy; New Age International (p) Limited.
13. Laboratory Techniques in Food Analysis; D. Pearson; Butterworths.
14. Principle of Biochemistry; Lehninger.
15. Textbook of Biochemistry; G. R. Agrawal.
16. Food Chemistry; L. H. Meyer.
17. Food Science; N. N. Potter.
18. Nutrition & Dietetics 1st and 2nd Edition; Subhangini Joshi.
19. Therapeutic Nutrition ó Robinson Normal.
20. Nutritive Value of Indian Food; Dr. C. Gopalan NIN Hyderabad.
21. Basic principle of nutrition; Seema Yadav, pub. Anmol publication pvt New Delhi (1997)
22. Introduction to biochemistry, second edition; John, W. Suttie, pub., Holt-Saunders publication.
23. Biochemistry volume3 ; S. K. Dasgupta, The Macmillan company of India(1978)
24. Elements of biochemistry; H.S. Shivastav, pub., Rastogi fourth edition (2001)
25. Analytical Practical Biochemistry by Plummer, Academic Press.
26. Practical Biochemistry by J.Narayan.
27. Food & Nutrition, Nikhilesh Kulkarni, Mahendra Deshpande, Himalaya Publishing House.

26. INDUSTRIAL MICROBIOLOGY

2S Indsutrial Microbiology

Fermentation Equipment and Techniques

UNIT-I : 1. Basic Fermentor design:

Parts and their functions of Conventionalstirred tank fermentor

2. Fermentor Configurations

- (a) Tubular Fermentor
- (b) Fluidised bed fermentor
- (c) Bubble Cap fermentor

UNIT-II: Instrumentation and control:

- a) Basic concepts of control systems
- b) Designs and working principles of instruments and systems for control of ó temperature, pressure, foam, pH, redox potential, oxygen tension (DO), exit gas analysis, medium composition analysis

UNIT-III: Instrumentation in Industrial Laboratory :**(1) Principle , Working and Applications of Instruments in Industry:**

- a. pH meter
- b. Colorimeter/Spectrophotometer
- c. Polarimeter
- d. Chromatography

(2) Computerisation in Industries-

- (i) Introduction
- (ii) Applications of computers in fermentation technology ó data logging, data analysis, process control
- (iii) Practical implementation of basic computer control strategies for enzyme production.

UNIT-IV: Methods of recovery and purification of fermentation products

- a) Precipitation, filtration and centrifugation
- b) Cell disruption
- c) Liquid-liquid extraction and solvent recovery
- e) Chromatography ó adsorption, ion exchange, gel, affinity.
- f) Distillation
- g) Cr ystallisation

UNIT-V : Detection and Assay of fermentation products-

- a) Physical and Chemical assays
- b) Biological assay of Vitamins and Antibiotics

UNIT-VI : Fermentation Economics-

Fermentation economics with respect to raw material, production process, recovery process and product economics, product patenting

Practicals :- Semester-II

1. Primary screening of:
 - a) Amylase producers
 - b) Protease producers
 - c) Antibiotic producers
2. Demonstration of antimicrobial activity of actinomycetes by the Giant Colony technique
3. Separation of amino acids, sugars, organic acids by paper and thin layer chromatography.
4. Demonstration of basic fermentation process :- Yoghurt, bread and idli.
5. Industrial Study tour.

The distribution of marks in practical shall be as follows :

- | | | |
|----|----------------------|---------------------|
| A) | Two short experiment | -20 marks (10 Each) |
| B) | One long experiment | -15 marks |

- | | | |
|----|------------------------------|-----------|
| C) | Viva voce | -10 marks |
| D) | Industrial Study Tour Report | -03 marks |
| E) | Practical Record | -02 marks |

Total -50 marks

List of Reference Books :-

1. Quantitative Bioassay ó D. Hancroft, T. Hector and F. Rowell. John Wiley & Sons for Analytical Chemistry by Opening Learning (ACOL) series.
2. Microbial Technology, Volumes I & II ó H. J. Peppler. Academic Press
3. Isolation Methods for Microbiologists, Volumes I & II ó Gibbs and Shapton, Academic Press.
4. Industrial Microbiology by A.H.Patel
5. Industrial Microbiology ó L. E. Casida Jr. John Wiley and Sons.
6. Experimental Microbiology ó R. J. Patel and K. R. Patel, Aditya Publishers, Ahmedabad
7. A Compendium of Good Practices in Biotechnology ó Biotol Series
8. Principles of Fermentation Technology ó Stanbury and Whitaker. Pergamon Press.
9. General Microbiology ó R. Y. Stanier and other s. Macmillan Press Ltd.

27. BIOTECHNOLOGY (Regular / Vocational)**2S-BIOTECHNOLOGY****(Microbiology)****UNIT I : Scope and importance of Microbiology:-**

Size, shape and arrangement of bacteria, Typical bacterial cell. Microscopy : Resolving power, Numerical aperture, Optical, TEM and SEM.

Staining techniques : Simple, Gram, Negative, Acid fast and Endospore staining.

Sterilization methods : Physical and chemical.

UNIT II : Microbial cell Structure:

Cell wall, Cytoplasmic membrane, and flagella.

Nutritional classification of microorganisms on the basis of carbon and energy source (Autotrophs, Hetrotrophs, Phototrophs and chemotrophs)

Classification of bacteria according to Bergey's Manual of Sys-

tematic Bacteriology

Microbes in extreme environment (Thermophiles, Halophiles, and Methanogens)

UNIT III: Microbial Metabolism:

Energy production by aerobic and anaerobic processes, (Glycolysis, Krebs cycle, Electron transport chain, Fermentation, and Photosynthesis)

Microbial Associations: Symbiosis (Rhizobium, Mycorrhiza), and Antibiosis,

Nitrogen fixing microorganisms in agriculture : (Azotobacter, Rhizobium, Cyanobacteria)

UNIT IV: Industrially useful Microorganisms:

Fermentation industry : (Saccharomyces cereviceae, and Lactobacillus)

Antibiotic Industry : (Penicillium and Streptomyces)

Enzyme Industry : (Aspergillus)

Food Industry: Cheese production (Penicillun roquefortii)

Biofertilizers : (Azotobacter, Rhizobium, and PSB)

Single cell protein : (spirullina)

UNIT V: Pathogenic microorganisms:

Elementary knowledge of diseases caused by bacteria (Typhoid, Tuberculosis, Cholera), viruses (AIDS, Polio, Hepatitis) and fungi (Dermatophytes)

Mycoplasma: structure, pathogenicity and laboratory diagnosis.

Host parasite relationship.

Host defense mechanisms against microorganisms (Non specific and specific)

UNIT VI: Basic techniques in Microbiology:

Spectroscopy (Beer Lambert's law, Components, working and applications of Colorimeter, and UV- VIS Spectrophotometer)

Chromatography; (Paper, and Thin layer)

Electrophoresis; (Paper and Gel)

Role of Radioactive isotopes in Biotechnology

Practicals

1. Cleaning of glasswares, preparation of media, cotton plugging & sterilization.
2. Isolation of microbes from different environments (water, soil, air, human body and plants)

3. Enumeration of microorganisms by Standard plate count.
4. Identification of isolated bacteria : (Simple, Gram , Endospore, and Negative staining)
5. Biochemical characterization of micro organisms (Sugar fermentation and IMViC test)
6. Growth curve of microorganisms.
7. Antibiotic sensitivity of microbes by disc diffusion method.
8. One step growth of bacteriophage.
9. Alcoholic & mixed-acid fermentation.
10. Isolation of microorganisms from leaf.
11. Isolation of Rhizobium from root nodules.
12. Study tour / Visit to laboratories /Industries

Distribution of Practical Marks :-

(1)	Major Experiment	12 Marks
(2)	Minor Experiment	08 Marks
(3)	Spotting	10 Marks
(4)	Viva	10 Marks
(5)	Practical Record	05 Marks
(6)	Study Tour/Visit	05 Marks

Total 50 Marks

Reference Books (For Sem-II)

- 1) Microbiology-Pelczar
- 2) General Microbiology ó Stanier
- 3) General Microbiology, Vol.I and II-Powar and Dagainawala
- 4) General Microbiology- Sulia
- 5) Textbook of Microbiology-Ananthanarayan
- 6) Text book of Microbiology- Dubey and Maheshwari
- 7) Elementary Microbiology Vol. I and II ó H.A. Modi
- 8) Stains and staining Procedures-Desai and Desai
- 9) Experimental Microbiology-Rakesh Patel
- 10) Experimental Microbiology-Dubey and Maheshwari

28. BIOINFORMATICS

2S-BIOINFORMATICS

Computer Fundamentals and Operating Systems

UNIT I : Introduction to Computers: Characteristics, classification of computer block Diagram of computer, Memory: Types of memory, RAM, ROM, PROM, EPROM, I/O devices: keyboard, mouse, floppy disk, monitor, compact disk.

Printers: Impact, Non-Impact, dot matrix, inkjet, laser Interpreter, compiler, Assembler.

Introduction to Number System: Decimal, binary, octal, hexadecimal codes ASCII, EBCDIC.

UNIT II: Windows: Introduction, features, desktop: Background screensaver, Customizing desktop, creating, moving, deleting Icons.

Windows Explorer Copying, renaming, moving, deleting, operations on files and folders.

My computer, My documents, control panel : Mouse, printer, date and time.

MS-Word: Introduction to word, features, page setup, views, text formatting, Auto correct, spell check, grammar, table, tabs, indentation mail merge, print Preview, printing of document, hyperlink.

UNIT III : MS- EXCEL: Introduction, features, creating and formatting worksheet, Inserting data, entering mathematical formulas and functions, autofill,

Graphs: Type of charts, creating, moving charts, (column, bar, & pie)

Introduction to Internet: Types of Internet connection: Direct, dial-up, Protocol : TCP / IP, FTP, HTTP. Domain name, Electronic mail address, word Wide web, search engines, browser: Internet Explorer.

UNIT IV : Based on Unix operating system: Overview of unix O.S., Unix file system, Data structure for process and memory management, process states and state Transition diagram, process scheduling, memory management, Executing and Terminating program in unix. Unix commands: pwd, cd, ls, mv, ln, cp, mkdir, rm, rmdir, du

UNIT V : Based on Linux operating system : Design principal, kernel modules, Process management, scheduling, memory management, file system, Inter Process communication, security.

UNIT VI : Networking : Needs and objectives, LAN- Introduction, classification, topology.

Topologies ó Bus, Tree, Ring, Star, Hybrid, WAN, MAN.

Communication Protocols ó Purpose, OSI model, Client Server Architecture.

Practical-II : Computer Fundamentals and Operating Systems :-

1. Use of Windows operating system (Notepad, WordPad, Calculator, Paint)
2. Use of Linux (basic commands)
3. Creating word file by using paragraphs, alignments
4. Create and print file using mail merge.
5. Working with spread sheet (all operations on cell like merging.)
6. Using function wizard.
7. Calculate regression and correlation use excel.
8. Using different distribution.
9. Creation of presentation.
10. Practicals on Unix basic commands.
11. Practicals based on internet.

Distribution of Practical Marks :-

(1) Two Program Writing/Execution	30 Marks
(2) Practical Record	10 Marks
(3) Viva-voce	10 Marks

Total 50 Marks

Books Recommended

11. Practicals based on internet.
1. Computer fundamentals: B. Ram, Nas Age publication.
2. A first course in computer: Sanjay saxena
3. PC Software: Taxali R.K.
4. Fundamentals of computer: V.Rajaraman, PHI Publication.
5. Information Technology: Alexie and Mathews, Vijay Nikole Publiucation.
6. IT Tool and Application: Alexie and Mathews, Vijay Niklole publicaton.
7. Operating system by: Achut S. Godbole Tata megrow Hill publication.
8. Operating system concept, sixth edition by silberschutz, Galvin, Gagne Wiley publication.

9. Computer Fundamentals, Pradeep K. Sinha. BPB Publication.
10. ABC of LAN ó Michel Doprtch (BPB)
11. Local Area Network ó Keiser - TMH

List of Equipments : (For Sem I & Sem II)	Quantity
(1) PC Pentium IV (1 PC for 2 students)	
(2) Legal Software Windows-XP.	01
(3) Legal Software Visual Studio	01
(4) PC based Unix O.S. Legal Software	01
(5) Printers	
(i) 80 Column Dot Matrix	01
(ii) Inkjet Printer	01
(6) LCD Projector	01
(7) Broad Band Connection.	01

29. APICULTURE

The examination in Apiculture will comprise of one theory paper to each semester of 100 marks each which include 80 marks for theory and 20 marks for internal assessment and practical of 50 marks. Each theory paper shall be of 3 hours duration and practical of 6 hours duration. The syllabi is based on 6 theory periods and 6 practical periods per week.

2S-APICULTURE

(Bee Botany, Pollination, & Melato Palynology)

- UNIT-I :** Introduction to Bee Botany :- Plant kingdom; morphology of flowering plant pollination & fertilization development of embryo & fruits. Floral structure & floral biology, elementary physiology of nectar, nectar secretion, nature, composition. Elements of classification & identification of important plant.
- UNIT-II: Bee Plants :-** Functional Classification of local bee, plants flora, wild, cultivated, annuals, permanent agricultural, horticultural, crops ornamental, road side avenue trees relative evaluation of bee plants, major & minor species, nectar & pollen species.
- UNIT-III:** Floral Calender :- Flowering sequence, succession, formulation of local floral calender, period of major honey flow, floral gaps during annual cycles, plant poison toxic to bee, poison honey, important bee plants of India.
- UNIT-IV:** Mellitto Palynology :- Pollen basket of florage, bees comb cells used for pollen storage, preparation of pollen side, pollen morphology, morphological characteristic of pollen types, Identification of floral source, types of pollination, pollinating

agents, importance of honey bee among other pollinating bees.

UNIT-V: Bee Pollination :- Definition, Self and cross pollination, pollinating agents.

- UNIT-VI:** (A) Methods of collecting bee pollination, migration of honey bee colonies for pollination, placement in farm & orchids, management of colonies during pollination, farmer bee keeper relationship. Effect of insecticide on honey bee, preventive measures to be taken. Economics of planed pollination by honey bees. Wild bees used for pollination.
- (B) Nector to Honey :- How bees make honey, general comption of honey.

B.Sc.Part-I (Appiculture) Semester-II Practical-II

Practicals :-

1. To study the structure of flower.
2. Study of selected bee plants.
3. Study of pollen grains.
4. Preparation of pollen slides.
5. Study of nector.
6. Study of plant toxic to bees.

Field Study :-

1. Preparation of floral calender.

Distribution of Marks :-

1. Identification and comments on important bee plants (four)	16
2. Study of structure of flower	10
3. Pollen slide preparation.	05
4. Floral Calender	05
5. Field Diary	05
6. Practical Record	05
7. Viva-voce	04

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Total 50

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List of Reference Books :- Semester-I & II

- 1 First lesson in Beekeeping-Dadant C.D. Malliton, Illinois.
- 2 Honey a Comprehensive survey Pub.- Heinemann (London) & International Bee Research Association England.
- 3 Value added products for Beekeeping- Food and Agriculture

- Organisation United Nationa Bulletin No.124.
- 4 Studies in Chemistry of Indian Honeys & Bee Waxes. Thesis for M.Sc. degree submitted to Botany Uni. Phadke R.P.
 - 5 Investigation on Indian Honey bee products
 - 6 Beekeeping in Integrated Mountain Development-Economic & Scientific perspective Publication.
 - 7 Beekeeping-Teach yourself Books, By-Vernon F. (1984)
 - 8 The Chemistry and Technology of Waxes Reinhold publication Corpn. N.Y.
 - 9 ~~Hand Book of Beekeeping (2nd Edition) By Dr. J. R. F. Jones, London, 1962.~~
 - 10 ~~Hand Book of Beekeeping (2nd Edition) By Dr. J. R. F. Jones, London, 1962.~~
 - 11 A.B.C. & X Y Z of Bee culture 39 edition A.Y.Root & Co America
 - 12 The hive & the Honey Bee-1975, 4th Edition, Dadant Publication, America
 - 13 Bees their vision, chemical senses & language-1950, Cornel University Press ó By ó Fon frish, & Karl.
 - 14 Honey bee Biology 1982-By Free & Johnson & Central Association of Bee Keepers England
 - 15 The social Behaviour of the Bees 1974-By Missioner C.D.
 - 16 Beekeeping in India 1962, 82 Sardar Singh- ICAR, New Delhi
 - 17 Technical Bulletins-C.B.R.T.I. Pune
 - 18 Beekeeping By-E.F.Phillips. Agrobios (India) Publication
 - 19 Hand Book of Beekeeping-By Dharamsingh, Devendra Pratap Singh-Agrobios.
 - 20 Technology & Value addition & Honey-Dr.D.M.Wankhale & K.D.Kamble, C.B.R.T.I. KVIC Pune
 - 21 Extracted Honey-specification (Second Rev.) I S 4941; 1994, BIS New Delhi
 - 22 Technology & Honey Bull-R.Borneeke & Gronnet
 - 23 Anatomy of Honey bee R.E.Snodgrass.
 - 24 Beekeeping in India Sardar Singh

Required Equipments :- Semester-I & II

1. Bee hives (Cerana Malifera)
2. Bee specimens
3. Hive tools
4. Honey extraction unit
5. Wax extraction unit
6. Microspace

30. Forensic Science

2S Forensic Science (Forensic Chemistry)

The examination in Forensic Science of Second semester shall comprise of one theory paper, internal assessment and practical examination. Theory paper will be of 3 Hrs. duration and carry 80 marks. The internal assessment will carry 20 marks. The practical examination will be of 4 to 6 hours duration and carry 50 marks.

The following syllabus is prescribed on the basis of six lectures per week and 6 practical periods per batch per week. Each theory paper has been divided into 6 units. There shall be one question in every unit with internal choice for each of 12 marks & one compulsory question covering all the syllabus of Semester-I (8 marks).

Total Lectures: 84

Marks: 80

Note: Figures to the right hand side indicate number of lectures.

Unit I

14L

A) Qualitative-Quantative Analysis

[5L]

Organic - inorganic products - oils, paints, petroleum products, cement.

B) Forensic Chemistry

[5L]

Screening, sampling-methods type (collection), statistical method, different standard methods, Inorganic analysis, Micro-chemical methods for forensic analysis.

C) Miscellaneous

[4L]

Characteristics/examination/act/organic-inorganic products-Gold, silver, tobacco, milk, coffee, tea, sugar, salts, fertilizers, dyes, drugs, paints, fats, various acts (legal aspects).

Unit II: Separation and detection technique

14L

Gas chromatography: Theoretical principles, instrumentations and technique, columns, stationary phases, detectors, Forensic applications. **HPLC:** Review of theory, Instrumentation, Technique, column, detectors, LC-MS, Forensic applications. **Atomic Absorption Spectroscopy and Flame spectrometry** - Theory and Forensic applications.

Unit III: Forensic Toxicology

14L

Introduction and concept of forensic toxicological examination and its significance. **Poisons:** (Plant Poison, Animal Poison, Metallic Poison) classification of poisons, types of poisoning, collection and preservation of toxicological exhibits in fatal and survival cases, signs and symptoms of poisoning, mode of action and its effect on vital functions, medico-legal and post mortem examination report/finding studies, specific analysis plan/approach to toxicological

examination of poisoning samples, excretion of poisons, detection of poisons on the basis of their metabolic studies, interpretation of analytical data and forming of opinion.

Unit IV: Narcotic Drugs and Psychotropic Substances 14L

Analysis of Narcotic Drugs and Psychotropic Substances, Drug effects, drug Hazards, Tolerance and dependence of drugs, Problems of drug addiction, Identification of drug addict, Drug addicts and crimes, Classification of Narcotics and other drugs, Analytical techniques for identification of drugs. Types of Pharma drugs, Steroids, Forensic Pharmacological studies, Ingestion of drugs, absorption, distribution, metabolism, pathways of drug metabolism, drug metabolism and drug toxicity, excretion of drugs.

Unit V: Study of Analysis of Beverages 14L

Introduction, Definition of alcohol and illicit liquor, Alcoholic and non-alcoholic beverages and their composition, Proof spirit, absorption, de-toxication and excretions of alcohol, problems in alcohol cases and difficulties in diagnosis, Alcohol and prohibition, Consequences of drunken driving, Analytical techniques in the analysis of alcohol and other articles. Case study.

UNIT VI: Miscellaneous Topics 14L

Arson: chemistry of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental methods: Management of Arson cases. **Food adulteration:** Introduction, Prevention of food adulteration, Analytical techniques for analysis of exhibits involved in food and other material cases. **Relevant provision of:** 1. Prevention of Food Adulteration Act 1954 (Definition, Power of Food Inspector, Offences and Penalties), 2. Narcotic Drugs & Psychotropic Substances Act 1985 (Definition, Licit Opium Cultivation, Minimum and Commercial Quantity in Narcotic Drugs, Offences and Penalties), 3. Prevention of Illicit Trafficking in NDPS Act 1985 (Detention of a Person Under the Act), 4. Drugs Control Act 1940 (Definition, Power of Chief Commissioner Under the Act), 5. Drugs & Cosmetics Act 1945 (Definition, Adulterated, Misbranded, Spurious Drugs and Cosmetics, Offences and Penalties).

Semester- II

2S Forensic Science (Forensic Chemistry)

Total Laboratory sessions: 21

Marks: 50

List of Practicals :

1. Identification of food adulteration - vegetable oil, Cold drinks etc. (2nos).
2. Quantitative or qualitative study of drug opiates. (2 nos).
3. Examination of fire arson cases by GC, TLC. (1 nos).

4. Detection and determination of various adulterants in alcohol, by colour tests. (Qualitative analysis) (2 nos.).
5. Analysis of Jaggery samples.
6. Qualitative Test for Examination of Ethyl Alcohol in Human Blood.
7. Detection of Inorganic Poison As, Hg, Cu, Ba, PO_4^{3-} etc.
8. Colour Tests for identification of poisons, drugs. (2 nos).
9. Plant, animal, Metallic poison analysis. (2 nos.).
10. Quantitative Estimation of Zinc Phosphate.
11. Separation of Sampling Material by TLC (drugs, poison etc.) (2nos).
12. Study of Steroids (separation by TLC).
13. Examination of chemicals used in Trap cases by UV-visible spectroscopy. (2 nos)
14. Analysis of Molasses Samples.
15. Analysis of Medicinal and Toilet preparation samples.
16. Analysis of French Polish.
17. Analysis of Ammonium Chloride and Sodium Chloride Mixture Samples.
18. Analysis of Soft Drinks.
19. Analysis of Diesel.

Distribution of Marks for Practical Examination :

Time: 4 – 6 hours

Marks: 50

Exercise- I	í í í ..	12
Exercise- II	í í í ..	12
Exercise- III	í í í ..	12
Viva-Voce	.í í í .	07
Record	.í í í .	07
	ô ô ô ô ô ô ô ô ô	
Total:		50

Books Recommended:

1. Instrumental Analysis by Skoog, Holler and Crouch.
2. Instrumental Method of Chemical Analysis. Chatwal & Anand, Himalya Publication.
3. Advance in Chromatography by Brown P. R.
4. Introduction of Forensic Science in Crime Investigation by Dr. (Mrs.) R. Krishnamurthy.
5. Howard: Forensics Analysis by Gas Chromatography.
6. Methods in Toxicology Anmol Publication, New Delhi (1998) by Prakash M. et.al.
7. The basic Science of Poisons Casarett & Doll Toxicology,
8. Instrumental Methods of Analysis, Willard H. H. et. al : 1974.
9. Hand book of drug and alcohol abuse by Holmann, F. G.

10. Bare Acts with short notes on the following : Narcotic Drugs & Psychotropic Substances Act, Drugs & Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Arms Act, Wild Life Protection Act
11. Practical Books : Physical Chemistry Practicals by J.B. Yadav.
12. Qualitative Analysis by Vogel.

31. Renewable Energy

2S-Renewable Energy

Fundamentals of Electricity

- Unit I :** **Electric Network:** Network elements: branch, junction, node, mesh. Network Laws: Kirchoff's laws, Thevenin's theorem, Power in electric circuit, unit of power, power in pure resistive circuit, Maximum power transfer theorem,
Energy sources: Voltage source, Current source. Combination of Sources: voltage and current sources, Voltage source series combination, current source series combination. Voltage source parallel combination, current source parallel combination, numerical.
- Unit II:** **Electromagnetic Induction :** Relation between Magnetism and Electricity-Production of Induced E.M.F. and Current-Faraday's Laws of Electromagnetic Induction- Lenz's Law-Induced E.M.F. -Self-Inductance-Coefficient of Self-Inductance (L)-Mutual Inductance-Coefficient of Mutual Inductance (M)-Coefficient of Coupling-Inductances in Series and Parallel, Transformer construction, working, applications and losses.
- Unit III:** Magnetic Hysteresis- Area of Hysteresis Loop Properties and applications of Ferromagnetic Materials, Permanent magnet materials, Hysteresis Law-Energy Stored in Magnetic Field, Rate of Change of Stored Energy, Transient Current: Rise and decay of current in series LR, CR Circuits.
- Unit IV :** **Elements of Electro-mechanical Energy Conversion:** Introduction, Salient aspects of conversions, Energy- Balance, Magnetic-field System; Energy and Co-energy, A Simple Electromechanical System, Energy in Terms of Electrical Parameters, Rotary Motion, Dynamic Equations and system-model of a simple system.
- Unit V:** **A C Fundamental** - A.C. Through Resistance, Inductance and Capacitance, A C applied to LR, CR and LCR circuits, , power consumption in ac circuit, Apparent Power, Power factor, Power consumed in pure inductive and capacitive circuit, Resonance in

LCR Circuits, Graphical Representation of Resonance, Sharpness of Resonance Curve, Q-Factor of a Series Resonant Circuit, Parallel A.C. Circuits, Bandwidth of a Resonant Circuit.

Unit VI: Primary and Secondary Batteries, Classification of Secondary Batteries based on their Uses, Classification of Lead Storage Batteries, Parts of a Lead-acid Battery, Electrical Characteristics of the Lead-acid Cell, Application of Lead-acid Batteries, Battery Ratings, Indications of a Fully Charged Cells.

Reference Book:

1. Text Book of 'Electrical Technology' Vol. II, B.L. Theraja & A.K. Theraja, S. Chand Publications.
2. 'Electrical Machines' by P. S. Bhimbra.
3. Energy Demand and Supply, (Stathis) Michaelides, Efstathios E. Springer Germany, 2012
4. Solar Electricity Handbook - 2012 Edition: A Simple Practical Guide to Solar Energy - Designing and Installing Photovoltaic Solar Electric Systems, Michael Boxwell, Greenstream Publishers, 2012
5. Photovoltaics: Design and Installation Manual, Solar Energy International, 2012
6. Solar Electric Handbook: Photovoltaic Fundamentals and Applications, Solar Energy International, 2012
7. Electrical Technology, Naidu-Kamakshiah, Tata McGraw-Hill Education, 2006
8. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI Learning Pvt. Ltd., 2005
9. A Text Book of Electrical Technology, B.L. Theraja, S. Chand Limited, 2008
10. Photovoltaic: Design and Installation Manual, Solar Energy International, 2012

Practical

1. Simulation of Hysteresis Loop on the CRO
2. Characteristics of LVDT
3. Characteristics of Current Transformers and Potential Transformers
4. Power measurement using current transformer & potential transformer
5. Power factor improvement with capacitor banks
6. Testing of energy meters

32. Animation**2S : Animation****Fundamentals of Graphics**

Unit-I : **Adobe Photoshop:** concepts of graphics, file menu basic of layers, selection, move, lasso, magic wand, crop, etc. (study of all tools expected).

Unit-II: All types of paint tools like air brush, custom shapes, quick mask, notes, audio annotation tools, masking, path, etc.

Unit-III: Working with layers, applications of masking to matting (study of all menus related to layers); image menu, color correction, scanning, filters, creating backgrounds & textures for website, slice tools, web related concepts. Creation of a simple web and presentation graphics, file automate options, video editing techniques.

Unit-IV : Adobe illustrator: Concepts of graphics designing, interface, basic shapes, all types of menus like file menu, edit, view, select, group/ungroup, lock, hide/show, etc.; File/outline, gradients, patterns, symbols, styles, swatches, mesh tool, paint brush. Creating a greeting card, etc.

Unit-V: Deformation tools, symbols tools, redrawing or cartoon making, type tools and type menus.

Unit-VI : Use of different tools like path, envelop, clipping and crop mask, etc; filters and effect menus, exporting document, idea of printing, setting bleed, idea of PDF technology.

Practicals : Minimum eight experiments based on above contents are to be performed.

Recommended Books :

1. Recommended Text Books: Digital fashion illustration with Photoshop and Illustrator by Kevin Tallon; Published by Batsford 2008.
2. Reference books: Real word Adobe Illustrator CS4 by Mordy Golding; Published by Pretence-Hall of India, 2008.
3. Creative Suite 3 integration: Photoshop, Illustrator by Keith Martin; Published by Pretence-Hall of India, 2008.
4. Special edition using Adobe Photoshop 7 by Peter Bauer, Jeff Foster; Published by Pretence-Hall of India, 2008.

The Concerning teachers are also suggested to use other relevant material available on the net, to update the knowledge of the students.

Following are the recommended links, for further search-

- 1) www.tatamcgrawhill.com
- 2) www.books.google.co.in
- 3) www.penguinbooksindia.com

- 4) www.bookcafe.in
- 5) www.newindianbooks.com
- 6) www.newasiabooks.org



Thursday, the 27th June, 2019

NOTIFICATION

No. 56 / 2019

Date: 27/6 /2019

- Subject : I) Introduction of new syllabi for the subject Geology at B.Sc. Part-III (Sem. V & VI) level, which to be implemented from the academic session 2019-20.**
II) Introduction of new syllabi for B.Sc. Part-III (Semester-V & VI) Computer Science / Computer Application/ Information Technology/Computer Application(Vocational)which to be implemented from the academic session 2019-20.

I) It is notified for general information of all concerned that the authorities of the University has introduced new syllabi for the subject Geology at B.Sc. Part-III (Sem. V & VI) level, which to be implemented from the academic session 2019-20. Hence, the page Nos. 42 to 46, appearing in prospectus No. 2016123 be substituted respectively by the **“APPENDIX-A”**, which is appended with this notification.

II) It is notified for general information of all concerned that the authorities of the University has introduced new syllabi for B.Sc. Part-III (Semester-V & VI) Computer Science / Computer Application/ Information Technology/Computer Application(Vocational), which to be implemented from the academic session 2019-20. Hence, the page Nos. 88 to 97, appearing in prospectus No. 2016123 be substituted respectively by the **“APPENDIX-B”**, which is appended with this notification.

Sd/-
(Dr. T.R.Deshmukh)
Registrar,
Sant Gadge Baba Amravati University

APPENDIX-A

SYLLABI PRESCRIBED FOR B.SC. FINAL TO BE IMPLEMENTED FROM THE A.S. 2019-20

SEMESTER- V

5S : GEOLOGY

ECONOMIC GEOLOGY AND MINERAL EXPLORATION

- UNIT I :** Economic geology: Introduction, purpose and scope; Metallic and non metallic minerals, ore, ore deposits, gangue minerals, tenor and grade of the ore; Processes of ore formation, types of deposits, distribution of mineral deposits in space and time, metallogenic epochs and provinces, geological thermometers; Classifications of mineral deposits, magmatic concentration deposits, contact metasomatic deposits.
- UNIT II :** Sedimentary deposits, hydrothermal deposits (cavity filling and replacement), evaporation deposits, colloidal deposits, residual and mechanical concentration deposits, oxidation and supergene sulphide enrichment deposits, metamorphic and metamorphosed deposits.
- UNIT III :** Mineralogy, properties, uses, origin, mode of occurrence, types of deposits, geological and geographical distribution in India of the metallic mineral deposits like gold, iron, copper, lead, zinc, manganese, aluminium and chromite.
- UNIT IV :** Mineralogy, properties, uses, origin, mode of occurrence, types of deposits, geological and geographical distribution in India of non-metallic deposits like asbestos, mica, gypsum, barite, magnesite and limestone. Properties, classifications, origin, uses, geological and geographical distribution of coal deposits of India. Origin and migration of oil, oil trap and its types, geological and geographical distribution of Petroleum deposits of India.
- UNIT V :** Mineral exploration and prospecting, definition and scope, surface methods of exploration and their applications, sub surface methods of exploration like, gravity, magnetic, electrical, seismic, radiometric, geochemical and geobotanical methods and their applications in Geology.
- UNIT VI :** Guides and controls of ore localization, sampling-Its types, calculations and computation of grade and ore reserves, geochemical cycle and dispersal; Strategic, critical and essential minerals.

Practicals

- A. Identification of ore minerals by Physical properties (40 to 60 specimens)
B. Identification of industrial Minerals by physical properties (20 to 30 specimens)
C. Exercises showing major metallic and non metallic minerals on India map (6 to 10 maps)
D. Exercises on calculations on grade and ore reserves (6 to 10 problems)
E. Laboratory exercises in solving exploration problems (8 to 10 problems)

Practical Examination

Practical Examination will be of four hours duration and carries 50 Marks. The distribution of Marks will be as follows,

I.	Identification of ore minerals (5 nos.)	10 Marks
II.	Identification of industrial minerals (5 nos.)	10 Marks
III.	Exercises of metallic and non-metallic deposits of India on maps (2 maps)	4 Marks
IV.	Laboratory exercises in solving exploration problems (2 problems)	8 Marks
V.	Exercises on calculations and grades of ore reserves (2 problems)	8 Marks
VI.	Practical record	5 marks
VII.	Viva – voce	5 marks

Total- 50 Marks

Books Recommended :

1. McKinsty, H.E. (1972) Mining Geology. Prentice – Hall Inc.
2. Arogyaswamy, R.N.P. (1995) Courses in Mining Geology. Oxford and IBH publishing Co., New Delhi.
3. Bagchi, T. C., Sen Gupta, D. K. and Rao, S.V.L.N.(1979) Elements of Prospecting.
4. Jensen, M.L. and Bateman, A.M.(1981) Economic Mineral Deposits. John Wiley and Sons, New York.
5. Deb, S. (1980) Industrial Minerals and Rocks of India. Allied Publishers, New Delhi.
6. Howel, B.F. (1959) Introduction to Geophysical prospecting. McGraw Hill.
7. Lowrie, W. (1997) Fundamentals of Geophysics. Cambridge University Press.
8. Sen, A.K. and Guha, P.K. (1993) a handbook of Economic Geology. Dynamic printers, Kolkata.
9. Banerjee, D.K. (1992) Mineral resources of India. The World Press Pvt. Ltd., Kolkata.
10. Sharma, N.L. and Ram, K.S.V. (1964) Introduction to India's Economic minerals, Dhanbad Publishers.
11. Dobrin, M.B. (1952) Introduction to Geophysical Prospecting. McGraw Hill.
12. Park, C. F. and MacDiamid, R.A Ore Deposits. Freeman and company, Saint Francisco.
13. Sinha and Sharma . Mineral Economics.
14. Krishnaswamy, S. (1979) India's Mineral Resources. Oxford IBH, Pub. Co. New Delhi.
15. Prasad Umeshwar. Economic deposits of India. CBS Publishers, New Delhi.

SEMESTER – VI

GS : GEOLOGY

HYDROGEOLOGY, REMOTE SENSING, ENGINEERING GEOLOGY AND GEOLOGICAL SURVEILLANCE

- UNIT I :** Concept of hydrology, hydrogeology and ground water, Hydrologic cycle and its components, Occurrence and distribution of ground water, Water Table; Aquifer and its types – confined, unconfined and semi-confined; Properties of aquifer- porosity, permeability, specific yield, safe yields, storage coefficient, storativity and transmissivity.
- UNIT II :** Recharge and discharge, Cone of depression, Influent and affluent seepages, Springs and its types. Ground water Provinces of India. Geophysical investigations for groundwater exploration, Groundwater and water quality services, Hydrochemical parameters of ground water (Acidity, Alkalinity, Hardness, pH, Conductivity). Recharge through wells and its types. Rain water harvesting,
- UNIT III :** Aerial photographs and its types, Satellite imageries. Methods of studying aerial photographs in the form of stereo-pairs and mosaic. Pocket and mirror stereoscopes, Overlap and sidelap, Drift and crab. Photogeology and elements of photorecognition- tone, texture, shape, size, pattern; Scale of photograph and vertical exaggeration. Guidelines for lithological, structural and geomorphic interpretations. Applications of photogeology. "Introduction and scope of photogeology".
- UNIT IV :** Concept of remote sensing, types of remote sensing systems (active and passive), Elements of passive remote sensing system (data acquisition and data analysis); applications of remote sensing in studying the natural resources like minerals, ground water, soil and forests. Satellites and Satellite data - introduction and brief history, types of satellites, information obtained with reference to latest IRS & LANDSAT satellites. Sensors – types and their applications.
- UNIT V :** Engineering Geology – introduction, scope and significance; engineering properties of rocks - specific gravity, porosity, crushing strength, compressive strength, and tensile strength. Tunnels - terminology, geological conditions for tunnel sites, tunnels in folded rocks and bedded rocks. Dams – terminology, geological conditions for the selection of dam, Types of dams - Masonary dams (Gravity buttress and Arch types), earthen dams. Landslides - causes, types and prevention of landslides.
- UNIT VI :** Geological skill developement - Role of geological expertise in local natural resources investigation, exploration and mining, beneficiation of minerals; Rocks and minerals thin section making, Civil engineering services, Environmental services, . Soil quality testing and conservation services, Laboratory and Research Technician. Geoheritage.

PRACTICALS: SEMESTER – VI

1. Plotting of ground water provinces on outline map of India.
2. Problems on determination of aquifer parameters, ground water table maps.
3. Interpretation of aerial photographs and satellite imageries.
4. Field work : Field work is an Integral part of Geology Syllabus. Every student should attend field work for a short duration and submit field diary, geological specimen collected and a report.

PRACTICAL EXAMINATION:

The Practical Examination will be four hour duration and carries 50 marks. The distribution of marks will be as follows-

I	Plotting of Ground water provinces on outline map of India.	08 Marks
II	Ground water table contour maps	06 Marks
III	Problems on determination of Aquifer Parameters.	10 Marks
IV	Interpretation of Aerial Photographs and Satellite Imageries.	06 Marks
VI	Field Work.	10 Marks
VII	Practical Record	05 Marks
VIII	Viva Voce	05 Marks

50 Marks

Text Books for Sem VI :

1. Todd, D.K. (1980) Ground Water Hydrology. John Wiley and Sons Inc. New York.
2. Karanth, K.R. (1989) Hydrogeology. Tata McGraw Hill Pub.Co.Ltd., New Delhi.
3. Nagabhushaniah, H.S. (2001) Groundwater in Hydrosphere (Groundwater Hydrology) CBS Publisher, New Delhi.
4. Karanth K.R. Groundwater, Assessment, Development and Management. Tata McGraw Hill Pub. Co. Ltd., New Delhi.
5. Raghunath : Ground Water Hydrology, New Age Publication, Pune.
6. P. Arul Murugan, R.R. Krishnamurthy, .in groundwater targeting and coastal hydrogeological studies"
7. Pande, S.N. (1987) Principles and Applications of Photogeology . Wiley Eastern Limited.
8. . Sabisin, F.F. (2000) Remote Sensing Principles and Interpretations. W.H. Freeman and Company, USA
9. . Lilesand, T.M. and Kiefer, R.W.(2000) Remote Sensing and Image Interpretation. John Wiley and Sons Inc.,New York.
10. Drury, S.A. (1997) Image Interpretaton in Geology. Chapman and Hall, London.
11. Dr.AFZAL An Introduction to Remote Sensing ;SHARIEFF ;Sarup book Publishers PVT.LTD. , New Delhi.
12. Text Book of Engineering Geology - Parbin Singh, Katson Publishing, Ludhina.
13. R B Gupte, Text Book of Engineering Geology,Published by Pune Vidyarthi Griha Prakashan
14. Hand book of analysis of water sample

APPENDIX-B

Syllabus prescribed for B.Sc. Part III (Semester-V & VI) Computer Science to be implemented from the Academic Session 2019-20 & onwards.

B.Sc.Part-III (Semester-V)

The Examination in Computer Science of Fifth Semester shall comprise of one theory paper of 80 Marks of three hours duration and internal assessment of 20 Marks. The practical examination will be of 4 Hrs. duration and carry 50 Marks.

The distribution of marks for practical examination is as under:

1. Program writing / execution (on group A & B)	: 30 Marks
2. Practical record	: 10 Marks
3. Viva Voce	: 10 Marks

Total 50 Marks

5S: Computer Science

. Net Technology and Java Programming

Unit I: Introduction to .NET Framework: NET framework, MSIL, CLR, CLS, CTS, Namespaces, Assemblies The Common Language Implementation, Assemblies, Garbage Collection, The End to DLL Hell - Managed Execution

Unit II: Introduction to visual programming : Concept of event driven programming - Introduction to VB.Net environment, The .NET Framework and the Common Language Runtime. Building VB.NET Applications, The Visual Basic Integrated Development - Basic Language - Console application and windows application, Data types, Declaring Variables, scope of variables, operators and statements.

Unit III: Decisions and loop : Making Decisions with If . . . Else Statements, Using Select Case, Making Selections with Switch and Choose, Loop statements - Do Loop, for, while - The With Statement - Handling Dates and Times - Converting between Data Types - Arrays - declaration and manipulation - Strings & string functions - Sub Procedures and Functions.

Unit IV : Introduction to JAVA : History and evolution ,Feature, JDK, JVM, Difference between C++ and Java, Structure of Java Program, Keywords, Variable, Data types and Literals, Operators Control of Flow, (Selection Statements, Iteration Statements),Command Line Argument, One dimensional and two dimensional array.

Unit V : Classes and inheritance: Class, Object, Method, Overloading Method, Constructor, Constructor Overloading, this Keyword, **Inheritance:** Introduction to Inheritance, Super, Multilevel Hierarchy, method overriding, Abstract class, Using Final (variables , methods and classes).

Unit VI : String, Package and Interface: **String:** String operation, String comparison, Searching and modifying string, **Package:** Package concept, Defining Package, Finding Package, Java In-built Packages **Interface:** Interface concept, Defining, and Implementing of Interface.

Books Recommended:

- 1) .NET Framework, OREILY Publication.
- 2) Steven Holzner, Visual Basic .NET Black Book
- 3) Rebecca Riordan, VB.NET for Developers, Keith Franklin, SAMS
- 4) Jason Beres, Sams Teach Yourself Visual Studio .NET 2005 in 21 Days,
- 5) Jesse Liberty, Learning Visual Basic .NET
- 6) The Complete Reference JAVA2 by Herbert Schildt (Tata McGraw)
- 7) The Complete Reference JAVA by Patrik Noughton
- 8) Programming with JAVA - A Primer : By E.Balguruswamy (Tata McGraw)
- 9) Programming in JAVA : By S.S.Khandare (S.Chand)
- 10) Teach Yourself 'Java' in 2 Hrs : By Sams.
- 11) Java for You : By P. Koparkar

Practical : Minimum 16 Practical base on

A: Unit II and Unit III (Minimum 8 practical)

B: Unit IV, Unit V and Unit VI (Minimum 8 practical)

B.Sc.Part-III (Semester-VI)

The Examination in Computer Science of Sixth Semester shall comprise of one theory paper of 80 Marks of three hours duration and internal assessment of 20 Marks. The practical examination will be of 4 Hrs. duration and carry 50 Marks.

The distribution of marks for practical examination is as under:

- | | |
|---|------------|
| 1. Program writing / execution (on group A & B) | : 30 Marks |
| 2. Practical record | : 10 Marks |
| 3. Viva Voce | : 10 Marks |

Total 50 Marks

**S: Computer Science
Advanced Java and VB.net**

Unit I : Exception Handling and Multithreading : **Exception Handling:** Concept of Exception handling, Type of Exception, Try, Catch, and Finally. Multiple Catch blocks, Nested Try Statements, throw, throws. **Multithreading:** Multithreading concept, life cycle, creating and running thread, thread priority.

Unit II : Applet: Introduction to Applet, Applet life cycle, HTML applet tag with all attributes, Running the applet, Passing parameters to applets, Displaying using applet viewer, getDocumentBase() and getCodeBase() methods, Applet context, Applet vs Application, Graphics introduction, Graphic class, draw lines, circle, rectangle, ellipse.

Unit III: Event Handling and AWT: Introduction, Event delegation model, Java AWT event description, sources of event, Event listener interfaces, Adapter classes, Inner classes. AWT (Abstract Window Toolkit): Introduction, AWT Controls Label, Button, Checkboxes, Lists, ScrollBar, TextField, TextArea, Layout manager.

Unit IV: Windows Applications: Forms: Adding Controls to Forms, Handling Events, MsgBox, InputBox , Working with Multiple Forms, Setting the Startup Form, SDI & MDI Forms, Handling Mouse & Keyboard Events, **Common controls:** Text Boxes, Rich Text Boxes, Labels, Buttons, Checkboxes, Radio Buttons, Group Boxes, List Boxes, Checked List Boxes, Combo Boxes, Picture Boxes, Scroll Bars, Tool Tips, Timers, properties – methods

UNIT V: Object Oriented Programming: Classes and Objects: Class definition, Creating objects, Defining Member functions, Methods and Events, Attaching a class with form, Delegates. **Exceptions Handling:** Exception classes in .net framework, Structured and Unstructured exceptions, tracing errors, breakpoints, watch, Quick watch.

UNIT VI: Data Access with ADO.Net, accessing data with Server Explorer, Accessing Data with data Adaptors and Data sets, Creating a new data connection, creating and populating Data set, displaying data in Data Grid, selecting a data provider, Data accessing using Data adapter Control, Binding Data to Controls.

Books Recommended:

1. Steven Holzner, Visual Basic .NET Black Book
2. Rebecca Riordan, VB.NET for Developers, Keith Franklin, SAMS
3. Jason Beres, Sams Teach Yourself Visual Studio .NET 2005 in 21 Days,
4. Jesse Liberty, Learning Visual Basic
5. The Complete Reference JAVA2 by Herbert Schildt (Tata McGraw)
6. The Complete Reference JAVA by Patrik Noughton
7. Programming with JAVA - A Primer : By E. Balguruswamy (Tata McGraw)
8. Programming in JAVA : By S.S. Khandare (S. Chand)
9. Teach Yourself 'Java' in 2 Hrs : By Sams.
10. Java for You : By P. Koparkar

Practical : Minimum 16 Practical base on

A: Unit I, Unit II and Unit III (Minimum 8 practical)

B: Unit IV, Unit V and Unit VI (Minimum 8 practical)

Syllabus prescribed for B.Sc. Part III (Semester-V & VI) Computer Application /Information Technology to be implemented from the Academic Session 2019-20 & onwards.

B.Sc. Part-III (Semester-V)

The Examination in the subject Computer Application/Information Technology of Fifth Semester shall comprise of one theory paper of 80 Marks of three hours duration and internal assessment of 20 Marks. The practical examination will be of 4 Hrs. duration and carry 50 Marks.

The distribution of marks for practical examination is as under:

- | | |
|--|------------|
| 1. Program based on Computer lab I | : 15 Marks |
| 2. Program based on Computer lab II | : 15 Marks |
| 3. Practical record | : 10 Marks |
| 4. Viva Voce (based on lab I & lab II) | : 10 Marks |

Total 50 Marks

**5S: Computer Application/ Information Technology
.Net C#**

- UNIT-I :** Introduction to C # : Evaluation of C#, characteristics of C#, application of C#, difference between C++ and C#, Introduction to C# environment : The .NET strategy, the origins of the .NET technology, the .NET framework, .NET, .NET languages, benefits of the .NET approach, C# and .NET.
- UNIT-II:** Overview of C#: Programming structure of C#, editing, compiling and executing C# programs, namespace, comments, using aliases for namespace classes, using command line argument, maths function.
Literals, variables and data types : literals, variables, data types, value types, reference type, declaration of variables, initialization of variables, default values, constant variables, scope of variables, boxing and unboxing.
- UNIT-III:** Operators and expression : arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, Bitwise operators, special operators, arithmetic expressions, evaluation of expression, precedence of arithmetic operators, type conversions, operator precedence and associativity, mathematical functions.
Decision making and branching : if statement, if...else statement, nesting of if...else statement, the else if ladder, switch statement, the ?: operator, Decision making and looping : while statement, do statement, for statement, for each statement, jumps in loops.
- UNIT-IV :** Methods in C# : declaring methods, the main method, invoking methods, nesting of methods, method parameters, pass by value, pass by reference, the output parameters, variable arguments list, method overloading, Arrays : 1-D array, creating an array, 2-D array, variable size arrays, the system, array class, array list class, String handling: creating strings, strings method, inserting strings using systems, comparing strings, finding substrings.
- UNIT-V:** Structures and enumeration: structures, structs with methods, nested structs, difference between classes and structs, enumerations, enumerator initialization, enumerator type conversion, common program errors, Classes and Objects : Basic principles of OOP's, class, objects, constructors, static members, static constructors, private constructors, copy constructors, destructors, member initialization, the this reference, nesting of classes, constant members, read only members, properties, indexers.

UNIT-VI : Interfaces : MultipleInheritance: defining an interface, extending an interface, implementing interface, interface & inheritance, explicit interface implementation, abstract class and interface, Operator overloading : overloadable operators, need for operator overloading, defining Operator overloading, overloading unary operators, overloading binary operators, overloading comparison operator. Delegates and Events : Delegate, delegate declaration, delegate methods, delegates instantiation, delegate invocation, using delegates, multicast delegates, events, Managing Console I/O operations : console class, console input, console output, formatted output, numericformatting, standard numeric format, custom numeric format.

Text Books:-

- 1.Programming in C# : E. Balguruswamy
- 2.Mastering in C# : BPB Publication
- 3.Programming C# : TMH Publication
- 4.Programming C# : PHI Publication

Practical: Minimum 16 programs should be prepared on above syllabi.

B.Sc.Part-III (Semester-VI)

S: Computer Application/ Information Technology

Computer Graphics, Multimedia & Animation

Unit-I : Overview of Graphics Systems: Refresh Cathode-Ray Tubes (CRT), Raster-Scan Display, Random-Scan Display, color CRT monitor, Flat-Panel Displays,3D viewing system, stereoscopic and virtual realitysystem, raster scan system, graphics monitor and workstations, Input Devices, keyboards, mouse, trackball and spaceball, joysticks, image Scanners, Touch panels, light pen, voice system

Unit-II : Output Primitives: Points and lines, line drawing algorithm, DDAalgorithm, Bresenham's LineAlgorithm, parallel line algorithm, loading the frame buffer, line function ,circle generating algorithm, Attributes: line Attributes ,line type, line width, pen and brush option, line color, curve Attributes, color and grayscale level, color tables, grayscale

Unit-III : Areas fill Attributes, character Attributes, basic transformation, matrix representation, composite transformation: translation, rotation and scaling

Unit-IV : IntroductiontoMultimedia:Whatismultimedia,multimedia and hypermedia, overview of multimedia, software tools: music, sequencing and notation, digital audio, graphics and imageediting,videoediting,Animation, multimediaauthoring, fileformat:GGIF, JPEG,PNG,TIFF,EXIF, graphics,animation files, PS and PDF, WindowWMF, Window BMP.

Unit-V : Multimedia Compression: IZW,DCT run length coding, JPEG MPEG, Hypertext, MHEG, Hypermedia, Document architecture, SGML, ooa Augmentedand virtual realityand multimedia: Concept, VR devices, VR chair, CCD, VCR, 3D Sound System, head mounted display.

Unit-VI : Animation: Introduction, History of Animation, Anatomy study, Basic Sketching, Introduction to 2D animation, Animation with flash –Tweening,Motion tweening, Shape twining

Text Books:-

- 1.Computer graphics – C Version”, Hearn D and Baker M.P , 2nd Edition, Pearson Education
- 2.Multimedia Computing, Communications andApplications , Ralf Steinmetz, Klara steinmetz, Pearson education, 2004.
- 3.Multimedia in Practice: TechnologyandApplication –Judith (PHI)
- 4.Fundamental of Multimedia byDREW-Pearson(Practical Ap- proach)
- 5.Multimedia : Making it Work: T. Vaughan
- 6.Multimedia programming :Siamon J. Gibbs and Dionysios C. Tsichritzis, Addison Wesley, 1995.
- 7.Multimedia Graphics : John Villamil, Casanova and Leony Fernanadez, Eliar, PHI, 1998.

Practical: Minimum 16 programs should be prepared on above syllabi.

Syllabus prescribed for B.Sc. Part III (Semester-V & VI) Computer Application (Vocational) to be implemented from the Academic Session 2019-20 & onwards.

B.Sc.Part-III (Semester-V)

The Examination in vocational subject Computer Application of Fifth Semester shall comprise of one theory paper of 80 Marks of three hours duration and internal assessment of 20 Marks. The practical examination will be of 4 Hrs. duration and carry 50 Marks.

The distribution of marks for practical examination is as under:

1. Program based on Computer lab I : 15 Marks
2. Program based on Computer lab II : 15 Marks
3. Practical record : 10 Marks
4. Viva Voce (based on lab I & lab II) : 10 Marks

Total 50 Marks

5S: Computer Application (Vocational)

.Net Technology

Unit I: Introduction to VB.NET, Programming Platform -.NET Framework,.NET Architecture, CLR, MSIL, The Just-in-time compiler, CTS, .NET framework class library, VB6 and VB .NET Differences

UNIT II: VB.NET Development Environment, Creating Application, Introduction to Controls in VB.NET: Label, TextBox, Button, Checkbox, RadioButton, ComboBox, ListBox, ImageList, PictureBox, Timer

UNIT III: VB.NET Language –datatypes, Variables, Declaring variables, scope of variables, Constants, and Operators, Functions and Subroutine.

UNIT IV: Programming Styles: Array in VB.NET, Types of array, controlling program flow, Conditional Statements:- if and select-case statements, Looping Statements:- The while, do, for, and for Each statements, flow control Statements:- goto, break, continue, and exit statements, Exception Handling- Unstructured Error Handling, Structured Exception Handling.

UNIT V: Object Oriented Programming: Class basics, Class Properties, Inheritance, Interface, Polymorphism, Constructors and Destructors, Introduction to Multithreaded Programming.

UNIT VI: Data Access with ADO.Net: What are Database, Overview of ADO.Net, ADO.NET object-Connection object, Command Object, Data Adapter Object, Dataset object, Data Reader Object.

Books Recommended :

- 1) Beginning Visual Basic 2005 - Thearon willis, bryan Newsome - Wiley Publishing, INC
- 2) A Programmer's Introduction to Visual Basic.NET - SAMS
- 3) "Beginning VB.NET 2005", WROX Publication Books :

Practical : Minimum 16 Practical base on

Lab I: Unit II and Unit III (Minimum 8 practical)

Lab II: Unit IV, Unit V and Unit VI (Minimum 8 practical)

B.Sc.Part-III (Semester-VI)

The Examination in vocational subject Computer Application of Sixth Semester shall comprise of one theory paper of 80 Marks of three hours duration and internal assessment of 20 Marks. The practical examination will be of 4 Hrs. duration and carry 50 Marks.

The distribution of marks for practical examination is as under:

- | | |
|--|------------|
| 1. Program based on Computer lab I | : 15 Marks |
| 2. Program based on Computer lab II | : 15 Marks |
| 3. Practical record | : 10 Marks |
| 4. Viva Voce (based on lab I & lab II) | : 10 Marks |

Total 50 Marks

S: Computer Application (Vocational)

PHP Programming

UNIT I: Introduction to PHP: Evolution of PHP, Features of PHP, Server Introduction of PHP, Installation & Configuration of PHP, PHP Ethics, **Fundamentals of PHP:** Keywords in PHP, Variables (Predefined, User defined), Constants, data types in PHP ,

UNIT II: Operators: Arithmetic/math operators, Assignment Operators, Comparison Operators, Logical Operators, Bitwise Operators, String Operator **Control Structures:** if, if..else, if..else..if, Loops in PHP: while, do.. while, for.

UNIT III: Introduction to arrays: What is array, Declaration of array, **Types of array:** Numeric array, Associative array, Multidimensional Array, Array Functions: print_r(), explode (), implode(), array_merge(), array_sum(),array_search(), array_push(), array_pop()

UNIT IV: Functions in PHP: Introduction to Functions in PHP, function Declaration, Function calling, predefined functions in PHP (crypt (), move_uploaded_file (), isset(), empty(),include(), require())

UNIT V: String Handling: Introduction to strings in PHP, Manipulation on string: Concatenation Operator for string, strlen(), strtolower(), substr(), strpos(), Date Function, Math Function

UNIT VI: Cookies: Anatomy, Setting Cookies with PHP, Accessing Cookies, Deleting Cookies, Session – Starting PHP session, Destroying PHP Session, Sessions without Cookies, Error Handling, Sending Emails.

Books Recommended :

1. The Complete Reference PHP :
2. Learning PHP , My SQL & Java Script – Robin Nicson (Orelly)
3. PHP for Web – Visual Quickstart Guide- Larry Ullman
4. PHP & My SQL Web Development – A.Martin, S. Mathews
5. Beginning PHP5
6. PHP Bible
7. Professional PHP5

Practical : Minimum 16 Practical base on

Lab I: Unit I , Unit II and Unit III (Minimum 8 practical)

Lab II: Unit IV, Unit V and Unit VI (Minimum 8 practical)

NOTIFICATION

No. 57 / 2019

Date: 27 / 6/2019

Subject : Additional chances for the failure students of old course

It is notified for general information of all concerned that the authorities of the University has provided the three additional chances for the failure students, in the subjects Geology and Computer Science/Computer Application/ Information Technology/Computer Application(Vocational) of B.Sc. Part-III Sem-V & VI, which will be as given below :

Sr.No.	Examination	Subjects	Additional Chances Provided
1	B.Sc.-III Sem-V	Geology	Winter-2019 to Winter-2020
2	B.Sc.-III Sem-VI	Geology	Summer-2020 to Summer-2021,
3	B.Sc.-III Sem-V	Computer Science/Computer Application/Information Technology/ Computer Application (Vocational)	Winter-2019 to Winter-2020
4	B.Sc.-III Sem-VI	Computer Science/Computer Application/Information Technology/ Computer Application (Vocational)	Summer-2020 to Summer-2021,

Sd/-
(Dr.T.R.Deshmukh)
Registrar
Sant Gadge Baba Amravati University

NOTIFICATION

No. 61/2017

Date : 29 June, 2017

Subject : Implementation of New Syllabi of Various Course/Subjects as per semester and credit & Grade System in the Faculty of Commerce & Management from the session 2017-2018 & onwards.

It is notified for general information of all concerned that, the authorities of the University has accepted Semester & Credit & Grade System syllabi of various Course/ Subjects of **B.Com. Part-I, Semester- I & Semester - II** mentioned in column No.2 and which is to be implemented stagewise from the session 2017-2018 and onwards with appendices as shown in column No.3 of the following table.

TABLE

Sr.No.	Course / Subjects	Appendices of the new syllabi.
1	2	3
<u>B.Com. Semester- I & II</u>		
1.	Compulsory English	The Syllabi prescribed for the subject Compulsory English which is appended herewith as Appendix - A
2.	Supplementary English	The Syllabi prescribed for the subject Supplementary English which is appended herewith as Appendix - B
3.	Hindi	The Syllabi prescribed for the subject Hindi which is appended herewith as Appendix - C
4.	Sanskrit	The Syllabi prescribed for the subject Sanskrit which is appended herewith as Appendix - D
5.	Marathi	The Syllabi prescribed for the subject Marathi which is appended herewith as Appendix - E
6.	Urdu	The Syllabi prescribed for the subject Urdu which is appended herewith as Appendix - F
7.	Pali	The Syllabi prescribed for the subject Pali which is appended herewith as Appendix - G
8.	Computer Fundamental Operating System- I & II	The Syllabi prescribed for the subject Computer and Fundamental and Operating System- I & II which is appended herewith as Appendix - H
9.	Principles of Economics	The Syllabi prescribed for the subject Principles of Economics which is appended herewith as Appendix - I
10.	Business Economics	The Syllabi prescribed for the subject Business of Economics which is appended herewith as Appendix - J
11.	Advanced Accountancy	The Syllabi prescribed for the subject Advanced Accountancy which is appended herewith as Appendix - K
12.	Financial Accounting	The Syllabi prescribed for the subject Financial Accounting which is appended herewith as Appendix - L
13.	Principles of Business organization	The Syllabi prescribed for the subject Principles of Business organization which is appended herewith as Appendix - M
14.	Principles of Business Management	The Syllabi prescribed for the subject Principles Management of Business Management which is appended herewith as Appendix - N

Sd/-
Registrar
Sant Gadge Baba Amravati University
Amravati.

(Compulsory English)
B. Com. □
Semester □I

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed for study : RAYS OF LETTERS

(As per model curriculum of the U.G.C. for B.Com. Part- I and published by Raghav Publisher and Distributors, Mahal, Nagpur.)

Unit I : PROSE

1. The Eyes are not Here □ Ruskin Bond
2. The Romance of a Busy Broker □ O. Henry

Unit II

: PROSE

3. Bores □ E.V. Lucas
4. The Lost Child □ Mulk Raj Anand

Unit III : POETRY

1. The World is too Much With us □ William Wordsworth
2. Once Upon a time □ Gabriel Okara
3. If □ Rudyard Kipling

Unit IV : GRAMMAR (strictly based on the prescribed text)

- A. Change the Narration
B. Articles
C. Synonyms & Antonyms
D. Tense Forms

Unit V : BUSINESS CORRESPONDENCE AND WRITING SKILLS

(As given in the prescribed text.)

- A. Letter Writing (Formal & Informal)
i) Formal Applications for Job/Complaint/Order
ii) Informal/ Personal Letters
B) Resume Writing

Distribution of Marks (80 : 20)

A) Theory 80 Marks

Textual Components :

□ ue. 1 □ P □ OSE

Any two long answer questions to be attempted out of four each carrying eight marks .

2X8=16 Marks

Que. 2- POETRY

Any Four short answer questions to be attempted out of Six each carrying four marks.

4X4=16 Marks

Que. 3 GRAMMAR (TEXTUAL)

- a) Change the narration
Two questions carrying two marks each Articles 2X2 = 4 Marks
b) Articles
Four questions carrying one mark each 4X1 = 4 Marks
c) Synonyms & Antonyms
Four questions carrying one mark each 4X1 = 4 Marks
d) Tense Forms
Four questions carrying one mark each 4X1 = 4 Marks

Que. 4 BUSINESS CORRESPONDENCE AND WRITING SKILLS

a) Letter Writing

- i) Formal Letter (Application for Job/Complaint/Order) 5X1 = 5 Marks
(Any one out of two)
ii) Informal Letters/Personal Letters 5X1 = 5 Marks
(Any one out of two)

b) Resume Writing

**6 Marks
20 Marks**

B) Internal Assessment □

- (i) Class Test □ 10 Marks.
(ii) Home Assignment □ 10 Marks.

B.Com.
Semester II
(Compulsory English)

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed for study : RAYS OF LETTERS

(As per model curriculum of the U.G.C. for B.Com. Part- I and published by Raghav Publisher and Distributors, Mahal, Nagpur.)

Unit I : PROSE

- | | | |
|-----------------------------------|--------------------------|---------------------|
| 1. Each is Great in His Own Place | <input type="checkbox"/> | Swami Vivekananda |
| 2. The Postmaster | <input type="checkbox"/> | Rabindranath Tagore |

Unit II : PROSE

- | | | |
|------------------------------------|--------------------------|---------------------|
| 3. How I Became a Public Speaker | <input type="checkbox"/> | George Bernard Shaw |
| 4. Prospects of Democracy in India | <input type="checkbox"/> | Dr. B.R. Ambedkar |

Unit III : POETRY

- | | | |
|--------------------------------|--------------------------|-----------------|
| 1. Success is Counted Sweetest | <input type="checkbox"/> | Emily Dickinson |
| 2. Laugh and Be Merry | <input type="checkbox"/> | John Masefield |
| 3. The Impossible Dream | <input type="checkbox"/> | Joe Darion |

Unit IV : GRAMMAR (strictly based on the prescribed text)

- A. Change the Voice
- B. Idioms & Phrases
- C. One Word Substitute
- D. Prepositions

Unit V : BUSINESS CORRESPONDENCE AND WRITING SKILLS

- A) E- mail
- B) Newspaper Reports

Distribution of Marks : (80 : 20 Marks)

Textual Components :

Que. 1 POSE

Any two long answer questions to be attempted out of four each carrying eight marks .

2X8=16 Marks

Que. 2- POETRY

Any Four short answer questions to be attempted out of Six each carrying four marks.

4X4=16 Marks

Que. 3 MULTIPLE CHOICE QUESTIONS

(10 questions from Prose and six questions from Poetry, each carrying one mark.

16X1= 16 Marks

Que. 4 GRAMMAR (TEXTUAL)

- a) Change the Voice
Four questions carrying one marks each
- b) Idioms & Phrases
Four questions carrying one mark each
- c) One Word Substitute
Four questions carrying one mark each
- d) Preposition
Four questions carrying one mark each

4X1=4 Marks

4X1 = 4 Marks

4X1 = 4 Marks

4X1 = 4 Marks

Que. 5 - BUSINESS CORRESPONDENCE AND WRITING SKILLS

- a) E- Mail
(Any one out of two)
- b) Newspaper Reports
(Any one out of two)

6X1 = 6 Marks

10X1 = 10 Marks

Internal Assessment

20 Marks

- | | | |
|----------------------|--------------------------|-----------|
| (i) Class Test | <input type="checkbox"/> | 10 Marks. |
| (ii) Home Assignment | <input type="checkbox"/> | 10 Marks. |

Appendix- B

**B.Com. I
Semester I
(Supplementary English)**

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed :

Practical English Prose and Verse edited by G.E.B. COE Orient Longman.

Unit I : PROSE

The following prose lessons are prescribed for study.

- | | | | |
|----|--------------------------------|--------------------------|-------------|
| 1. | A Slip of Tongue | <input type="checkbox"/> | J.E.B. Gray |
| 2. | Socrates and the School Master | <input type="checkbox"/> | F.L. Brayne |

Unit II : PROSE

- | | | | |
|----|----------------|--------------------------|----------------|
| 3. | Good Manners | <input type="checkbox"/> | J.C. Hill |
| 4. | The Bottle Imp | <input type="checkbox"/> | R.L. Stevenson |

Unit III : POETRY

The following poems are prescribed for study.

- | | | | |
|----|-------------------|--------------------------|----------------------|
| 1. | The Daffodils | <input type="checkbox"/> | William Wordsworth |
| 2. | Break Break Break | <input type="checkbox"/> | Alfred Lord Tennyson |
| 3. | The Wild Swans | <input type="checkbox"/> | W.B. Yeats |
| 4. | All in June | <input type="checkbox"/> | W.H. Davies |

Unit IV : a) Comprehension of an Unseen Passage
b) Precis Writing

Unit V : COMPOSITION :-

An essay of about 300 words on Social, Economic, Commercial and Information Technology Issues.

Distribution of Marks

A) Theory 80 Marks

Que. 1: PROSE

Any two long answer questions to be attempted out of four each carrying eight marks

2X8=16 Marks

Que. 2 : POETRY

Any four short answer questions to be attempted out of Six each carrying four marks.

4X4=16 Marks

Que. 3 : MULTIPLE CHOICE QUESTIONS

Eight Multiple Choice Questions based on Prose, each carrying one mark

: 8 Marks

Eight Multiple Choice Questions based on Poetry, each carrying one mark

: 8 Marks

Que. 4 : (a) Comprehension of an Unseen Passage
(b) Precis Writing

: 8 Marks

: 8 Marks

Que. 5 : An essay of about 300 words to be attempted out of the five given topics.

: 16 Marks

B) Internal Assessment

20 Marks

- | | | |
|----------------------|--------------------------|----------|
| (i) Class Test | <input type="checkbox"/> | 10 Marks |
| (ii) Home Assignment | <input type="checkbox"/> | 10 Marks |

**B.Com. I
Semester II
(Supplementary English)**

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed :

Practical English Prose and Verse edited by G.E.B. COE Orient Longman.

Unit I : PROSE

The following prose lessons are prescribed for study.

- | | | | |
|----|-------------------------------|--------------------------|---------------------|
| 1. | Playing the English Gentleman | <input type="checkbox"/> | Mahatma Gandhi |
| 2. | The Home Coming | <input type="checkbox"/> | Rabindranath Tagore |

Unit II : PROSE

- | | | | |
|----|----------------------|--------------------------|-------------|
| 3. | The Miracle of Radio | <input type="checkbox"/> | H. Shipp |
| 4. | Robin | <input type="checkbox"/> | Jim Corbett |

Unit III : POETRY

The following poems are prescribed for study.

- | | | |
|---|--------------------------|---------------|
| 1. Adlestrop | <input type="checkbox"/> | Edward Thomas |
| 2. The Soldier | <input type="checkbox"/> | Rupert Brooke |
| 3. To the Indian Who Died in South Africa | <input type="checkbox"/> | T.S. Eliot |
| 4. That Whitsun | <input type="checkbox"/> | Philip Larkin |

Unit IV : a) Comprehension of an Unseen Passage
b) Precis Writing

Unit V : COMPOSITION :-

An essay of about 400 words on Social, Economic, Commercial and Information Technology Issues.

Distribution of Marks

A) Theory 80 Marks

Que. 1 : PROSE

Any two long answer questions to be attempted out of four each carrying eight marks

2X8:=16 Marks

Que. 2 POETRY

Any four short answer questions to be attempted out of Six each carrying four marks.

4X4 =16 Marks

Que. 3 :

Eight Multiple Choice Questions based on Prose, each carrying one mark

: 8 Marks

Eight Multiple Choice Questions based on Poetry, each carrying one mark

: 8 Marks

Que. 4 :

(a) Comprehension of an Unseen Passage

: 8 Marks

(b) Precis Writing

: 8 Marks

Que. 5 :

An essay of about 400 words to be attempted out of the five given topics.

: 16 Marks

B) Internal Assessment

20 Marks

- | | | |
|----------------------|--------------------------|----------|
| (i) Class Test | <input type="checkbox"/> | 10 Marks |
| (ii) Home Assignment | <input type="checkbox"/> | 10 Marks |

Appendix- C

		हिन्दी अनिवार्य बी.कॉम. प्रथम वर्ष प्रथम सत्र		
समय - ३ घण्टे)				(पूर्णांक - ८०
पाठ्य पुस्तक - □ गुंजन □	सम्पादक -	डॉ.अरुण घोगरे		
		- डॉ.तीर्थराज राय		
	प्रकाशक -	राघव पब्लिशर्स एंड डिस्ट्रिब्यूटर्स, नागपुर		
पाठ्यपुस्तक का इकाईयों में अंक विभाजन एवं प्रश्नों का स्वरूप निम्नानुसार है -				
इकाई एक	-	गद्य खण्ड - (प्रथम सात पाठों से)		
		अ) दीघात्तरी प्रश्न (एक)	---	(०८ अंक)
		ब) लघुत्तरी प्रश्न (चार)	---	(१ अंक)
इकाई दो	-	पद्य खण्ड - (प्रथम छः कविताओं से)		
		अ) दो कविताओं के केन्द्रीय भाव	---	(१ अंक)
इकाई तीन	-	व्यावहारिक भाषा एवं व्याकरण		
		१) संधि विग्रह (दो)	---	(०२ अंक)
		२) शब्द शुद्धि (दो)	---	(०२ अंक)
		३) एकार्थक शब्द (दो)	---	(०२ अंक)
		४) अनेक शब्दों के लिए एक शब्द (दो)	---	(०२ अंक)
		५) विराम चिह्न (दो)	---	(०२ अंक)
		६) हिन्दी के संख्यावाचक शब्दोंकी मानक वर्तनी (दो)	---	(०२ अंक)
इकाई चार -	पत्र लेखन (एक)		---	(०८ अंक)
		व्यावसायिक अथवा कार्यालयीन पत्र (शब्द सीमा लगभग १५० शब्द)		
इकाई पाँच -	वस्तुनिष्ठ प्रश्न		---	(२० अंक)
		(प्रत्येक प्रश्न पर एक अंक)		

सूचना -	१.	प्रथम चार इकाईयों से विकल्प के साथ प्रश्न पूछे जायेंगे		
	२.	वस्तुनिष्ठ प्रश्न इकाई एक और दो से ही पूछे जायेंगे		
	३.	दीघात्तरी प्रश्न का उत्तर लगभग ५० पंक्तियों में अपेक्षित है		
	४.	लघुत्तरी प्रश्न का उत्तर लगभग २५ पंक्तियों में अपेक्षित है		
	५.	जिन पाठों से दीघात्तरी प्रश्न पूछे जायेंगे, उनमें से लघुत्तरी प्रश्न न पूछे जायें		
		पत्र लेखन - शब्द सीमा लगभग १५० शब्द		
आन्तरिक मूल्यांकन -		(२० अंक)		
	१.	गृहपाठ	-	(१० अंक)
	२.	इकाई मूल्यांकन	-	(१० अंक)

		हिन्दी अनिवार्य बी.कॉम. प्रथम वर्ष द्वितीय सत्र		
समय - ३ घण्टे)				(पूर्णांक - ८०
पाठ्य पुस्तक - ठगुंजनठ	सम्पादक -	डॉ.अरुण घोगरे		
		- डॉ.तीर्थराज राय		
	प्रकाशक -	राघव पब्लिशर्स एंड डिस्ट्रिब्यूटर्स, नागपुर		
पाठ्यपुस्तक का इकाईयों में अंक विभाजन एवं प्रश्नों का स्वरूप निम्नानुसार है -				
इकाई एक	-	गद्य खण्ड - (पाठ आठ से चौदह तक)		
		अ) दीघात्तरी प्रश्न (एक)	---	(०८ अंक)
		ब) लघुत्तरी प्रश्न (चार)	---	(१ अंक)
इकाई दो	-	पद्य खण्ड - (सात से बारह कविताओं से)		
		अ) दो कविताओं के केन्द्रीय भाव	---	(१ अंक)
इकाई तीन	-	व्यावहारिक भाषा एवं व्याकरण		
		१) देवनागरी लिपि	---	(० अंक)

(सामान्य परिचय, मानक वर्णमाला, विशेषताएँ, वर्तनी का मानक रूप)

२)	पदनाम (तीन)	---	(०३ अंक)
३)	परिभाषिक प्रशासनिक शब्दावली	---	(०३ अंक)
इकाई चार -	निबंध (एक : व्यावसायिक विषयों पर)	---	(०८ अंक)
इकाई पाँच -	वस्तुनिष्ठ प्रश्न (२०)	---	(२० अंक)
	(प्रत्येक प्रश्न पर एक अंक)		

सूचना -	१.	प्रथम चार इकाईयों से विकल्प के साथ प्रश्न पूछे जायेंगे
	२.	वस्तुनिष्ठ प्रश्न इकाई एक और दो से ही पूछे जायेंगे
	३.	दीघात्तरी प्रश्न का उत्तर लगभग ५० पंक्तियों में अपेक्षित है
	४.	लघूत्तरी प्रश्न का उत्तर लगभग २५ पंक्तियों में अपेक्षित है
	५.	जिन पाठों से दीघात्तरी प्रश्न पूछे जायेंगे, उनमें से लघूत्तरी प्रश्न न पूछे जायें
	.	निबंध लेखन - शब्द सीमा लगभग ५०० शब्द
आन्तरिक मूल्यांकन -	(२० अंक)	
	१.	गृहपाठ - (१० अंक)
	२.	इकाई मूल्यांकन - (१० अंक)

Appendix- D

वाणिज्य स्नातक भाग- १

(सत्र - १)

संस्कृत आवश्यक

पुस्तक : गीर्वाणसारथिः - भाग १ (प्रथम विभाग),

मुख्य संपादक - डॉ. भगवान पंडा,

सह संपादक - डॉ. रुपाली कविार, अथर्व प्रकाशन, जळगाव

गुण - लेखी परीक्षा - ८०

अन्तर्गत मूल्यमापन - २०

एकूण गुण - १००

घटक □ १ : गद्य पाठ १ व २	- १ गुण
घटक □ २ : गद्य पाठ ३ व ४	- १ गुण
घटक □ ३ : पद्य पाठ १ व २	- १ गुण
घटक □ ४ : पद्य पाठ ३ व ४	- १ गुण
घटक □ ५ : प्रश्नावली भाग १	- १ गुण

प्रश्नपत्रिकेचे स्वरूप

लेखी परीक्षा - ८०

वेळ - ३ तास

पूर्ण गुण - ८०

प्रश्न १.(अ) ४ पैकी २ अनुवाद करा (५ ते ओळ चे उतारे)	- १० गुण
(ब) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण
प्रश्न २.(अ) ४ पैकी २ अनुवाद करा (५ ते ओळ चे उतारे)	- १० गुण
(ब) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण
प्रश्न ३.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळ चे)	- १० गुण
(ब) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण
प्रश्न ४.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळ चे)	- १० गुण
(ब) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण
प्रश्न ५. २० पैकी १ वस्तुनिष्ठ प्रश्न	- १ गुण

अन्तर्गत मूल्यमापन -

पूर्ण गुण - २०

१) स्वाध्याय	- १० गुण
२) मौखिक	- १० गुण

वाणिज्य स्नातक भाग- १

(सत्र - २)

संस्कृत आवश्यक

पुस्तक : गीर्वाणसारथिः - भाग १ (द्वितीय विभाग)

मुख्य संपादक - डॉ. भगवान पंडा,

सह संपादक - डॉ. रुपाली कविार, अथर्व प्रकाशन, जळगाव

गुण - लेखी परीक्षा - ८०

अन्तर्गत मूल्यमापन - २०

एकूण गुण - १००

घटक □ १ : गद्य पाठ १ व २	- १ गुण
घटक □ २ : गद्य पाठ ३ व ४	- १ गुण
घटक □ ३ : पद्य पाठ १ व २	- १ गुण
घटक □ ४ : पद्य पाठ ३ व ४	- १ गुण
घटक □ ५ : प्रश्नावली भाग २	- १ गुण

प्रश्नपत्रिकेचे स्वरूप

लेखी परीक्षा	- ८०	
वेळ - ३ तास		पूर्ण गुण - ८०
प्रश्न १.(अ) ४ पैकी २ अनुवाद करा (५ ते ओळ चे उतारे)	- १० गुण	
(1) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण	
प्रश्न २.(अ) ४ पैकी २ अनुवाद करा (५ ते ओळ चे उतारे)	- १० गुण	
(1) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण	
प्रश्न ३.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळ चे)	- १० गुण	
(1) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण	
प्रश्न ४.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळ चे)	- १० गुण	
(1) दीघात्तरी प्रश्न (दोन पैकी एक)	- ० गुण	
प्रश्न ५. २० पैकी १ वस्तुनिष्ठ प्रश्न	- १ गुण	
अन्तर्गत मूल्यमापन -		पूर्ण गुण - २०
१) स्वाध्याय	- १० गुण	
२) मौखिक	- १० गुण	

गीर्वाणसारथि: (भाग - १)

अनुक्रमणिका

पहिलेसत्र

गद्य विभाग

- १) सर्वधर्मपरिषदि विवेकानन्दः
- २) स्वामिभिः
- ३) प्रतिमागृहवर्णनम्
- ४) लक्ष्मीमदः

पद्य विभाग

१) कर्मयोगः

- २) हंसविलापः
- ३) दिलीपसिंहसंवादः
- ४) सुभाषितानि

प्रश्नावली भाग - १

दुसरेसत्र

गद्य विभाग

- १) वानरयूथकथा
- २) दिलीपभरतसंवादः
- ३) समस्यायाः परिहाराय.....
- ४) विनयाधिकरणम्

पद्य विभाग

- १) अयं मे हस्तो भगवान्
- २) विदुरोपदेशः
- ३) वैद्यकीयसुभाषितानि
- ४) उ त्वतरणम्

प्रश्नावली भाग - २

Appendix- E

मराठी (आवश्यक) बी. कॉम. भाग-१

पुस्तकाचे नाव : अनुबंध भाग □ १

संपादक : डॉ. अशोक नामदेव पळवेकर, डॉ. पंडित गोबरा राठोड, डॉ. अनंत सिरसाट

प्रकाशकाचे नाव : राघव पब्लिशर्स अॅण्ड डिस्ट्रिब्यूटर्स , नागपूर

सत्र □ १

अनुक्रमणिका

घटक : अ - वैचारिक

- | | | |
|---------------------------------|---|------------------------|
| १) नवीन ग्रथांची आवश्यकता | : | लोकहितवादी |
| २) शेती सुधारण्याचे उपाय | : | जोतीराव ँले |
| ३) भारतीय लोकशाहीचे भवितव्य काय | : | डॉ. बाबासाहेब आंबेडकर |
| ४) भाषा आणि लोकजीवन | : | डॉ. कुसुमावती देशपांडे |

घटक : ब - ललित

- | | | |
|------------------|---|-----------------|
| ५) वेणु | : | बाबा पद्मनजी |
|) इहलोकचा स्वर्ग | : | हरी नारायण आपटे |
| ७) सांजवात | : | आनंदीबाई शिक |
| ८) युवा कोण | : | बाबा आमटे |
| ९) कवितेचा जन्म | : | बाबुराव बागूल |
| १०) लाट | : | हमीद दलवाई |

घटक : क □ कविता

- | | | |
|-----------------------------------|---|---------------------------|
| ९) संतवाणी | : | ाने ार / जनाबाई / तुकाराम |
| १०) स्वर्ग, पृथ्वी आणि मनुष्य | : | केशवसुत |
| ११) धर्मांतर म्हणजे देशांतर नव्हे | : | लक्ष्मीबाई टिळक |
| १२) हिरीताचं देणं घेणं | : | बहिणाबाई चौधरी |
| १३) शीगवाला | : | नारायण सुव |
| १४) निर ा | : | तुळशीराम काजे |
| १५) मनातल्या मनात मी | : | सुरेश भट |
| १) वटहुकूम | : | ीपाद भालचं जोशी. |

घटक : ड - उपयोजित लेखन

- | | | |
|-------------------------------------|---|------------|
| १) प्रसारमाध्यमांसाठी लेखन | : | संतोष शेणई |
| २) अपठित उतारा - प्रश्नोत्तरे | : | |
| ३) सारांश लेखन - १/३ शब्दांत सारांश | : | |

मराठी (आवश्यक)

बी.कॉम. प्रथम वर्ष

प्रथम सत्र

वेळ : ३ तास

एकूण गुण : ८०

सूक्ष्म वाचनाकरिता पाठ्यपुस्तक : अनुबंध भाग □ १

प्रकाशकाचे नाव : राघव पब्लिशर्स अॅण्ड डिस्ट्रिब्यूटर्स, नागपूर, हे पुस्तक अभ्यासक्रमासाठी राहिल.

उपयोजित लेखन (प्रसारमाध्यमांसाठी लेखन आणि अपठित उतारा - प्रश्नोत्तरे व सारांश लेखन)

प्रश्न विभागणी :

- | | | |
|---|---|------------------------------|
| प्रश्न :१) वैचारिक विभाग | : | दीघात्तरी एक प्रश्न □ १० गुण |
| प्रश्न :२) वैचारिक विभाग | : | लघूत्तरी एक प्रश्न - ० गुण |
| प्रश्न :३) ललित विभाग | : | दीघात्तरी एक प्रश्न □ १० गुण |
| प्रश्न :४) ललित विभाग | : | लघूत्तरी एक प्रश्न □ ० गुण |
| प्रश्न :५) कविता विभाग | : | दीघात्तरी एक प्रश्न □ १० गुण |
| प्रश्न :) कविता विभाग | : | लघूत्तरी एक प्रश्न - ० गुण |
| प्रश्न :७) प्रसारमाध्यमांसाठी लेखन | : | दीघात्तरी एक प्रश्न □ १० गुण |
| प्रश्न :८) अपठित उतारा - प्रश्नोत्तरे व | : | लघूत्तरी एक प्रश्न □ ० गुण |

सारांश लेखन

(वरील सर्व प्रश्नांना अंतर्गत पर्याय राहतील.)

प्रश्न :९) वस्तुनिष्ठ प्रश्न (प्रत्येकी एक गुण) - १ गुण

(पाठ्यपुस्तकातील विभाग अ,ब,क,ड यावर प्रत्येकी चार गुणांचे चार वस्तुनिष्ठ प्रश्न विचारले जातील.)

अंतर्गत मूल्यमापन :

- | | | |
|---------------------------------|---|-------------|
| १)घटक चाचणी (Class Test) | : | एक □ १० गुण |
| २)स्वाध्याय (Home - Assignment) | : | एक □ १० गुण |

मराठी (आवश्यक) बी. कॉम. - भाग - १

पुस्तकाचे नाव : अनुबंध भाग १

संपादक : डॉ. अशोक नामदेव पळवेकर, डॉ. पंडित गोबरा राटोड, डॉ. अनंत सिरसाट

प्रकाशकाचे नाव : राघव पब्लिशर्स अॅण्ड डिस्ट्रिब्युटर्स , नागपूर

सत्र २

अनुक्रमणिका

घटक : अ - वैचारिक

१) स्वातंत्र्य : संकल्पना आणि व्यवहार	:	डॉ. आ. ह. साळुंखे
२) प्रशासक नेता	:	प्रा. सुरेश व्दादशीवार
३) सारे युग वाट पाहाते आहे	:	डॉ. प्रल्हाद लुलेकर
४) ती मीच आहे	:	मलाला

घटक : ब - ललित

५) गोदो	:	नामदेव कांबळे
६) अवधूत	:	रमेश अंधारे
७) दिंडी गेली पुं	:	किशोर सानप
८) महालूट	:	सदानंद देशमुख
९) जन्मचिंतन	:	अनंत नानोटी
१०) पीळ	:	ऐ. र्थ पाटेकर

घटक : क - कविता

११) माय	:	स. ग. पाचपोळ
१२) सावज	:	नारायण कुळकण कवठेकर
१३) अद्याप	:	प्रभा गणोरकर
१४) जखम	:	उषाकिरण आत्राम
१५) देणं	:	जयराम खेडेकर
१६) कबीर	:	लोकनाथ यशवंत
१७) ते आले, त्यानंतरची गोष्ट	:	प्रभू राजगडकर
१८) दरवेशी	:	अजीम नवाज राही
१९) यापुं मा णी ल ई	:	सिध्दार्थ भगत
२०) अभंग	:	वीरा राटोड

घटक : ड - उपयोजित लेखन

१) कार्यालयीन पत्रव्यवहार स्वरूप वैशिष्ट्ये आणि प्रकार	:	डॉ. कल्याणी दिवेकर
२) आशयलेखन व भाषांतर	:	

मराठी (आवश्यक)

बी.कॉम. प्रथम वर्ष

द्वितीय सत्र

वेळ : ३ तास

एकूण गुण : ८०

सूक्ष्म वाचनाकरिता पाठ्यपुस्तक : अनुबंध भाग १

प्रकाशकाचे नाव : राघव पब्लिशर्स अॅण्ड डिस्ट्रिब्युटर्स, नागपूर, हे पुस्तक अभ्यासक्रमासाठी राहिल.

उपयोजित लेखन (कार्यालयीन पत्रव्यवहार : स्वरूप, वैशिष्ट्ये आणि प्रकार. तसेच आशयलेखन व भाषांतर)

प्रश्न विभागणी :

प्रश्न :१) वैचारिक विभाग	:	दीघात्तरी एक प्रश्न १० गुण
प्रश्न :२) वैचारिक विभाग	:	लघूत्तरी एक प्रश्न - ० गुण
प्रश्न :३) ललित विभाग	:	दीघात्तरी एक प्रश्न १० गुण
प्रश्न :४) ललित विभाग	:	लघूत्तरी एक प्रश्न ० गुण
प्रश्न :५) कविता विभाग	:	दीघात्तरी एक प्रश्न १० गुण
प्रश्न : ६) कविता विभाग	:	लघूत्तरी एक प्रश्न - ० गुण
प्रश्न :७) कार्यालयीन पत्रव्यवहार	:	दीघात्तरी एक प्रश्न १० गुण

(स्वरूप, वैशिष्ट्ये आणि प्रकार)

प्रश्न :८) आशयलेखन व भाषांतर	:	लघूत्तरी एक प्रश्न ० गुण
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(वरील सर्व प्रश्नांना अंतर्गत पर्याय राहतील.)

प्रश्न :९) वस्तुनिष्ठ प्रश्न (प्रत्येकी एक गुण)	:	- १ गुण
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(पाठ्यपुस्तकातील विभाग अ,ब,क,ड यावर प्रत्येकी चार गुणांचे चार वस्तुनिष्ठ प्रश्न विचारले जातील.)

अंतर्गत मूल्यमापन :

१) वर्ग चाचणी (Class Test)	:	एक १० गुण
२) स्वाध्याय (Home - Assignment): एक	:	एक १० गुण

Appendix-F

B.Com. PART - I URDU COMPULSORY SEMESTER - I		B.Com. PART - I URDU COMPULSORY SEMESTER - II	
Time : Three Hours	Max. Marks 80	Time : Three Hours	Max. Marks 80
TEXT PRESCRIBED : SHUA - E ADAB (Part - I)		TEXT PRESCRIBED : SHUA - E ADAB (Part - I)	
Edited by : Dr. Mohd. Samiullah, Dr. Roohina Tabassum		Edited by : Dr. Mohd. Samiullah, Dr. Roohina Tabassum	
Published by: TAFSA Computers, Amravati.		Published by: TAFSA Computers, Amravati.	
UNITWISE DUSTRIBUTION OF MARKS		UNITWISE DUSTRIBUTION OF MARKS	
UNIT I : (Prose) The following ONE Lesson from Text		UNIT I : (Prose) The following TWO Lessons from Text	
	تاریخ	دیباکی پہلی تہہ جسے - سائنس کا گھر کہتے ہیں	
There Shall be FOUR short Answer type Questions out of Six of 4 marks each	16	There Shall be FOUR short Answer type Questions out of Eight of 4 marks each	16
UNIT - II (Prose) The following ONE Lesson from Text		UNIT - II (Prose) The following ONE Lesson from Text	
	اردو ادب اور قومی یکجہتی		سنو
There Shall be FOUR short Answer type Questions out of Six of 4 marks each	16	There Shall be FOUR short Answer type Questions out of Six of 4 marks each	16
UNIT III : (Prose) The following lessons from Text		UNIT III : (Prose) The following lessons from Text	
	ذرائع اطلاع کی اہمیت		صحافتی ذرائع اطلاع
There Shall be FOUR short Answer type Questions out of Six of 4 marks each	16	There Shall be FOUR short Answer type Questions out of Six of 4 marks each	16
UNIT IV : (Prose) The following lesson from Text		UNIT IV : (Prose) The following lesson from Text	
	اطلاع کے بہتر طریقے		اطلاع کے تحریری طریقے
There Shall be FOUR Short Answer type Questions out of Six of 4 marks.	16	There Shall be FOUR Short Answer type Questions out of Six of 4 marks.	16
UNIT V : Communication Skill		UNIT V : Communication Skill	
i) Application letters 8	16	i) Reporting of any function, events 8 marks	16
ii) Commercial letters 8		ii) An Essay on General Topic 8 marks	

Appendix- G

		पाली (आवश्यक) बी.कॉम. प्रथम वर्ष प्रथम सत्र		
वेळ : ३ तास				गुण : ८०
	गज्जो विभागो			
Unit I :	जातक कथा	--	बकजातक सिलविमंसनजातक	१ गुण
Unit II :	महावग्ग	--	धम्मच कपवत्तनसुत्त	०८ गुण
	ख कपाठ	--	सरणत्तय दससि खापद	०८ गुण १ गुण
		पज्जो विभागो		
Unit III :	धम्मपद	--	यमकवग्गो अप्पमादवग्गो	१ गुण
Unit IV :	थेरीगाथा	--	अम्बपाली थेरी पुण्णिका थेरी	१ गुण
Unit V :	व्याकरण			
	१) पाली वर्णमाला व वर्णपरिवर्तन			१ गुण
	२) काळ			
	अन्तर्गत मुल्यमापन			
	१) वर्ग चाचणी	: एक		१० गुण
	२) स्वाध्याय	: गृहपाठ		१० गुण

		पाली (आवश्यक) बी.कॉम. प्रथम वर्ष प्रथम सत्र		
वेळ : ३ तास				गुण : ८०
प्रश्न १	अ,ब,क-गद्य पाठावरील मुळ पाली उतान्याचे तीन पैकी दोनचे मराठी भाषांतर करा.			१ गुण
प्रश्न २	पद्य पाठावरील मुळ पाली गाथांचे चार पैकी दोन गाथांचे ससंदर्भ भाषांतर करा			१ गुण
प्रश्न ३	(अ) गद्य पाठावरील दिघात्तरी प्रश्न दोन पैकी एक सोडवा		१० गुण	
	(ब) पद्य पाठावरील लघुत्तरी प्रश्न दोन पैकी एक सोडवा		० गुण	
प्रश्न ४	खालील प्रश्नांची योग्य पर्याय निवडुन उत्तरे लिहा (प्रत्येक प्रश्नाला एक गुण)			१ गुण
प्रश्न ५	व्याकरण सोडवा			१ गुण
	१) पाली वर्णमाला लिहा			
	२) स्वाध्याय			
	अन्तर्गत मुल्यमापन			
	१) वर्ग चाचणी			१० गुण
	२) स्वाध्याय			१० गुण

पाठ्य ग्रंथ

□ बुध्दवाणी □

संपादक -

डॉ.रेखा जे. वानखडे

प्रकाशक -

सुगम प्रकाशन - ग्रीन पार्क कॉलनी, शंकर नगर, अमरावती.

पाली (आवश्यक)
बी.कॉम. प्रथम वर्ष
द्वितीय सत्र

वेळ : ३ तास गुण : ८०

गज्जो विभागो

Unit I :

जातक कथा -- गिज जातक १ गुण
कल्याणधम्मजातक

Unit II :

माज्जिम निकाय -- पियजातिकसुत्त १ गुण
मखादेवसुत्त

पज्जो विभागो

Unit III :

धम्मपद -- तन्हावग्गो १ गुण
बुध्दवग्गो

Unit IV :

थेरीगाथा -- सुनित थेर १ गुण
आनंद थेर

Unit V :

व्याकरण १) सन्धि १ गुण
स्वर सन्धी, व्यंजन सन्धी

२) क्रियापद
भू, गम, पठ, चज, चर

अन्तर्गत मुल्यमापन

१) वर्ग चाचणी १० गुण
२) स्वाध्याय १० गुण

पाली (आवश्यक)
बी.कॉम. प्रथम वर्ष
द्वितीय सत्र

वेळ : ३ तास गुण : ८०

प्रश्न १ गद्य पाठावरील मुळ पाली उताऱ्याचे तीन पैकी दोनचे मराठी भाषांतर करा. १ गुण

प्रश्न २ पद्य पाठावरील मुळ पाली गाथांचे चार पैकी दोन गाथांचे ससंदर्भ भाषांतर करा १ गुण

प्रश्न ३ (अ) गद्य पाठावरील दिघात्तरी प्रश्न दोन पैकी एक सोडवा १० गुण
(ब) पद्य पाठावरील लघुत्तरी प्रश्न दोन पैकी एक सोडवा ० गुण

प्रश्न ४ खालील प्रश्नांची योग्य पर्याय निवडून उत्तरे लिहा १ गुण
(प्रत्येक प्रश्नाला एक गुण)

प्रश्न ५ व्याकरण सोडवा
१) संधी विग्रह करा (कोणतेही चार) ०८ गुण
२) क्रियापद ०८ गुण
भू, गम, पठ, चज, चर

अन्तर्गत मुल्यमापन

१) घटक चाचणी १० गुण
२) स्वाध्याय १० गुण

पाठ्य ग्रंथ

□ बुध्दवाणी □

संपादक - डॉ.रेखा जे. वानखडे

प्रकाशक - सुगम प्रकाशन - ग्रीन पार्क कॉलनी, शंकर नगर, अमरावती.

B.Com. Part - I
Semester I

Appendix- H

COMPUTER FUNDAMENTAL AND OPERATING SYSTEM -I

Time : 3 Hours

Theory : Marks 60

Practical: Marks 40

Objective: The objectives of this course are to impart basic knowledge about Computer, Word Processing.

Unit-I

Fundamentals of Computer: Introduction to Computer- Definition, Evolution, Characteristics, Generations, Types & Applications of Digital Computer.

Unit-II

Computer Organization: Block Diagram of Computer, Input Unit, Output Unit.

CPU: Memory Unit, Arithmetic Logic Unit, Control Unit.

Computer Software: Concept of Software and Hardware.

Types of Software: System Software, Application Software, and Firmware.

Unit-III

Memory organization of Computer:

Primary Memory: Concept, Types: RAM, SRAM, DRAM.

Read-Only Memory: PROM, EPROM, EEPROM.

Secondary Memory: Concept, Types: Hard Disk, Optical Disk, Pen Drive, Memory Card, Data Card, Blue Ray Disc.

Unit-IV:

Input/Output Devices of Computer System:

Input Devices: Keyboard, MICR, OCR, Bar Coding, Mouse.

Output Devices: Printers, Types of Printers: Dot Matrix Printer, Laser Printer, and Inkjet Printer.

Monitor: CRT, LCD, LED.

Unit-V:

Word Processing Working with Text [MS-WORD 2007]:

Concept of Word processing, MS-Word Screen Components, Working with Ribbon, Creating, Opening, Saving and Printing a Document.

Formatting Document: Paragraph Format, Aligning Text and Paragraph, Line Spacing, Bullets and Numbering, Border and Shading, Header & Footer, Multiple Columns, Change Case, Subscript, Superscript.

BOOKS RECOMMENDED :

1. Fundamentals of Computers □□ Rajarman □PHI□
2. Computer Fundamentals-B.Ram (WE)
3. Introduction to IBMPC & Applications-Taxali.
4. MS-OFFICE (PHI)
5. MS-OFFICE (BPB)
6. MS-OFFICE (TMH)
7. Yeats : Systems Analysis & Design ; Macmillan India, New Delhi.
8. Basics of Computer and Business Mathematics, By Dr. Rajiv Ashtikar, Dr. Santosh Sadar and Prof. Vilas Chopade : Payal Prakashan, Nagpur.
9. Computer Fundamentals & Operating System : Supriya Bhagade-Pimpalapur & Co. Pub.,Nagpur.
10. संगणक मूलतत्वे आणि चलन प्रणाली -Prof. S.M.Kolte, Pimpalapur & Co. Publishers, Nagpur.

Practicals based on Microsoft Word 2007.

Note : B.Com. Sem. I & II Practical Batch will be of 20 students.

SCHEME

Year	Paper	Total Marks		Min. Passing Marks	
		T	P	T	P
B.COM.Sem.I	Computer Fundamentals & Operating System-I	60	*40	24	16

***Division of Marks for Practical**

Record preparation	10 Marks
Practical	15 Marks
Discription	10 Marks
Viva	05 Marks

TOTAL 40 Marks

(Use Answer Book for practical provided by the University)

B.Com. Part - I

Semester II

COMPUTER FUNDAMENTAL AND OPERATING SYSTEM -II

Time : 3 Hours

Theory : Marks 60

Practical : Marks 40

Objective: The objectives of this course are to impart basic knowledge about Computer, MS-Word Processing 2007 and MS-PowerPoint 2007.

Unit-I :Operating System:

Operating System Basics: Introduction, Main Functions, Structure, Types of Operating System. Concepts of Popular Operating Systems: MS DOS, MS WINDOWS, MS Window NT, UNIX, LINUX, MACINTOSH.

Window 7: Introduction, Features, Types and Elements of Windows.

Window Screen : Desktop, Computer, Documents, Recycle Bin, Internet Explorer, Task Bar, Properties, Management of the Files & Folders.

Unit-II :Operating System [Advance]:

Program and Features: Installing and uninstalling various programs, Accessories.

Functions of operating system- Memory management, CPU Management, File Management, I/O Device Management, Data Management, Security.

Unit-III :Modern communications (Concepts only):

Communications: FAX, Voice mail, and information services; e- Mail, Group Communication: Tele conferencing, Video conferencing, File exchange; Bandwidth; Modem; Network Topologies: Network types LAN, MAN, WAN and their Architecture, Dial up access.

Unit-IV :Word Processing working with Table and Graphics: [MS-WORD 2007]

Working with Tables; Create, Add Rows & Columns, Convert Table to Text, Using Graphics & Objects; Insert Clip Arts, Links, Shapes, Text Box, WordArt, Drop Cap, Procedure and Application of Mail Merge

Unit-V :PowerPoint Presentation:

Working with MS-PowerPoint 2007 : Concept of Presentation, MS-PowerPoint Screen, Creating, Opening and Saving Presentations, Inserting Text, Clips & WordArt to Slides, Working with Different Slide Views, Background features, Gallery, Color Layout, Slide Effects, Slide Show and Printing.

BOOKS RECOMMENDED :

1. Fundamentals of Computers by Rajarman PHI
2. Computer Fundamentals-B.Ram (WE)
3. Introduction to IBMPC & Applications-Taxali.
4. MS-OFFICE (PHI)
5. MS-OFFICE (BPB)
6. MS-OFFICE (TMH)
7. Yeats : Systems Analysis & Design ; Macmillan India, New Delhi.
8. Basics of Computer and Business Mathematics, By Dr. Rajiv Ashtikar, Dr. Santosh Sadar and Prof. Vilas Chopade : Payal Prakashan, Nagpur.
9. Computer Fundamentals & Operating System : Supriya Bhagade-Pimpalpure & Co. Pub.,Nagpur.
10. संगणक मूलतत्त्वे आणि चलन प्रणाली -Prof. S.M.Kolte, Pimpalpure & Co. Publishers, Nagpur.

Practicals based on Microsoft Word 2007 & Microsoft Power Point 2007

Note : B.Com. Sem. I & II Practical Batch will be of 20 students.

SCHEME

Year	Paper	Total Marks		Min. Passing Marks	
		T	P	T	P
B.COM.Sem.I	Computer Fundamentals & Operating System-I	60	*40	24	16

***Division of Marks for Practical**

Record preparation	10 Marks
Practical	15 Marks
Discription	10 Marks
Viva	05 Marks

TOTAL 40 Marks

(Use Answer Book for practical provided by the University)

B.Com. Part - I

Semester I

PRINCIPLES OF ECONOMICS

Time : 3 Hours

Marks : 80

Unit-I : INTRODUCTION :

- 1.1 Definition of Economics : Adam Smith, Marshall & Robbins.
- 1.2 Definition of J.K. Mehta, Amartya Sen & Mahanobis.
- 1.3 Economic Laws : Nature, Characteristics, Limitation & Importance.
- 1.4 Micro Economics-Meaning, Scope, Merits & Demerits, Importance.
- 1.5 Macro Economics-Meaning, Scope, Merits & Demerits, Importance.

Unit-II : UTILITY APPROACH :

- 2.1 Meaning and Definition.
- 2.2 Marginal diminishing Utility Theory.
- 2.3 Equi Marginal Utility Theory.
- 2.4 Demand : Meaning, Definition, Change in Demand.
- 2.5 Law of Demand & its Exceptions.

Unit-III : ELASTICITY OF DEMAND :

- 3.1 Concept and Types.
- 3.2 Measurements.
- 3.3 Determinants and Importance.
- 3.4 Indifference Curve : Meaning, Definition & Rate of Marginal Substitute. (MRS)
- 3.5 Characteristics of Indifference Curve.

Unit-IV : PRODUCTION FUNCTION :

- 4.1 Meaning and Definition.
- 4.2 Law of Variable proportion.
- 4.3 ISO quants : Concept & Characteristics.
- 4.4 Internal economies & diseconomies.
- 4.5 External economies & diseconomies.

Unit-V : COST AND REVENUE :

- 5.1 Meaning & Types of Cost.
- 5.2 Short run Cost Curve.
- 5.3 Long run Cost Curve.
- 5.4 Meaning & Types of revenue.
- 5.5 Total, Average & Marginal revenue Curve.

BOOKS RECOMMENDED :

1. Ahuja H.L. : Business Economics : S.Chand & Co.New Delhi.
2. Business Economics : Pimpalkar, Bapat, Joshi, Orient-Longmans.
3. Koustsoyianni A Modern Micro Economics:Macmillan New Delhi.
४. अर्थशास्त्राचे सिध्दांत □ प्रा. जी.एन्. ामरे, पिंपळापूरे प्रकाशन.
५. व्यावसायिक अर्थशास्त्र □ डॉ.रा.य.माहारे,अंशुल पब्लिकेशन, नागपूर.
. अर्थशास्त्रके सिध्दांत □ जोशी, सिंग, पीवास्तव, जयपूर.
७. आधुनिक सुक्ष्मअर्थशास्त्र □ के.पी.एम्.सुंदरम्.
8. व्यवसायिक अर्थशास्त्र □ प्रा.एच.आर.तिवारी, डॉ.के.के.पाटील, डॉ. पी. पी.तायवाडे आणि वाय.पी.सिंग - अद्वैत प्रकाशन, अकोला.
9. Business Economics : Dr.Sudhir Bodhankar, Dr, Medha Kanetkar, Shri Sainath Prakashan, Nagpur.
10. Business Economics : Dr. (Mrs.) Pushpa Tayade-Shree MangeshPrakashan, Ramdaspath, Nagpur-10.
11. Business Economics (English Edition) : Dr.G.N.Zamare-Pimpalpure & Co.Publishers, Nagpur.
१२. व्यावसायिक अर्थशास्त्र (मराठी आवृत्ती) :डॉ.जी.एन्. ामरे-Pimpalpure & Co. Publishers, Nagpur.

B.Com. Part - I
Semester II
BUSINESS ECONOMICS

Time : 3 Hours

Marks : 80

Unit-I: BUSINESS AND MANAGERIAL ECONOMICS :

- 1.1 Meaning and characteristics of Business Economics.
- 1.2 Meaning, Definition and characteristics managerial Economics.
- 1.3 Nature and Scope of Managerial Economics.
- 1.4 Objectives and Importance of managerial Economics.
- 1.5 Relation of managerial Economics with Business Economics and Business Management.

Unit-II: MARKET STRUCTURE :

- 2.1 Meaning and classification of Markets.
- 2.2 Working of Price Mechanism.
- 2.3 Monopoly : Meaning and Characteristics.
- 2.4 Price determination under monopoly
- 2.5 Price discrimination under monopoly.

Unit-III: MARKET STRUCTURE :

- 3.1 Monopolistic competition : Meaning and Characteristics.
- 3.2 Price determination in monopolistic competition.
- 3.3 Oligopoly : Meaning and Characteristics.
- 3.4 Price determination under Oligopoly.
- 3.5 Perfect competition : Meaning, Characteristics and determination.

Unit-IV: FACTORS PRICING :

- 4.1 Nature of demand & supply of factors inputs.
- 4.2 Marginal productivity theory.
- 4.3 WAGES : Meaning & Types.
- 4.4 Determination of wages and Exploitation of Labour.
- 4.5 RENT : Concept, Ricardian and modern theories of Rent, Quasi Rent.

Unit-V : FACTORS PRICING :

- 5.1 INTEREST : Concept and time preference.
- 5.2 Loanable funds and Liquidity preference theory of Interest.
- 5.3 PROFIT : Meaning and Definition.
- 5.4 Dynamic & Risk bearing theory of Profit.
- 5.5 Innovation theory of Profit.

BOOKS RECOMMENDED :

1. Ahuja H.L. : Business Economics : S.Chand & Co.New Delhi.
2. Business Economics : Pimpalkar, Bapat, Joshi, Orient-Longmans.
3. Koustsoyianni A Modern Micro Economics:Macmillan New Delhi.
४. अर्थशास्त्राचे सिध्दांत □ प्रा. जी.एन्. ामरे, पिंपळापूरे प्रकाशन.
५. व्यावसायिक अर्थशास्त्र □ डॉ.रा.य.माहोरे,अंशुल पब्लीकेशन, नागपूर.
६. अर्थशास्त्रके सिध्दांत □ जोशी, सिंग, गीवास्तव, जयपूर.
७. आधुनिक सुक्ष्मअर्थशास्त्र □ के.पी.एम्.सुंदरम्.
८. व्यवसायिक अर्थशास्त्र □ प्रा.एच.आर.तिवारी, डॉ.के.के.पाटील, डॉ.बी.बी.तायवाडे आणि वाय.पी.सिंग -अद्वैत प्रकाशन, अकोला.
9. Business Economics : Dr.Sudhir Bodhankar, Dr, Medha Kanetkar, Shri Sainath Prakashan, Nagpur.
10. Business Economics : Dr. (Mrs.) Pushpa T
11. ayade-Shree Mangesh Prakashan, Ramdaspeth, Nagpur-10.
12. Business Economics (English Edition) : Dr.G.N.Zamare-Pimpalapur & Co. Publishers, Nagpur.
१३. व्यावसायिक अर्थशास्त्र (मराठी आवृत्ती) :डॉ.जी.एन. ामरे-Pimpalapur & Co. Publishers, Nagpur.

**B.Com. Part - I
Semester I
ADVANCED ACCOUNTANCY**

Time : 3 Hours

Marks : 80

Objectives : To impart basic Accounting Knowledge as applicable to business.

Unit-I 1.1 Meaning, definition, scope, need and development of Book keeping & Accounting. Objectives, principles Concepts and conventions of Accounting. Branch Accounts.

1.2 **Accounting Transactions :**

Classification of Accounts, Rules of debit and credit, Journal & ledger, Rules regarding posting and balancing of ledger Account and Trial Balance.

1.3 **Rectification of errors :**

Types of errors, Rectification entries and suspense Account.

Unit-II 2.1 **Sub- subsidiary Book :**

Sub-sidiary Book, Purchases Book, Purchases Return Book, Sales Book, Sales Return Book.

2.2 **Cash Book :**

Single column/Simple Cash Book, Double column Cash Book, Triple column Cash Book and petty Cash Book.

Unit-III Final Accounts of individual, Manufacturing Account, Trading Account, Profit & Loss Accounts, Balance Sheet with Adjustment.

Unit-IV 4.1 **Depreciation Methods :**

Concepts of depreciation, Different methods of depreciation.

Problem on :

I) Straight line Method.

II) Reducing Balance Method.

Unit-V **Bank Reconciliation statement :**

Meaning, Importance and need, Cause of difference between cash book and pass book. Preparation of all types of Bank Reconciliation statement.

BOOKS RECOMMENDED

- Anthony, R. N. and Reece, J. S. : Accounting Principles; Richard Irwin Inc.
- Gupta, R. L. and Radhaswamy, M : Financial Accounting; Sultanchand and Sons, New Delhi.
- Monga J. R. Ahuja Girish, and Sehgal Ashok : Financial Accounting; Mayur Paper Back, Noida.
- Shukla, M. C., Grewal T S., and Gupta, S. C. : Advanced Accounts; S. Chand & Co. New Delhi.
- Compendium of Statement and Standards of Accounting ; The Institute of Chartered Accountants of India, New Delhi.
- Agarwala A. N., Agarwala K. N. : Higher Sciences of Accountancy; Kitab Mahal, Allahabad. (Hindi and English)
- Ashok Banerjee : Financial Accounting; Excel Books, New Delhi-110028.
- N. Vinayakam, P.L. Mani, K.L. Nagarajan : Principles of Accountancy; Eurasia Publishing House (Pvt.) Ltd., New Delhi-110 055.
- R.R. Gupta : Advanced Accountancy.
- Jain, Narang (Kalyanipulli) : Advanced Accountancy.
- William Pickles : Accountancy.
- A. Mukherjee, M.Hanif : Modern Accountancy ; Tata McGraw Hill Publishing Co. Ltd.
- P.C. Tulsian : Accountancy; Tata McGraw Hill Publishing Co. Ltd.
- Monga, Gandhi, Kadu : Advanced Accounts; National Publishing House.
- S. Chakravorti : Advanced Accounting.
- Fundamentals of Accounting : R.L. Gupta & V.K. Gupta, Sultanchand & Sons.
- fundamentals of Accounting : T.P Ghosh, Sultanchand & Sons.
- Financial Accounting : Payal Prakashan, Nagpur.
- Financial Accounting : V.R. Mohota, Rashi publication, Arni, Distt. Yavatmal.

- Financial Accounting : Dr. Gajanan Patil, Dr. Shakil Sattar, Dr. Anil Bhawsar, Dr. Dattatraya Gujrathi-Das Ganu Prakashan, Nagpur.
- Financial Accounting : Dr. anetkar Medha, Dr. Baheti D.R. □ Shri Sainath Prakashan, Nagpur.
- Financial Accounting : L.N. Chopde, D.H. Choudhary, Dr. Raju, L. Rathi, Sheth Publishers Pvt. Ltd, Mumbai-31.

हिंदी

रूपराम गुप्त, विद्यासरन गुप्त : एडवांसड एकाउन्टेसी आगरा बुक स्टोअर्स

डॉ. एस.एम.शु ला : अडव्हान्स अकौन्टन्सी.

स सेना, वैश्य : उच्च लेखाकर्म

डॉ.एम.पी.खंडेलवाल : उच्चतर लेखाकर्म.

ए.एन.अग्रवाल : उच्चतर लेखावि गान.

जे.के.अग्रवाल : बृहत लेखाकर्म.

गुप्ता, अग्रवाल : एडवान्सड एकाउन्ट्स एस.चान्द.

मराठी

डॉ.शु ल, डोंगरे, मोहता : लेखा तत्व आणि व्यवहार पिंपळापुरे अॅण्ड कं. पलिशर्स, नागपुर.

प्रा. अरविंद शेंडे, प्रा. अब्दुल बारी : वित्तीय लेखांकन भाग-१ अनुराधा प्रकाशन, नागपुर.

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गजानन पाटील, भरत मेघे, विकास चोपडे : आ थक लेखांकन दत्त सन्स, सदर, नागपुर.

प्रा.भ.नी. गग, प्रा.वि.द. पें ारकर, ज.अ. पाध्ये : उच्च लेखाकर्म मंगेश प्रकाशन.

प्रा. लांजेवार, गुल्हाने, कडु : लेखाकर्म भाग-१ संगम प्रकाशन.

नाथ, लांजेवार, भागवत : उच्च लेखाकर्म भाग-१ : महाराष्ट्र राज्य ग्रंथ नि मती मंडळ.

प्रा.ए.एस. उखळकर : उच्च लेखाकर्म भाग-१ विद्या प्रकाशन.

रोडे, स्मार्थ, नेन्बारे : प्रथम वर्ष जमाखर्च □ खंड १ एस.चांद कं. लि.

Appendix- L

**B.Com. Part - I
Semester □ II**

FINANCIAL ACCOUNTING

Time : 3 Hours

Marks : 80

Objective : To develop conceptual understanding of fundamentals of financial accounting system and to impart skills in accounting for various kinds of business transaction.

Unit-I Accounts of Non-trading Institutions

Unit-II Special Accounting Areas : Accounts of Co-operative societies.

Unit-III Accounting for Agriculture Farms.

Unit-IV Hire purchases & Instalment purchase Accounts.

Unit-V Insolvency Account of and Individuals : □aw's of insolvency- Provisions for preferential creditors, Meaning of insolvency, Procedure of insolvency, Problems on Insolvency Accounts.

BOOKS RECOMMENDED

Anthony, R. N. and Reece, J. S. : Accounting Principles; Richard Irwin Inc.

Gupta, R. L. and Radhaswamy, M : Financial Accounting; Sultanchand and Sons, New Delhi.

Monga J. R. Ahuja Girish, and Sehgal Ashok : Financial Accounting; Mayur Paper Back, Noida.

Shukla, M. C., Grewal T S., and Gupta, S. C. : Advanced Accounts; S. Chand & Co. New Delhi.

Compendium of Statement and Standards of Accounting ; The Institute of Chartered Accountants of India, New Delhi.

Agarwala A. N., Agarwala K. N. : Higher Sciences of Accountancy; Kitab Mahal, Allahabad. (Hindi and English)

Ashok Banerjee : Financial Accounting; Excel Books, New Delhi-110028.

N. Vinayakam, P.L. Mani, K.L. Nagarajan : Principles of Accountancy; Eurasia Publishing House (Pvt.) Ltd., New Delhi-110 055.

R.R. Gupta : Advanced Accountancy.

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ए.एन.अग्रवाल : उच्चतर लेखावि गान.
जे.के.अग्रवाल : बृहत लेखाकर्म.
गुप्ता, अग्रवाल : एडवान्सड एकाउन्ट्स एस.चान्द.

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प्रा. लांजेवार, गुल्हाने, कडु : लेखाकर्म भाग-१ संगम प्रकाशन.
नाथ, लांजेवार, भागवत : उच्च लेखाकर्म भाग-१ : महाराष्ट्र राज्य ग्रंथ नि मती मंडळ.
प्रा.ए.एस. उखळकर : उच्च लेखाकर्म भाग-१ विद्या प्राकाशन.
रोडे, स्मार्थ, नेन्बारे : प्रथम वर्ष जमाखर्च खंड १ एस.चांद कं. लि.

Appendix- M

B.Com. Part - I

Semester I

PRINCIPLES OF BUSINESS ORGANIZATION

Unit 1 Commerce and Industry

- 1.1 Commerce and Industry - Meaning, Scope and Evolution
- 1.2 Industrial Revolution- Its Effects
- 1.3 Emergence of Indian MNC
- 1.4 Recent Trends in Business World
- 1.5 Indian Business in New Millennium.

Unit 2 Business

- 2.1 Business Sectors and Its Form
- 2.2 Forms of Business Organization
- 2.3 Unorganised Business-Mom and Pop Stores, Peddlers and Hawkers, Market Traders and Street Traders
- 2.4 E-Commerce and Online Trade
- 2.5 E- Tailers, Cashless Transaction

Unit 3 Merger and Acquisition

- 3.1 Mergers and Acquisition- Meaning and Mergers In India
- 3.2 Networking of Business
- 3.3 Franchising ,Dealership, Business Outlets
- 3.4 BPOs and POs
- 3.5 Patents , Trademarks, Copyrights

Unit □□New Enterprises

- 4.1 Decisions in Setting up Enterprises
- 4.2 Opportunity and Idea Generation
- 4.3 Role of Creativity And Innovation
- 4.4 Feasibility Study and Business Plan
- 4.5 Business Size and Location Decision

Unit □□Trade In India

- 5.1 Whole Sale and Retail Trade
- 5.2 Malls, Super Markets, Hypermarket
- 5.3 Stores-Speciality, Convenience, Departmental and Discount
- 5.4 Transport, Insurance, Communication and Other Services
- 5.5 Import □ Export Trade Procedure

Reference :

1. **Organization: Text, Cases and Readings on the Management of Organizational Design and Change**, J.P.Kotter, L.A. Schlesinger and V. Sathe.
2. **Business Organization & Management**, Mr.Mahesh Chaudhary.
3. **Business Organization & Management**, Kaul V (Pearson Education 2012).
4. **Business Organization & Management**, Tulsian P and Pandey V (Pearson Education 2011).
5. **Business Environment**, Cherunilam F. (Himalaya Publishing House 2010).
6. **Business Sutra**, Pattanaik D. (Aleph Book Company 2013).
7. **Organizational Traps: Leadership, Culture, Organizational Design**, Chris A (Oxford University Press 2010).
8. **World Class in India**, Piramal G and Ghoshal S (Penguin India 2002).
9. **Business Maharajas**, Piramal G (Penguin India 2011).
10. **On Becoming a Leader**, Warren B., (Perseus Books Group 2009)

Appendix- N

**B.Com. Part - I
Semester □ II**

PRINCIPLES OF BUSINESS MANAGEMENT

Unit □1 Management Concept

- 1.1 Management-Concept, Meaning, Definition and Importance
- 1.2 Management Thought and Schools
- 1.3 Contribution of Fredrik Taylor
- 1.4 Contribution of Henry Fayol
- 1.5 Contribution of Elton Mayo

Unit □2 Planning

- 2.1 Planning : Concept, Meaning and Definition.
- 2.2 Nature and Importance of Planning
- 2.3 Objectives of Planning
- 2.4 Forecasting and Planning
- 2.5 Planning Process.

Unit □□Organizing

- 3.1 Organization -Concept, Nature, Meaning and Importance
- 3.2 Principles of Organization.
- 3.3 Line Organization
- 3.4 Staff Organization
- 3.5 Departmentalization

Unit □□Directing

- 4.1 Directing- Concept, Meaning, Definition and Importance.
- 4.2 Nature of Direction
- 4.3 Advantages and Disadvantages
- 4.4 Motivations □ Concept, Meaning and Importance
- 4.5 Coordination: - Meaning and Principle

Unit □□Controlling

- 5.1 Controlling-Concept, Meaning, Definition and Importance.
- 5.2 Advantages and Disadvantages
- 5.3 Technique of Controlling
- 5.4 Tool of Controlling
- 5.5 Process of Controlling.

Reference :

1. **MGMT: Principles of Management**, Chuck Williams, Cengage Learning,
2. **Boston** : Cengage Learning Cop. 2016
3. **Principles of Management 1st Edition**, Charles W.L. Hill (Author), Steven McShane.
4. **Principles of Management Paperback-2009**, Mason Carpenter (Author), Talya Bauer, Berrin Endogan

NOTIFICATION

No. 41 /2018

Date : 7 June, 2018

Subject : Implementation of New Syllabi of Various Course/Subjects as per semester and credit & Grade System in the Faculty of Commerce & Management from the session 2018-2019 & onwards.

It is notified for general information of all concerned that, the authorities of the University has accepted Semester & Credit & Grade System syllabi of various Course/ Subjects of **B.Com. Part-II, Semester- III & IV** mentioned in column No.2 and which is to be implemented stagewise from the session 2018-2019 and onwards with appendices as shown in column No.3 of the following table.

TABLE

Sr.No.	Course / Subjects	Appendices of the new syllabi.
1	2	3
<u>B.Com. Semester- III</u>		
1.	Compulsory English	The Syllabi prescribed for the subject Compulsory English which is appended herewith as Appendix - A
2.	Supplementary English	The Syllabi prescribed for the subject Supplementary English which is appended herewith as Appendix - B
3.	Marathi	The Syllabi prescribed for the subject Hindi which is appended herewith as Appendix - C
4.	Hindi	The Syllabi prescribed for the subject Sanskrit which is appended herewith as Appendix - D
5.	Sanskrit	The Syllabi prescribed for the subject Marathi which is appended herewith as Appendix - E
6.	Pali	The Syllabi prescribed for the subject Urdu which is appended herewith as Appendix - F
7.	Urdu	The Syllabi prescribed for the subject Pali which is appended herewith as Appendix - G
8.	Company Account	The Syllabi prescribed for the subject Company Account which is appended herewith as Appendix - H
9.	Business Mathematics	The Syllabi prescribed for the subject Business Mathematics which is appended herewith as Appendix - I
10.	Auditing	The Syllabi prescribed for the subject Auditing which is appended herewith as Appendix - J
11.	Monetary System	The Syllabi prescribed for the subject Monetary System which is appended herewith as Appendix - K
12.	Information Technology & Business Data Processing - I	The Syllabi prescribed for the subject Information Technology & Business Data Processing - I which is appended herewith as Appendix - L
<u>B.Com. Semester- IV</u>		
1.	Compulsory English	The Syllabi prescribed for the subject Compulsory English which is appended herewith as Appendix - M
2.	Supplementary English	The Syllabi prescribed for the subject Supplementary English which is appended herewith as Appendix - O
3.	Marathi	The Syllabi prescribed for the subject Hindi which is appended herewith as Appendix - P
4.	Hindi	The Syllabi prescribed for the subject Sanskrit which is appended herewith as Appendix - Q
5.	Sanskrit	The Syllabi prescribed for the subject Marathi which is appended herewith as Appendix - R

- | | | |
|-----|---|---|
| 6. | Pali | The Syllabi prescribed for the subject Urdu which is appended herewith as Appendix - S |
| 7. | Urdu | The Syllabi prescribed for the subject Pali which is appended herewith as Appendix - T |
| 8. | Corporate Accounting | The Syllabi prescribed for the subject Corporate Accounting which is appended herewith as Appendix - U |
| 9. | Business Statistics | The Syllabi prescribed for the subject Business Statistics which is appended herewith as Appendix - V |
| 10. | Income Tax | The Syllabi prescribed for the subject Income Tax which is appended herewith as Appendix - □ |
| 11. | Indian Financial System | The Syllabi prescribed for the subject Indian Financial System which is appended herewith as Appendix - X |
| 12. | Information Technology & Business Data Processing - II | The Syllabi prescribed for the subject Information Technology & Business Data Processing - I which is appended herewith as Appendix - Y |
-

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Amravati.

**B.Com Part-II
SEMESTER-III
ENGLISH (COMPULSORY)**

Marks :- 40

Time :- 2 Hours

**I) Text Prescribed -
Impressions**

An Anthology of Prose and Poetry Published by Anagav Publishers & Distributors,
Nagpur.

Unit- I :- Prose

- 1 Travel by Train - J.P. Priestley
- 2 Two Gentlemen of Verona - A.J. Cronin
- 3 Go, Miss the World :- Subroto Chakrabarti
- 4 The Struggle for an Education Up from Slavery : An Autobiography by Booker T. Washington

Unit-II :- Poetry

- 1 Here the mind is without Fear - Rabindranath Tagore
- 2 Stopping by Woods on a Snowy Evening - Robert Frost
- 3 Leisure - W.H. Davies
- 4 The Daffodils - William Wordsworth

Unit-III :- Communication skills

2) Book Prescribed :-

Synergy

Communication in English and Study Skills Ed. by Orient Black Swan.

Following chapters from Communication Skills are prescribed :-

- 1 An Introduction to Communication.
- 2 Notices, Agendas and Minutes.
- 3 Presentations.

DISTRIBUTION OF MARKS

1) Impressions :-

Unit – I – Prose :

Any 3 out of 4 questions..... [12 Marks]

[4 Marks each]

Unit-II- Poetry :-

Any 3 out of 4 questions..... [12 Marks]

[4 Marks each]

2) Unit-III Communication skills

SYNERGY :-

Any 2 out of 3 questions..... [08 Marks]

[4 Marks each]

8 Multiple Choice questions on Unit I & II [8 Marks]

Internal Assessment :- (10 Marks)

1 Home Assignment [05 Marks]

2 Unit Test [05 Marks]

Bom Part-II
SEMESTER-III
SUPPLEMENTARY ENGLISH

Marks :- 40

Time :- 2 Hours

I) Text Prescribed -

Footprints

□ A Supplementary English Coursebook for Undergraduates □ Published by □aghav Publishers & Distributors, Nagpur.

Unit- I :- Prose

- | | | |
|-----------------------------|---|-------------------|
| 1 □ Tolerance | - | E.M. □orster |
| 2 □ n Shaking Hands | - | A.G. Gardiner |
| 3 □ f Travel | - | □rancis □acon |
| 4 □ n knowledge and □ isdom | - | □ertrand □ussell. |

Unit-II :- Poetry

- | | | |
|-------------------------|---|----------------------|
| 1 □ The Solitary □eaper | - | □ illiam □ ordsworth |
| 2 □ The □oad not Taken | - | □obert □rost |
| 3 □ I Too | - | □angston Hughes |
| 4 □ Teacher | - | □akshman Hirulkar |

Unit – III - Short Stories :-

- | | | |
|----------------------|---|--------------------------|
| 1 □ The Cabuliwallah | - | □abindranath Tagore |
| 2 □ Monday Morning | - | Mark Twain |
| 3 □ Drought | - | Sharadchandra Chatterjee |

DISTRIBUTION OF MARKS

1) Footprints :-

Unit – I – Prose :

Any 3 out of 4 □uestions..... □12 Marks□
□4 Marks each□

Unit-II- Poetry :-

Any 3 out of 4 □uestions..... □12 Marks□
□4 Marks each□

Unit- III- Short Stories :-

Any 2 out of 3 □uestions..... □8 Marks□
□4 Marks each□

8 Multiple Choice □uestions on Unit I & III □8 Marks □

Internal Assessment :-

(10 Marks)

- | | |
|---------------------|-----------|
| 1 □ Unit Test | □5 Marks□ |
| 2 □ Home Assignment | □5 Marks□ |

□□□□□

बी.कॉम. भाग २
विषय -- मराठी
सत्र तिसरे

लेखी परीक्षा ४० गुण

अंतर्गत मूल्यमापन १० गुण

नेमलेले पाठ पुस्तक अनुबंध भाग-२ सत्र ३ रे

अनुक्रमणिका

विभाग अ : वचारिक

१)	या अंधारातून वाट सापडत नाही	रा.ग. जाधव	संध्यासमयीच्या गुजगोष्टी
२)	अद्भूतरम्य आणि रू तदायक जीवन:	डॉ.वि.भि.कोलते	
३)	राष्ट्रसंत तुकडोजी : एक विचार	डॉ.अरविंद देशमुख	

विभाग ब : ललित

१)	एक पाटलेला तंत्र ।	स्टीव्ह जॉब	
२)	डेबूचा गाडगेबाबा होतांना.....	डॉ.वि ल वाघ	
३)	पारख	नरें इंगळे	

विभाग क : कविता

१)	सोहळा	मधुकर केचे	पुनवेचा थेंब
२)	मोडलेल्या माणसांचे...	ना.धों. महानोर	पान ङड
३)	जगणे कठीण आहे	अशोक थोरात	
४)	वाटा	शशिकांत हिंगोणेकर	युध्द सुरु आहे
५)	हमी भाव वाहून गेला	वि ल कुलट	

विभाग ड : उपयोजित मराठी

- १) स्वपरिचय पत्र व नोकरीसाठी अर्ज लेखन डॉ. भूषण केळकर
(संदर्भ ग्रंथ उपयोजित मराठी - संपादक केतकी मोडक व इतर)

बी.कॉम. भाग २

मराठी
सत्र तिसरे

एकूण गुण ५०
लेखी परीक्षा <input type="checkbox"/> ४० गुण
अंतर्गत मूल्यमापन <input type="checkbox"/> १० गुण
वेळ - २ तास

नेमलेले पाठ पुस्तक : अनुबंध भाग-२, सत्र ३ रे, राघव प्रकाशन, नागपुर

लेखी परीक्षा गुण विभागणी :

विभाग अ : वचारिक	०८ गुण
विभाग ब : ललित	०८ गुण
विभाग क : कविता	०८ गुण
विभाग ड : उपयोजित मराठी	०८ गुण
वरील सर्व विभागांवर आधारित वस्तूनिष्ठ बहुपर्यायी प्रश्न	०८ गुण
एकूण	४० गुण

विभाग ड साठी संदर्भ ग्रंथ म्हणुन □उपयोजित मराठी□संपादक □केतकी मोडक व इतर, पद्मगंधा प्रकाशन,पुणे हा ग्रंथ आहे. या ग्रंथातील प्रकरण ४ थे □स्वपरिचय व नोकरीसाठी अर्ज लेखन, लेखक- भूषण केळकर हे प्रकरण नेमण्यात आले असून त्यावर आधारित दोन लघुत्तरी प्रश्न विचारण्यात येतील. चार गुणांचा एक प्रश्न प्रत्यक्ष प्रकरणावर आधारित असेल आणि चार गुणांचा दुसरा लघुत्तरी प्रश्न हा □स्वपरिचय पत्र तयार करणे □किंवा जाहिरातीचा संदर्भ देवून नोकरीसाठी अर्ज करणे अशा स्वरूपाचा असेल.

प्रश्ननिहाय गुण विभागणी

प्रश्न - १ ला (विभाग अ वचारिक) १ दीघात्तरी प्रश्न	०८ गुण
प्रश्न - २ ला (विभाग ब ललित) १ दीघात्तरी प्रश्न	०८ गुण
प्रश्न - ३ रा (विभाग क कविता) २ लघुत्तरी प्रश्न (प्रत्येकी ४ गुण)	०८ गुण
प्रश्न - ४ था (विभाग ड उपयोजित मराठी) २ लघुत्तरी प्रश्न (प्रत्येकी ४ गुण) (टिप - वरील सर्व प्रश्नांना अंतर्गत पर्याय राहिल.)	०८ गुण
प्रश्न - ५ वा (विभाग अ,ब,क,ड) ८ वस्तुनिष्ठ प्रश्न (प्रत्येकी १ गुण) (टिप □अभ्यासक्रमातील अ.ब.क.ड या विभागांवर आधारीत प्रत्येकी २ प्रश्न.)	०८ गुण

अंतर्गत मूल्यमापन

एकूण १० गुणांची अंतर्गत मूल्यमापन परीक्षा राहिल.

गुण विभागणी

१) घटक चाचणी □Class Test□	०५ गुण
२) गृहपाठ (स्वाध्याय) □Home Assignment□	०५ गुण

लेखी परीक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उत्तीर्ण होणे आवश्यक असेल. त्यासाठी किमान गुण खालील प्रमाणे आवश्यक असतील.

लेखी परीक्षा - ४० पकी १ गुण आवश्यक

अंतर्गत मूल्यमापन- १० पकी ४ गुण आवश्यक

सूचना :

- घटक चाचणी ही अभ्यासक्रमावर आधारित असेल आणि सत्रामध्ये किमान दोन वेळा चाचणी घेवून अंतिम परीक्षेत सरासरी गुणदान ग्रा धरण्यात यावे.
- गृहपाठ हा पाठ्यपुस्तकांव्यतिरिक्त इतर कोणत्याही भाषिक कौशल्य विकसित करणाऱ्या विषयावर असावा.

Appendix - D

बी. कॉम. द्वितीय वर्ष सत्र - तृतीय हिन्दी

समय - २ घण्टे

पूर्णांक - ४०

पाठ्यक्रम का इकाइयों में अंक विभाजन एवम् प्रश्नों का स्वरूप निम्न प्रकार से होगा।

इकाई : एक	- आधारभूत पाठ्यक्रम के तीन निबंध (१ से ३) से एक दीघात्तरी प्रश्न विकल्प के साथ पूरा जायेगा।	१ X ८ = ८ अंक
इकाई : दो	- भाषागत पाठ्यक्रम के पाँच पाठ (१ से ५) से कुल पाँच लघुत्तरी प्रश्न पूरे जायेंगे। जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।	३ X ४ = १२ अंक
इकाई : तीन	- पद्य विभाग से : कविता (१ से) से दो कविताओं का केन्द्रीय भाव विकल्प के साथ पूरा जायेगा।	२ X ४ = ८ अंक
इकाई : चार	- एक कल्पना विस्तार विकल्प के साथ पूरा जायेगा।	४ X १ = ४ अंक
इकाई : पाँच	- इकाई एक, दो आर तीन से कुल आठ वस्तुनिष्ठ अतिलघुत्तरी प्रश्न पूरे जायेंगे।	८ X १ = ८ अंक

आन्तरिक मूल्यांकन	१० अंक
१. पाठ्यपुस्तक पर आधारित गृहपाठ	- ५ अंक
२. पाठ्यपुस्तक पर आधारित माखिकी	- ५ अंक
पुस्तक -	गानदा, संपादक - प्रो.(डॉ.) ज्योति यास, डॉ. तीर्थराज राय, प्रकाशक - राघव प ब्लशर्स एण्ड डॉ. निभा उपायाय, डॉ. सुशांत ठोके डि स्टब्युटर्स, नागपुर

Appendix - E

बी. कॉम.भाग-२
सत्र -३
संस्कृत (आवश्यक)

वेळ २ तास	लेखी परीक्षा □ ४० अंतर्गत मूल्यमापन - १० एकूण □ ५०
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गद्य विभाग

युनिट -१	०८ गुण
१) मदनिकाया: चातुर्यम् ।	
२) सज्जनश तः जागरणीयाः।	डॉ.संध्या गाडगे

युनिट -२	०८ गुण
३) आदिश :राचार्य ।	
४) मनुमत्स्यकथा ।	

पद्य विभाग

युनिट □ ३	०८ गुण
१) सुभाषितानि	
२) ग्रामरक्षणम्	- डॉ. पी भा.वणकर

युनिट □ ४	०८ गुण
३) पितृमहात्म्यपध्दतिः ।	- डॉ.मधुसूदन पे ा
४) रघुवंशवर्णनम्	

युनिट □ ५	०८ गुण
प्रश्नावली □ कालिदास, भास, भवभूती या संस्कृत कव वर आधारित प्रश्नावली.	

अंतर्गत मूल्यमापन :- १० गुण

घटकचाचणी - ०५ गुण

स्वाध्याय लेखन - ०५ गुण

प्रश्नपत्रिके स्वरूप	गुण - ५०
प्रश्न १ ला	- गद्य विभागातील ४ पैकी २ उतान्यांचे भाषान्तर - १० गुण
प्रश्न २ रा	- गद्य विभागातील २ पकी १ प्रश्नांचे उत्तर - ० गुण
प्रश्न ३ रा	- पद्य विभागातील ४ पकी २ पद्यांचे भाषान्तर - १० गुण
प्रश्न ४ था	- पद्य विभागातील २ पकी १ प्रश्नांचे उत्तर - ० गुण
प्रश्न ५ वा	- वस्तुनिष्ठ प्रश्न १० पकी ८ - ०८ गुण
	अंतर्गत मूल्यमापन - १० गुण

वाणिज्य स्नातक भाग-२
सेमिस्टर-३
पाली आणि प्राकृत (आवश्यक)

वेळ २ तास		लेखी परीक्षा-- ४०
		अंतर्गत मूल्यमापन -१०
		एकूण-- ५०
युनिट-१		
१) कुरुंगमिगजातक -- (जातक कथा)		०८ गुण
२) उचुंग जातक -- (जातक कथा)		
युनिट-२		
१) चित्तवग्ग (धम्मपद)		०८ गुण
२) बुध्दवग्ग (धम्मपद)		
युनिट-३		
१) पु ण्णका थेरी (थेरीगाथा)		०८ गुण
२) महाप्रजापती गातमी थेरी (थेरीगाथा)		
युनिट-४		
१) नालंदा विद्यापीठ		०८ गुण
२) तक्षशिला विद्यापीठ		
युनिट-५		
१) युनिट क्रमांक १ ते ४ वरील वस्तुनिष्ठ प्रश्न --		०८ गुण
अंतर्गत मूल्यमापन		
१) माखिक परीक्षा --	०५ गुण	
२) गृहपाठ --	०५ गुण	
संदर्भग्रंथ		
१) जातक पालि --	नालंदा संस्करण, इगतपुरी	
२) धम्मपद पालि --	डॉ.भदन्त आनंद कासल्यायन	
३) थेरीगाथा --	डॉ.विमलकित	
४) थेरीगाथा --	डॉ.आर.जे.वानखडे	
५) पाली साहित्य का इतिहास -	भरतसिंह उपाध्याय	
) पाली साहित्य का इतिहास -	डॉ.मालती साखरे	

वाणिज्य स्नातक भाग-२
सेमिस्टर-३
पाली व प्राकृत (आवश्यक)

वेळ २ तास		५० गुण
प्रश्नपत्रिकेचे स्वरूप		
प्रश्न-१ अ) भाषांतर करा (दोन पकीएक)		०४ गुण
ब) सामान्य प्रश्न सोडवा (दोन पकीएक)		०४ गुण
प्रश्न-२ अ) संदर्भसह गाथांचे स्पष्टीकरण (दोन पकीएक)		०४ गुण
ब) सामान्य प्रश्न सोडवा (दोन पकीएक)		०४ गुण
प्रश्न -३ दीघात्तरी प्रश्न सोडवा (दोन पकीएक))		०८ गुण
प्रश्न -४ सामान्य माहिती लिहा		०८ गुण
प्रश्न -५ वस्तुनिष्ठ प्रश्न सोडवा. (कोणतेही चार)		०८ गुण
(प्रत्येकी दोन गुण)		

Compulsory Urdu

B. Com. - 2

Semister - III

Theory : 40 Marks

Time : 2 Hours

Text prescribed for study: FUROGH-E-ADAB (Part-II)

(As per model curriculum of the UGC for B. Com. Sem.-III and published by Mother India Publication, Amravati)

Unit - I : PROSE نثر

1. Intekhab Az Safare Hijaz (انتخاب از سفر حجاز) - Abdul Majid Daryabadi (عبدالماجد دریا بادی)

Unit - II : PROSE نثر

1. Tijarat ka Asar: Aql-o-Akhlaq par (تجارت کا اثر: عقل و اخلاق پر) Maulana Hali (مولانا حالی)
2. Marhoom ki yaad mei'n (مرحوم کی یاد میں) - Pitras Bukhari (پطرس بخاری)

Unit - III : POETRY نظم

1. Mukaafaat-e-Amal (مکافات عمل) - Nazeer Akbarabdi (نظیر اکبر آبادی)

Unit - IV : COMMUNICATION SKILL فن تدرسیل و ابلاغ

1. Formal Letter Writing
Applications for Job, Complaint, Order etc.

Unit - V : MCQs

Based on Unit I, II and III

Distribution of Marks (40:10)

A. Theory - 40 Marks

Textual Components

Q. No. 1. Prose

Any two long answer questions to be attempted out of four each carrying four marks

Marks:

4 x 2 = 08

Q. No. 2. Prose

a) Any two short answer questions to be attempted out of four each carrying two marks based on "Tijarat ka Asar: Aql-o-Akhlaq par"

Marks: $2 \times 2 = 04$

b) Any two short answer questions to be attempted out of four each carrying two marks based on "Marhoom ki yaad mei'n"

Marks: $2 \times 2 = 04$

Q. No. 3. Poetry

Any two stanzas to be explained out of three each carrying four marks.

Marks: $4 \times 2 = 08$

Q. No. 4. Communication Skill

1. Formal Letter Writing

Applications for Job, Complaint, Order etc.

(Any two out of four)

Marks $4 \times 2 = 08$

Q. No. 5. Multiple Choice Questions

Marks $8 \times 1 = 08$

B. Internal Assessment - 10 Marks

1. Viva-voca 05 Marks

2. Assignment 05 Marks

**B.Com.II
Semester - III
Company Accounts**

Time: 3 Hours

Full Marks – 80

Objectives: This course enable the students to develop awareness about company account.

Unit-1

Issue, forfeiture and Re-issue of Shares.

Unit- 2

Final Accounts of company

Manufacturing Account, Trading Account, Profit & Loss Account, Profit & Loss Appropriation Account & Balance sheet with Adjustment.

Unit – 3

Profit prior to Incorporations.

Unit- 4

Amalgamation of Company

Unit- 5

Absorption of Company

Books Recommended:

- M.C. Shukla, T.S.Grewal & S.C. Gupta □ Advanced Accounts □ol.II
- □.□.Gupta & M.□adhaswamy □ Advanced Accountancy □ol.II
- S.N.Maheshwari □ Advanced Accountancy □ol.II
- □.D. Agrawal □ □inancial Accounting Advanced □ol.II
- Dr. S.M.Shukla, Dr. S.□.Gupta- Corporate □inancial Accounting.

**B.Com.II
Semester - III
Business Mathematics**

Time: 3 Hours

Full Marks – 80

Objective: The objective of this course is to enable the students to have such minimum knowledge of Mathematics.

Unit-1

- a) Natural Numbers, Integers H.C.L. & L.C.M. on two or more integers.
- b) Linear Equation in one and two variables method with application

Unit- 2 a)

- Percentage
- b) □ Discount
- c) □ Commission and □rokerage

Unit – 3

- a) □ Average,
- b) □ Profit and □oss

Unit □ 4 Mathematics of □inance

- a) □ Simple Interest
- b) □ Compound Interest

Unit-5 Ratio and Proportion:

□atio and percentage Concept of proportion. Simple and Compound proportion, Direct and inverse proportion.

Books Recommended

- Allen □DG: □asic mathematics : Macmillan New Delhi.
- Soni □. S. : □usiness Mathematics, Pitamber Publishing House.
- apoor □. □. □usiness Mathematics , sultanchand & sons Delhi
- * एम. एम. कोलते, - व्यावसायिक अंकगणित, पिंपळापुरे अँड के प लीशर्स, नागपुर
- *नी.मा.झोंगेरे, -- व्यापार गणित
- Dr. Madhuri Datar, Dr.Sindhu Ghate, Dr. Parag Joshi.

**B.Com-II
Semester-III
Auditing**

Time 3 Hours

Marks-80

- Unit 01 Meaning of Auditing, Objectives & Advantages, Types of Audit, commencement of business audit.
- Unit-2 Internal Check system, Audit programme, Routine checking and Vouching, Verification and Valuation of Assets and liabilities.
- Unit-3 Company Auditor, Appointment, Power, duties, Liabilities.
- Unit-4 Audit of Divisible Profit, Dividend, Audit Report, Types of Report,
- Unit-5 Audit of Banking, Insurance & Educational Institutions.

Internal Assessment

20 Marks

- Visit to Auditor's firm & its Report 10 marks
Home Assessment 10 marks

- Books : 1. अंकेक्षणची मुलतत्वे -- ए.एस.उखलकर
2. अंकेक्षण के सिध्दात -- सुरेशचं शु ला
3. Auditing -- Ukhalkar

**B.Com. Part II
Semester III
Monetary System**

Time: Three Hours

Marks: 80

Unit I MONEY:

- 1.1 Barter System of Exchange and its Problems
- 1.2 Brief History, Meaning, Definition and Nature of Money
- 1.3 Functions and Importance of Money
- 1.4 Kinds of Money: Commodity, Metallic, Paper, E-Money and Virtual Currency
- 1.5 Demonetisation: Merits & Demerits

Unit II VALUE OF MONEY

- 2.1 Demand of Money- Meaning and Determinants
- 2.2 Supply of Money: Meaning and Determinants
- 2.3 Demand-Supply Equilibrium-Value of Money
- 2.4 Fishers Quantity Theory of Money
- 2.5 Criticism on Fishers Theory

Unit III : PRICE FLUCTUATIONS

- 3.1 Inflation-Meaning, Definition and Causes
- 3.2 Inflation-Effects and Measures
- 3.3 Deflation-Meaning, Definition and Causes
- 3.4 Deflation-Effects and Measures
- 3.5 Trade Cycle-Concept and Meaning

Unit IV: MONEY MARKET

- 4.1 Money Market-Meaning, Definition, Nature, Features and Objectives
- 4.2 Indian Money Market-Structure and Components
- 4.3 Functions and Importance of Money Market
- 4.4 Institutions and Instruments of Money Market
- 4.5 Impact of Demonetisation on Indian Money Market

Unit V: CAPITAL MARKET

- 5.1 Concept, Meaning, Definition, Features, Nature and Objectives of Capital Market
5.2 Structure and Components of Indian Capital Market
5.3 Functions and Importance of Capital Market
5.4 SEBI: Organisational Structure, Functions, Powers and Responsibilities
5.5 Role of SEBI in Money and Capital Market

References – III rd Semester

- 1) Gupta S. :- Monetary Planning of India, S. Chand, New Delhi
2) G.N. Halm :- Monetary theory
3) M.N. Garg :- Money Banking
4) Khan M. :- Indian financial system theory & practice, Tata Mcgraw Hill, New Delhi
5) Mithani Dr. D.M. Money, Banking, International Trade & Public Finance Himalaya Publishing house, New Delhi
6) Somashekar Ne.Thi : Money Banking International Trade & Public Finance, Anmol Publication Pvt. Ltd. New Delhi
7) RBI :- Bulletins
8) Report of currency and finance
9) पसा व वित्त :- डॉ. जितें अहिरराव,
10) मुद्रा आणि वित्तीय पत्र :- डॉ. जी.एन. तामरे
11) मुद्रा अधिकोष आणि सार्वजनिक वित्त :- डॉ. रवि- देशमुख, पिपळापुणे अण्ड प लीशर्स, नागपूर- २०१५
12) भारतीय ाँकीग प्रणाली :- डॉ. सुधीर गोधनकर, डॉ. मेघा कानेटकर, साईनाथ प्रकाशन, नागपूर
13) मातृक अर्थशास्त्र :- माधव शेळके

Appendix - L

**B.Com-II
Semester-III**

Information Technology & Business Data Processing-I

Time 3 Hours

Theory Marks – 80

Practical Marks 20

Objective – The objective of this course is to familiarize with basics of Information Technology and use of Spreadsheet Package for Business Data Processing

Unit – I Data and Data Processing:

Data: Concept and Use of Data in Computing.

Data Processing: Concept and Advantages of Data Processing, Application of Data Processing in Business.

Unit – II Database: Concept, Objectives, Need of Database, Database Users.

Data warehousing: Concept, Need and Advantages of Data Warehousing.

Data Mining: Concept, Advantages and Applications of Data Mining,

Unit – III Database management System:

DBMS Concept, Characteristics, Objectives, Advantages, Limitations,

Components of DBMS. **DBMS Models:** Hierarchical, Network and Relational.

Architecture of DBMS: Internal Level, Conceptual Level and External Level

Unit –IV Spreadsheet Package:

MS-Excel 2003 / Higher: Introduction to Spreadsheet Package, Components of Spreadsheet Windows

Spreadsheet Basics: Concept, Columns & Rows, Cell, Cell Address, Cell Range, Cell Pointer, Sheet Tabs.

Working in Worksheet:

Editing and Formatting Worksheet, Alignment of data in a Cell, Inserting & Deleting Cell, Rows and Columns, Changing the Column width and Row height, Page Setup, Saving and Printing of Worksheet.

Unit V Formulas, Functions and Chart in Excel:

Introduction to Formulas, Functions and Categories of Functions.

Working with Common Excel Functions: TODAY, DATEDIF, NOW, UPPER, LOWER, PROPER, CONCATENATE, AVERAGE, MAX, MIN, COUNT, COUNTIF, COUNTA, COUNTBLANK, SUM, SUMIF, AUTOSUM, IF

Chart in Excel: Introduction, Types, Creating and formatting a Chart Displaying, Saving & Printing.

Books Recommendation:

- Microsoft Office Excel 2007 Free Text Book at www.microsoft.com
- Curtis D. Fry Microsoft Excel 2007 Step by Step Published by Microsoft Press
- MS Office 2007
- Pradeep K. Sinha and Priti Sinha's Fundamentals of Computing P Publication.
- Alexis Leon and Mathews Leon's Fundamentals of Information Technology Published by Leon Nikas.
- **Practical Based on Microsoft Excel**

Appendix - M

**B.Com Part-II
SEMESTER-IV
ENGLISH (COMPULSORY)**

Time :- 2 Hours

Marks :- 100

I) Text Prescribed -

Impressions

□ An Anthology of Prose and Poetry Published by Vaghav Publishers & Distributors, Nagpur.

Unit- I :- Prose

- | | | | | |
|--------------------------|---|-------|---|-----------------|
| 1 □ The Town | □ | Chick | - | E. V. Lucas |
| 2 □ Florence Nightingale | □ | | - | Lytton Strachey |
| 3 □ The Gift of Magi | □ | | - | Henry |
| 4 □ Three Hermits | □ | | - | Leo Tolstoy |

Unit-II :- Poetry

- | | | | | |
|----------------------|---|--|---|----------------|
| 1 □ On His Blindness | □ | | - | John Milton |
| 2 □ Solitude | □ | | - | Alexander Pope |
| 3 □ Still I Rise | □ | | - | Maya Angelou |
| 4 □ Money Madness | □ | | - | D.H. Lawrence |

2) Book Prescribed :-

Synergy

□ Communication in English and Study Skills Ed. by Orient Black Swan.

□ Following chapters from Communication Skills are prescribed :-

- 1 □ Interview and Interviewing skills.
- 2 □ Meeting skills
- 3 □ Nonverbal Communication.

DISTRIBUTION OF MARKS

- 1) **Impressions :-**
Unit – I – Prose :
Any 3 out of 4 questions..... 12 Marks
4 Marks each
- Unit-II- Poetry :-**
Any 3 out of 4 questions..... 12 Marks
4 Marks each
- 2) **Unit-III- Communication Skills**
SYNERGY :-
Any 2 out of 3 questions..... 08 Marks
4 Marks each
- 8 Multiple Choice questions on Unit I & II 8 Marks
- Internal Assessment :- (10 Marks)**
1 Home Assignment 5 Marks
2 Personal Interview..... 5 Marks

Appendix - O

**B.Com Part-II
SEMESTER-IV
SUPPLEMENTARY ENGLISH**

Time :- 2 Hours

Marks :- 0

I) Text Prescribed -

Footprints

A Supplementary English Coursebook for Undergraduates Published by P. V. Raghav Publishers & Distributors, Nagpur.

Unit- I :- Prose

- 1 University Days - James Thurber
2 The Portrait of a Lady - Ruskin Bond
3 A Tryst with Destiny - Jawaharlal Nehru
4 My First Dollar - Stephen Leacock

Unit-II :- Poetry

- 1 The Human Seasons - John Keats
2 I, Captain My Captain - Walt Whitman
3 A Fragment - P. B. Shelley
4 Stay Calm - Grenville Kleiser

Unit – III - Short Stories :-

- 1 The Bet - Anton Chekhov
2 Mr. Snow All - Somerset Maugham
3 Engine Trouble - K. V. Narayan

DISTRIBUTION OF MARKS

- 1) **Footprints :-**
Unit – I – Prose :
Any 3 out of 4 questions..... 12 Marks
4 Marks each
- Unit-II- Poetry :-**
Any 3 out of 4 questions..... 12 Marks
4 Marks each
- Unit- III- Short Stories :-**
Any 2 out of 3 questions..... 08 Marks
4 Marks each
- 8 Multiple Choice questions on Unit I & III 8 Marks
- Internal Assessment :- (10 Marks)**
1 Home Assignment 5 Marks
2 Personal Interview..... 5 Marks

बी.कॉम. भाग २

सत्र चाथे
मराठी

लेखी परीक्षा ४० गुण

अंतर्गत मूल्यमापन १० गुण

नेमलेले पाठ पुस्तक अनुबंध भाग-२ सत्र ३ रे

अनुक्रमणिका

विभाग अ : वचारिक

१)	आत्मनिरीक्षणाचा परिणाम	महात्मा गांधी	सत्याचे प्रयोग
२)	जेट युगातील माणूस	शंतनु ल. किलास्कर	जेट युगातील माणूस
३)	कर्मवीर आणि महाराष्ट्राची जडणघडण	गंगाधर पानतावणे	आधारवड : कर्मवीर भा राव पाटील गारवग्रंथ

विभाग ब : ललित

१)	धांदुलाचा प्दांत	सर्व ा पी चक्रधर स्वामी	लीळाचरित्र
२)	आगळ	महें कदम	
३)	आबा	विजय पाटील	

विभाग क : कविता

१)	एक आम्ही असे निघालो	नारायण सुव	मा े विद्यापीठ
२)	जुंज	सुरेश भट	एल्गार
३)	दुःखाचं महावस्त्र	पी वि ल	मा या वर्तमानाची नोंद
४)	या नभाला वेचतो मी.....	विष्णू सोळंके	
५)	डा वन	वभव भिवरकर	

विभाग ड : उपयोजित मराठी

- १) जाहिरात लेखन संदीप खरे
(संदर्भ ग्रंथ उपयोजित मराठी - संपादक केतकी मोडक व इतर)

बी.कॉम. भाग २

मराठी
सत्र चाथे

गुण विभागणी

एकूण गुण ५०
लेखी परीक्षा <input type="checkbox"/> ४० गुण
अंतर्गत मूल्यमापन <input type="checkbox"/> १० गुण
वेळ - २ तास

नेमलेले पाठ पुस्तक : अनुबंध भाग-२, सत्र ४ थे, राघव प्रकाशन, नागपुर

लेखी परीक्षा गुण विभागणी :

विभाग अ : वचारिक	०८ गुण
विभाग ब : ललित	०८ गुण
विभाग क : कविता	०८ गुण
विभाग ड : उपयोजित मराठी	०८ गुण
वरील सर्व विभागांवर आधारित वस्तूनिष्ठ बहुपर्यायी प्रश्न	०८ गुण
एकूण	४० गुण

विभाग ड साठी संदर्भ ग्रंथ म्हणुन [उपयोजित मराठी] संपादक [केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे हा ग्रंथ आहे. या ग्रंथातील प्रकरण ८ वे [जाहिरात लेखन], लेखक- संदीप खरे हे प्रकरण नेमण्यात आले असून त्यावर आधारित दोन लघुत्तरी प्रश्न विचारण्यात येतील. चार गुणांचा एक प्रश्न प्रत्यक्ष प्रकरणावर आधारित असेल आणि चार गुणांचा दुसरा लघुत्तरी प्रश्न हा [माहिजेत] किंवा [वस्तू विक्रीची जाहिरात] तयार करणे अशा स्वरूपाचा असेल.

प्रश्ननिहाय गुण विभागणी

प्रश्न - १ ला (विभाग अ वचारिक) १ दीघात्तरी प्रश्न	०८ गुण
प्रश्न - २ ला (विभाग ब ललित) १ दीघात्तरी प्रश्न	०८ गुण
प्रश्न - ३ रा (विभाग क कविता) २ लघुत्तरी प्रश्न (प्रत्येकी ४ गुण)	०८ गुण
प्रश्न - ४ था (विभाग ड उपयोजित मराठी) २ लघुत्तरी प्रश्न (प्रत्येकी ४ गुण) (टिप - वरील सर्व प्रश्नांना अंतर्गत पर्याय राहिल.)	०८ गुण
प्रश्न - ५ वा (विभाग अ,ब,क,ड) ८ वस्तुनिष्ठ प्रश्न (प्रत्येकी १ गुण) (टिप [अभ्यासक्रमातील अ.ब.क.ड या विभागांवर आधारीत प्रत्येकी २ प्रश्न.]	०८ गुण

अंतर्गत मूल्यमापन

एकूण १० गुणांची अंतर्गत मूल्यमापन परीक्षा राहिल.

गुण विभागणी

३) घटक चाचणी [Class Test]	०५ गुण
४) गृहपाठ (स्वाध्याय) [Home Assignment]	०५ गुण

लेखी परीक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उत्तीर्ण होणे आवश्यक असेल. त्यासाठी किमान गुण खालील प्रमाणे आवश्यक असतील.

लेखी परीक्षा - ४० पकी १ गुण आवश्यक

अंतर्गत मूल्यमापन- १० पकी ४ गुण आवश्यक

सूचना :

- घटक चाचणी ही अभ्यासक्रमावर आधारित असेल आणि सत्रामध्ये किमान दोन वेळा चाचणी घेवून अंतिम परीक्षेत सरासरी गुणदान ग्रा धरण्यात यावे.
- गृहपाठ हा पाठ्यपुस्तकांब्यतिरिक्त इतर कोणत्याही भाषिक कौशल्य विकसित करणाऱ्या विषयावर असावा.

Appendix - Q

बी. कॉम. द्वितीय वर्ष सत्र - चतुर्थ हिन्दी

समय - २ घण्टे

पूर्णांक - ४०

पाठ्यक्रम का इकाइयों में अंक विभाजन एवम् प्रश्नों का स्वरूप निम्न प्रकार से होगा।

इकाई : एक	-	आधारभूत पाठ्यक्रम के तीन निबंध (४ से) से एक दीघात्तरी प्रश्न विकल्प के साथ पूरा जायेगा।	१ X ८ = ८ अंक
इकाई : दो	-	भाषागत पाठ्यक्रम के पाँच पाठ (से १०) से कुल पाँच लघुत्तरी प्रश्न पूरे जायेंगे। जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।	३ X ४ = १२ अंक
इकाई : तीन	-	पद्य विभाग से : कविता (से १२) से दो कविताओं का केन्द्रीय भाव विकल्प के साथ पूरा जायेगा।	२ X ४ = ८ अंक
इकाई : चार	-	कुल : लोको तयों पूरे जायेंगी, जिनमें से चार लोको तयों का अर्थ लिखना होगा।	१ X ४ = ४ अंक
इकाई : पाँच	-	इकाई एक, दो आर तीन से कुल आठ वस्तुनिष्ठ अतिलघुत्तरी प्रश्न पूरे जायेंगे।	८ X १ = ८ अंक

आन्तरिक मूल्यांकन

१० अंक

१. पाठ्यपुस्तक पर आधारित गृहपाठ - ५ अंक
 २. पाठ्यपुस्तक पर आधारित माखिकी - ५ अंक
 पुस्तक - आनदा, संपादक - प्रो.(डॉ.) ज्योति यास, डॉ. तीर्थराज राय, प्रकाशक - राघव प ब्लशर्स एण्ड
 डॉ. निभा उपायाय, डॉ. सुशांत ठोके डि स्टब्युटर्स, नागपुर

Appendix -R

बी. कॉम.भाग-२
 सत्र -४
 संस्कृत (आवश्यक)

वेळ २ तास

लेखी परीक्षा □ ४०
 अंतर्गत मूल्यमापन -१०
 एकूण □ ५०

गद्य विभाग

- युनिट -१ ०८ गुण
 १) व्यसने मित्रपरीक्षा । (हितोपदेश)
 ५) लवचन्दकेतुसंवादः ।
 युनिट -२ ०८ गुण
 १) महाराणाप्रतापः ।
 २) विजुतचरितम् ।

पद्य विभाग

- युनिट □ ३ ०८ गुण
 १) प्रवहतात् संस्कृतमन्दाकिनी । - डॉ.गं. आ.पळसुले
 २) चर्पटपत्रजरिका स्तोत्रम् ।
 युनिट □ ४ ०८ गुण
 ३) अन्यो तयः।
 ४) कलिविडम्बनम् - डॉ.नीलकण्ठ दीक्षित
 युनिट □ ५ ०८ गुण
 प्रश्नावली □ भारवी, माघ,अ ाघोष यांच्यावर आधारित प्रश्नावली.

अंतर्गत मूल्यमापन :- १० गुण

घटकचाचणी - ०५ गुण

स्वाध्याय लेखन - ०५ गुण

प्रश्नपत्रिके स्वरूप

गुण - ५०

- प्रश्न १ ला - गद्य विभागातील ४ पैकी २ उताऱ्यांचे भाषान्तर - १० गुण
 प्रश्न २ रा - गद्य विभागातील २ पैकी १ प्रश्नांचे उत्तर - ० गुण
 प्रश्न ३ रा - पद्य विभागातील ४ पैकी २ पद्यांचे भाषान्तर - १० गुण
 प्रश्न ४ था - पद्य विभागातील २ पैकी १ प्रश्नांचे उत्तर - ० गुण
 प्रश्न ५ वा - वस्तुनिष्ठ प्रश्न १० पैकी ८ - ०८ गुण
 अंतर्गत मूल्यमापन - १० गुण

वाणिज्य स्नातक भाग-२
सेमिस्टर-४
पाली आणि प्राकृत (आवश्यक)

वेळ २ तास

लेखी परीक्षा -- ४०
अंतर्गत मूल्यमापन - १०
एकूण -- ५०

युनिट-१

- अ) वेसालियाप चमदस्सन (महापरिनिब्बानसुत्त) ०८ गुण
ब) उलुक जातक (जातक कथा)

युनिट-२

- अ) सिविराज जरिय (चरियापिटक) ०८ गुण
ब) अकिली चरिय (चरियापिटक)

युनिट-३

- अ) चार आर्यसत्य ०८ गुण
ब) आर्य अष्टांगीक मार्ग

युनिट-४

- अ) पाली निबन्ध ०८ गुण

युनिट-५

- अ) युनिट क्रमांक १ ते ४ वरील वस्तुनिष्ठ प्रश्न ०८ गुण

अंतर्गत मूल्यमापन १० गुण

- १) माखिक परीक्षा - ०५
२) गृहपाठ - ०५

संदर्भग्रंथ

- १) दिघनिकाय -- नालंदा संस्करण, इगतपुरी
२) चरियापिटक -- डॉ.शेषराव मे ाम
३) पाली निबंधावली -- डॉ.हरिशंकर शु ला
४) पाली साहित्य का इतिहास - भरतसिंह उपाध्याय
५) पाली साहित्य का इतिहास - डॉ.मालती साखरे
जातक पालि -- नालंदा संस्करण, इगतपुरी

वाणिज्य स्नातक भाग-२
सेमिस्टर-४
पाली व प्राकृत (आवश्यक)

वेळ २ तास

५० गुण

प्रश्नपत्रिकेचे स्वरूप

- प्रश्न-१ दीघात्तरी प्रश्न सोडवा (दोन पकीएक)) ०८ गुण
प्रश्न-२ अ) संदर्भसह स्पष्टीकरण (दोन पकीएक) ०४ गुण
१) लघुत्तरी प्रश्न सोडवा (दोन पकीएक) ०४ गुण
प्रश्न -३ टिपणात्मक (दोन पकीएक)) ०८ गुण
प्रश्न -४ पाली भाषेमध्ये निबंध लिहा (कोणताही एक) ०८ गुण
प्रश्न -५ वस्तुनिष्ठ प्रश्न सोडवा.(कोणतेही चार)(प्रत्येकी दोन गुण) ०८ गुण

Compulsory Urdu

B. Com. - 2

Semister - IV

Theory : 40 Marks

Time : 2 Hours

Text prescribed for study: FUROGH-E-ADAB (Part-II)

(As per model curriculum of the UGC for B. Com. Sem.-III and published by Mother India Publication, Amravati)

Unit - I : PROSE نثر

1. Ek Shahr Paanch Hungame (ایک شہر پانچ ہنگامے) Intezar Husain (انتظار حسین)

Unit - II : PROSE نثر

1. Silsilae Kohe Himalya (سلسلہء کوہ ہمالیہ) - Muhammad Aslam Parvez (محمد اسلم پرویز)
2. Underline (انڈر لائن) - Dr. Muhammad Asadullah (ڈاکٹر محمد اسد اللہ)

Unit - III : POETRY نظم

- Ghazals 1,2,3 غزل - Hasrat Mohani (حسرت موہانی)

Unit - IV : COMMUNICATION SKILL فن ترسیل و ابلاغ

1. Newspaper Reports
2. Advertisement

Unit - V : MCQs

Based on Unit I, II and III

Distribution of Marks (40:10)

A. Theory - 40 Marks

Textual Components

Q. No. 1. Prose

Any two long answer questions to be attempted out of four each carrying four marks

Marks:

$$4 \times 2 = 08$$

Q. No. 2. Prose

a) Any two short answer questions to be attempted out of four each carrying two marks based on "Silsilae Kohe Himalya"

Marks:

$$2 \times 2 = 04$$

b) Any two short answer questions to be attempted out of four each carrying two marks based on " Underline "

Marks:

$$2 \times 2 = 04$$

Q. No. 3. Poetry

Any four couplets to be explained out of seven each carrying two marks.

Marks:

$$2 \times 4 = 08$$

Q. No. 4. Communication Skill

a) Newspaper Report

(Any one out of two)

Marks

$$4 \times 1 = 04$$

b) Advertisement

(Any one out of two)

Marks

$$4 \times 1 = 04$$

Q. No. 5. Multiple Choice Questions

Marks

$$8 \times 1 = 08$$

B. Internal Assessment - 10 Marks

1. Viva-voca 05 Marks

2. Assignment 05 Marks

**B.Com.II
Semester - IV
Corporate Accounting**

Time: 3 Hours

Full Marks 80

Objectives: This course enable the students to develop awareness about corporate accounting.

- Unit- 1** Final Accounts of Banking Company
Schedule wise Profit & Loss Account & Balance Sheet
- Unit – 2** Final Accounts of fire and accident Insurance Company
- Unit -3** Liquidation of Company
Excluding statement of affairs and deficiency Account
- Unit- 4** Valuation of Goodwill
Meaning of Goodwill, need, characteristics, method of valuation of goodwill.
Problems on following methods...
1 Average Profit Method
2 Super Profit Method
3 Capitalization Method.
- Unit- 5** Valuation of Shares:
Meaning of share, need, characteristics, method of valuation of Shares
Problem on following methods.
1 Net Asset Method
2 Field Method.

Books Recommended:

- 1 M.C. Shukla, T.S.Grewal & S.C. Gupta Advanced Accounts Vol.II
- 2 P.K.Gupta & M.Chadhaswamy Advanced Accountancy Vol.II
- 3 S.N.Maheshwari Advanced Accountancy Vol.II
- 4 P.D. Agrawal Financial Accounting Advanced Vol.II
- 5 Dr. S.M.Shukla, Dr. S.K.Gupta- Corporate Financial Accounting



**B.Com.II
Semester - IV
Business Statistics**

Time : 3 Hours

Full Marks 80

Objective: The objective of this course is to enable the students to have such minimum knowledge of Statistics.

Unit-1 :

Introduction :- Statistics as a subject, Descriptive Statistics- Compared to inferential Statistics, Types of data, Collection, Tabulation and presentation of statistical data.

Unit- 2

Index Numbers, Construction of Index Number

Unit – 3

Analysis of Universal Data : Construction of a frequency of distribution, concept of central tendency & their measures, Mean , Median, Mode

Unit – 4

Concept of Dispersion, Absolute and relative measures of dispersion Skewness.

Unit- 5

Co-efficient of correlation Karl Pearson's formula. Calculation of Co-efficient of correlation in grouped and ungrouped data. Probable error.

Books Recommended :-

Gupta S.P. : Statistical Methods

C.S. Sawlikar : Dr P. Ingole, S.P. Mishor : Basic Computer and Statistical Techniques

Elhance D.N. : Fundamental of Statistics

Dr Sukhadeve Parsha S. : A Text book of Modern Approach to Statistics

C.S. Mahajan Applied Statistics.



Appendix -□

**B.Com-II
Semester-IV
Income Tax**

Time 3 hours

Marks-80

- Unit □1 Basic Concept-Income Tax, Income, Total Income, Gross total Income , Assessment Year, Previous Year, Casual Income, Agricultural Income, Person, Heads of Income, Income which does not from part of total Income.
- Unit □2 Computation of Income from Salary & Income from House property
- Unit-3 Income from other sources, Deductions to be made from Gross Total Income, reading to resident Individual.
- Unit □4 Income tax Authorities, Power of Income tax officer & Commissioner, Assessment procedure,
- Unit □5 Return of Income, e-filing procedure, filling of Form No .16 Form No. 10 E, Tax Planning, Advance tax , PAN, TDS.

Internal Assessment

20 Marks

FormNo. 16, 10E, 15G, efilling of return of Income

10 marks

Home Assessment

10 marks

Books :-

1. Income Tax Law & Practice

□

Chagwati Prasad

2. Income Tax Law & Practice

□

Malhotra & Goyal

3. आयकर तत्व आर व्यवहार

--

मेहरोत्रा आर गोयल

4. Taamann's GST Manual

5. आयकर डॉ.घोरपडे आणि डॉ.गोंगले

. आयकर -- उखलकर

. आयकर व अंकेक्षण -- डॉ.विजय उपगडे



B.Com-II
Semester IV
Indian Financial System

Time : 3 Hrs

Total Marks : 80

Int.Ass. : 20

Unit-I Indian Financial Market :

- 1.1 Meaning, Features, Kinds of Finance
- 1.2 Definition & Significance of Indian Financial Market
- 1.3 Structure & Organization of Financial Market
- 1.4 Functions of Indian Financial Market
- 1.5 Problems & Importance of Financial System in Indian Economy.

Unit-II Indian Banks :

- 2.1 Brief History, Definition & Nature of Banks
- 2.2 Classification of Indian Banks.
- 2.3 Banking Services ATM, CDM, Debit Card, Credit Card, E-banking, HIM Bharat Interface for Money
- 2.4 Importance of Banking Services in India
- 2.5 Concept & Importance of Core Banking

Unit-III Commercial Bank :

- 3.1 Meaning & Definition of Commercial Bank
- 3.2 Functions of Commercial Bank
- 3.3 Process of Credit Creation of Commercial Bank
- 3.4 Limitations of Credit Creation
- 3.5 Role & Importance of Commercial Bank in India.

Unit-IV Reserve Bank of India (RBI) :

- 4.1 History, Meaning & Importance of RBI.
- 4.2 Functions of Reserve Bank of India.
- 4.3 Credit Control Quantitative Tools.
- 4.4 Credit Control Qualitative Tools.
- 4.5 Role of RBI in Indian Economy.

Unit-V Stock Exchange :

- 5.1 History, Meaning & Features of Stock Exchange
- 5.2 Structure & Components of Indian Stock Exchange.
- 5.3 Functions of Indian Stock Exchange
- 5.4 Role & Importance of Stock Exchange.
- 5.5 Concept of SENSEX & NIFTY

Books Recommended :

1. Gupta S. :- Monetary Planning of India, S. Chand, New Delhi
2. G.N. Halm :- Monetary theory
3. N. Garg :- Money Banking
4. Khan M. :- Indian financial system theory & practice, Tata Mcgraw Hill, New Delhi
6. Mithani Dr. D.M. Money, Banking, International Trade & Public Finance
7. Himalaya Publishing house, New Delhi
8. Somashekar Ne.Thi : Money Banking International Trade & Public Finance,
9. Anmol Publication Pvt. Ltd. New Delhi
10. :- Bulletins
11. Report of currency and finance
१२. प्रसा व वित्त :- डॉ. जितें अहिरराव,
१३. मुद्रा आणि वित्तीय पत्र :- डॉ. जी.एन. तामरे
१४. मुद्रा अधिाष आणि सार्वजनिक वित्त :- डॉ. रवि- देशमुख, पिपळापुरे अॅण्ड प लीशर्स, नागपूर- २०१५
१५. भारतीय ँकीग प्रणाली :- डॉ. सुधीर ाधनकर, डॉ. मेघा कानेटकर, साईनाथ प्रकाशन, नागपुर
१६. मााीक अर्थशास्त्र :- माधव शेळके.

Appendix -Y

**B.Com-II
Semester-IV**

Information Technology & Business Data Processing-II

Time 3 Hours

Theory Marks – 0
Practical Marks 0

Objective – The objective of this course is to familiarize with basics of Database, Database management System and use of Accounting Package for Business Data Processing.

Unit – I Information – Concept, Characteristics, Data v/s Information, Uses of Information within the Organisation and outside the Organisation

Information Technology: Introduction, Definition of IT, Uses of IT in Business and Various Fields.

Unit- II Computerised Accounting Package:

Computerised Accounting: Concept, Advantages and Limitation of Computer Accounting, Manual vs Computerised Accounting.

Unit-III Accounting Software Tally 9.0 / Higher: Introduction, Features, Company info, Menu, Gateway of Tally Menu, Button Bar, Status Bar, Calculator.

Unit- IV Working in Tally

Company Creation: Accounts only and Accounts with inventory.

Groups: Concept, Predefined Groups, Creation of New Single Group, Display, Alteration and Deletion of Group.

Ledgers: Concept, Single ledger Creation, Display, Alternation & Deletion.

Vouchers: Concept, Types of Vouchers, Features and Configuration of Accounting Vouchers

Transaction: Accounting Voucher, Inventory Vouchers.

Unit- V Reports and Advanced Features in Tally:

Reports Display and Printing: Balance Sheet, Profit & Loss Account, Ratio Analysis, Stock Summary, Trial Balance, Day Book and Account Book

Data Export & Import: ODBC Outward and Inward Connectivity, Data Import and Export, Email, Upload, Backup, Restore.

Indian Tax System: TDS, TCS, GST: computation of GST

Book Recommendation-

Shiksha Gupta's Computer and Financial Accounting with Tally 9.0, Published by dreamTech.

Pradeep K. Sinha and Priti Sinha's Fundamentals of Computing P Publication.

Alexis Leon and Mathews Leon's Database Management System Published by Leon Kikas

Goods & Service Tax Act Sai Jyoti Publication, Nagpur--Prof. Pravin Kamthe, Prof. Meghana Patil.

Practical Based on Tally

NOTIFICATION

No. 47/2018

Date : 7 June, 2018

Subject : Implementation of Syllabi of Various Courses / Subjects as per Semester and Credit & Grade System in the Faculty of Humanites, from the session 2018-2019 and Onwards.

It is notified for general information of all concerned that, the authorities of the University has accepted Semester, Credit & Grade System syllabi of various Courses/ Subjects of B.A. Part-II Semester-III & Semester – IV mentioned in column No.2 and which is to be implemented stagewise from the session 2018-2019 and onwards, with appendices as shown in column No.3 of the following table.

TABLE

Sr.No.	Course / Subjects	Appendices of the New Syllabi
1	2	3.

B.A.Part-II Semester – III & IV

1. English
The Syllabi prescribed for the subject Compulsory English, English Literature, Functional English & Supplymentary English which is appended herewith as **Appendix-A**
2. Marathi
The Syllabi prescribed for the subject Compulsory Marathi , Marathi Literature, which is appended herewith as **Appendix-B**
3. Hindi
The Syllabi prescribed for the subject Compulsory Hindi, Hindi Literature, & Prayojanmulak Hindi which is appended herewith as **Appendix-C**
4. Sanskrit
The Syllabi prescribed for the subject Compulsory Sanskrit & Sanskrit Literature, which is appended herewith as **Appendix-D**
5. Urdu
The Syllabi prescribed for the subject Compulsory Urdu & Urdu Literature, which is appended herewith as **Appendix-E**
6. Persian Literature
The Syllabi prescribed for the subject Persian Literature which is appended herewith as **Appendix-F**
7. Pali & Prakrit
The Syllabi prescribed for the subject Compulsory Pali & Prakrit & Pali Literature which is appended herewith as **Appendix-G**
8. Music
The Syllabi prescribed for the subject Indian Music which is appended herewith as **Appendix-H**

Sd/-
Registrar
Sant Gadge Baba Amravati University.

**SYLLABUS
PRESCRIBED FOR
B.A – PART II EXAMINATION
SEMESTER III
COMPULSORY ENGLISH**

TIME : 3 HOURS

MAX MARKS THEORY : 80 MARKS

MAX MARKS INTERNAL ASSESSTMENT : 20 MARKS

Prescribed Textbook : Blossoming Flowers by Board of Editors, Published by Orient Blackswan.

UNIT I

PROSE –

1. India's Message to the World – Swami Vivekanand
2. The Pleasure of Ignorance – Robert Lynd
3. The Happy Prince – Oscar Wilde
4. The Three Questions – Leo Tolstoy

UNIT II

POETRY –

5. Sonnet 116 – William Shakespeare
6. Dirge – James Shirley
7. Leisure – W H Davies
8. A Baby Asleep After Pain – D.H Lawrence

UNIT III

GRAMMAR :

9. Clauses :
 - ✓ Main Clause
 - ✓ Subordinate Clause (Noun Clause , Adverb Clause , Adjective Clause)
10. Types of Sentences :
 - ✓ Assertive/ Affirmative Sentences
 - ✓ Exclamatory Sentences
 - ✓ Negative Sentences
 - ✓ Interrogative Sentences
 - ✓ Simple Sentences
 - ✓ Compound Sentences
 - ✓ Complex Sentences
 - ✓ Compound Complex Sentences

UNIT IV

COMMUNICATION SKILLS :

11. Telephone Conversation
 - ✓ Answering the Telephone and Asking for Someone
 - ✓ Taking and Leaving Messages
 - ✓ Making Enquiries on the Phone
12. Interpersonal Conversation
 - ✓ Getting People's Attention and Interrupting
 - ✓ Making Requests and Responding to Them
 - ✓ Asking for Directions and Giving Directions

UNIT V

MULTIPLE CHOICE QUESTIONS

Based on prescribed text Unit I & II only

Internal Assessment :

Viva- Voce

A) Personal Interview

B) Seminar - Presentation (Based on prescribed text : Prose & Poetry)

BA Part II
Compulsory English
Semester III
SGB Amravati University, Amravati

TIME : 3 HOURS

MAX MARKS THEORY : 80 MARKS

MIN PASSING MARKS : 32 MARKS

MAX MARKS INTERNAL ASSESSMENT: 20 MARKS

MIN PASSING MARKS : 08 MARKS

Distribution of Marks

UNIT I (16 Marks)

A) **Prose** i) The students will have to answer TWO out of THREE short answer questions of 3 marks each. = 6 Marks

ii) The students will have to answer TWO out of THREE long answer questions of 5 marks each = 10 Marks

UNIT II (16 Marks)

B) **Poetry** i) The students will have to answer TWO out of THREE short answer questions of 3 marks each. = 6 Marks

ii) The students will have to answer TWO out of THREE long answer questions of 5 marks each. = 10 Marks

UNIT III (16 Marks)

C) **Grammar** : Prescribed Text Blossoming Flowers by Board of Editors & published by Orient Blackswan

i) Clauses = 06 Marks

ii) Types of Sentences = 10 Marks

UNIT IV (16 Marks)

D) **Communication Skills** :

i) Telephonic Conversation = 8 Marks

ii) Interpersonal Conversation = 08 Marks

UNIT V (16 Marks)

E) **Multiple Choice Questions (MCQ)**

Based on Unit I & II : The students will have to answer SIXTEEN out of SIXTEEN MCQ's = 16 Marks

F) **Internal Assessment**

i) **Viva- Voce = 20 Marks**

a) Personal Interview = 10Marks

b) Seminar - Presentation = 10 Marks

Note:

1. The teachers are expected to impart formal training in Grammar Composition, Making Introduction, Greeting People, Talking about Family, Describing People, Places & Animals, Expressing Feelings, Inviting, Suggesting, Accepting & Refusing, Reading & Oral Skills in the tutorial classes.

2. Internal examiner shall interview an examinee to test his or her spoken skills.

3. There shall be separate passing for theory & Internal Assessment.

SYLLABUS
PRESCRIBED FOR
B.A - PART II EXAMINATION
SEMESTER IV
COMPULSORY ENGLISH

TIME : 3 HOURS

MAX MARKS THEORY : 80 MARKS

MAX MARKS INTERNAL ASSESSTMENT : 20 MARKS

Prescribed Textbook : Blossoming Flowers by Board of Editors, Published by Orient Blackswan.

UNIT I

PROSE -

1. [Why Are Beggars Despised](#) - George Orwell
2. On the Conduct of Life (extract) - William Hazlitt
3. The Girl - O Henry
4. The Magic Shop - H. G Wells

UNIT II

POETRY -

5. Where the mind is without fear - Rabindranath Tagore
6. A Lament - P.B Shelley
7. Love in Life - Robert Browning
8. Up - Hill : Christina Rossetti

UNIT III

GRAMMAR :

9. Transformation of Sentences :

- ✓ Interchange of Affirmative & Negative Sentences
- ✓ Interchange of Assertive & Interrogative Sentences
- ✓ Interchange of Assertive & Exclamatory Sentences
- ✓ Conversion of Simple to Compound Sentences
- ✓ Conversion of Simple to Complex Sentences
- ✓ Conversion of Complex to Simple Sentences
- ✓ Conversion of Compound to Complex Sentences
- ✓ Conversion of Complex to Compound Sentences

10. Synthesis of Sentences :

Combination of two or more simple sentences into a single simple sentence / Compound Sentence / Complex Sentence.

UNIT IV

COMMUNICATION SKILLS :

11. Interpersonal Conversation

- ✓ Congratulating and Responding to Congratulations
- ✓ Paying Compliments, Showing Appreciation, Offering Encouragement and Responding
- ✓ Asking for , Giving and Refusing Permission

12. Casual Conversation

- ✓ Talking about the Weather
- ✓ Describing Daily Routines
- ✓ Talking about Current Activities

UNIT V

MULTIPLE CHOICE QUESTIONS

Based on prescribed text Unit I & II only

Internal Assessment :

Viva- Voce

A) Personal Interview

B) Seminar - Presentation (Based on prescribed text : Prose & Poetry

**BA Part II
Compulsory English
Semester IV**

SGB Amravati University, Amravati

TIME : 3 HOURS

MAX MARKS THEORY : 80 MARKS

MIN PASSING MARKS : 32 MARKS

MAX MARKS INTERNAL ASSESSMENT: 20 MARKS

MIN PASSING MARKS : 08 MARKS

Distribution of Marks

UNIT I (16 Marks)

A) **Prose** i) The students will have to answer TWO out of THREE short answer questions of 3 marks each. = 6 Marks

ii) The students will have to answer TWO out of THREE long answer questions of 5 marks each = 10 Marks

UNIT II (16 Marks)

B) **Poetry** i) The students will have to answer TWO out of THREE short answer questions of 3 marks each. = 6 Marks

ii) The students will have to answer TWO out of THREE long answer questions of 5 marks each. = 10 Marks

UNIT III (16 Marks)

C) **Grammar** : Prescribed Text Blossoming Flowers by Board of Editors & published by Orient Blackswan

i) Transformation of Sentences= 8 Marks

ii) Synthesis of Sentences = 8 Marks

UNIT IV (16 Marks)

D) Communication Skills :

- i) Interpersonal Conversation = 8 Marks
- ii) Casual Conversation = 08 Marks

UNIT V (16 Marks)

E) Multiple Choice Questions (MCQ)

Based on Unit I & II : The students will have to answer SIXTEEN out of SIXTEEN MCQ's = 16 Marks

F) Internal Assessment

i) Viva- Voce = 20 Marks

- a) Personal Interview = 10Marks
- b) Seminar - Presentation = 10 Marks

Note:

1. The teachers are expected to impart formal training in Grammar Composition, Making Introduction, Greeting People, Talking about Family, Describing People, Places & Animals, Expressing Feelings, Inviting, Suggesting, Accepting & Refusing, Reading & Oral Skills in the tutorial classes.
2. Internal examiner shall interview an examinee to test his or her spoken skills.
3. There shall be separate passing for theory & Internal Assessment.

**SYLLABUS
PRESCRIBED FOR
B.A PART II EXAMINATION
SEMESTER III
ENGLISH LITERATURE
UNIT I**

Text Prescribed : A Background to the study of English Literature by B.Prasad.

Chapters Prescribed :

- Chapter II - The Novel
- Chapter III - The Short Story
- Chapter IV - Biography and Autobiography

UNIT II

**Prescribed Textbook : Unheard Melodies by Board of Editors, Published by Orient Blackswan
POETRY :**

The following poems are prescribed

1. Palanquin Bearers - Sarojini Naidu
2. Between These Lines - S Joseph
3. The Epileptic - Keki N Daruwalla
4. A Walk by Moonlight - Henry Derozio
5. Endless Time - Rabindranath Tagore

UNIT III

Prescribed Textbook : Unheard Melodies by Board of Editors, Published by Orient Blackswan

A)Introduction to Literary Terms - I

Following Literary Terms are prescribed

1. Point of View
2. Anticlimax
3. Climax
4. Binary Opposition
5. Euphemism
6. Subaltern
7. Oxymoron
8. Picaresque Narrative
9. Epistolary Novel
10. Bildungsroman
11. Ekphrastic Poem
12. Stream of Consciousness Narrative
13. Metafiction
14. Objective Correlative
15. Platonic Love
16. Anti-Hero

B)Introduction to Literary Theories - I

Following Literary Theories are prescribed

1. Archetypal Criticism
2. Russian Formalism
3. Structuralism
4. Narratology

UNIT IV

Prescribed Textbook : Unheard Melodies by Board of Editors, Published by Orient Blackswan

SHORT STORIES :

Following Short Stories are prescribed

1. A Cup of Tea - Katherine Mansfield
2. The Bird Comes to Yellow Sky - Stephen Crane
3. A Job Well Done - Ruskin Bond
4. The Antidote - R.K Narayan

UNIT V

MULTIPLE CHOICE QUESTIONS

Based on Unit II, III & IV.

BA Part II
English Literature
Semester III
SGB Amravati University, Amravati

TIME : 3 HOURS

MAX MARKS THEORY : 80 MARKS

MIN PASSING MARKS : 32 MARKS

MAX MARKS INTERNAL ASSESSMENT: 20 MARKS

MIN PASSING MARKS : 08 MARKS

Distribution of Marks

UNIT I (16 Marks)

Unit I : A Background to the study of English Literature

- i) The students will have to answer TWO out of FOUR long answer questions
(Each carries EIGHT marks) = 16 Marks

UNIT II (16 Marks)

Unit II : Poetry

- i) The students will have to answer ONE out of THREE long answer questions of 8 marks = 8 Marks
ii) The students will have to attempt TWO out of FOUR passages for explanation with reference to the context
(Each carries FOUR marks) = 8 Marks

UNIT III (16 Marks)

Unit III :

A) Introduction to Literary Terms

The students will have to answer TWO out of FOUR Literary Terms
(Each carries FOUR marks) = 8 Marks

B) Introduction to Literary Theory

The students will have to answer ONE out of TWO Literary Theories = 8 Marks

UNIT IV (16 Marks)

Unit IV : SHORT STORIES

The students will have to answer TWO out of THREE long answer questions.
(Each carries EIGHT marks) = 16 Marks

UNIT V (16 Marks)

Unit V : Multiple Choice Questions (MCQ)

The students will have to answer SIXTEEN MCQ's
(Each carries ONE mark) = 16 Marks

Internal Assessment

i) Viva- Voce = 10 Marks

ii) Assignments (Assignments based on prescribed syllabus) = 10 Marks

SYLLABUS
PRESCRIBED FOR
B.A PART II EXAMINATION
SEMESTER IV
ENGLISH LITERATURE
UNIT I

Text Prescribed : A Background to the study of English Literature by B.Prasad.

Chapters Prescribed :

Chapter I - The Essay

Chapter V - Criticism

Chapter VI - Style

UNIT II

Prescribed Textbook : Unheard Melodies by Board of Editors, Published by Orient Blackswan

POETRY :

The following poems are prescribed

1. Sonnet - Alice Dunbar-Nelson
2. A Noiseless Patient Spider - Walt Whitman
3. Brahma - Ralph Waldo Emerson
4. Art - Herman Melville
5. The Lonely House - Emily Dickinson

UNIT III

Prescribed Textbook : Unheard Melodies by Board of Editors, Published by Orient Blackswan

A) Introduction to Literary Terms - II

Following Literary Terms are prescribed

1. Humanism
2. Naturalism
3. Refrain
4. Motif
5. Fantasy
6. Aestheticism
7. Absurdism
8. Alienation Effect
9. Pantomime
10. Decorum
11. Pathetic Fallacy
12. Soliloquy
13. Round & Flat Characters
14. Hypertext
15. Blog
16. Affective Fallacy

B) Introduction to Literary Theories - II

Following Literary Theories are prescribed

1. Post- Colonialism
2. Post - Structuralism
3. Feminism
4. Psychoanalytic Criticism

UNIT IV

Prescribed Textbook : Unheard Melodies by Board of Editors, Published by Orient Blackswan

ESSAYS :

Following Essays are prescribed

1. Walking Tour - R.L Stevenson
2. The Worship of the Wealthy - GK Chesterton
3. On Revenge - Francis Bacon
4. On The Feeling of Immortality in Youth - William Hazlitt

UNIT V

MULTIPLE CHOICE QUESTIONS

Based on Unit II, III & IV.

**BA Part II
English Literature
Semester IV
SGB Amravati University, Amravati**

TIME : 3 HOURS

MAX MARKS THEORY : 80 MARKS

MAX MARKS INTERNAL ASSESSMENT: 20 MARKS

MIN PASSING MARKS : 32 MARKS

MIN PASSING MARKS : 08 MARKS

Distribution of Marks

UNIT I (16 Marks)

Unit I : A Background to the study of English Literature

- i) The students will have to answer TWO out of FOUR long answer questions
(Each carries EIGHT marks) = 16 Marks

UNIT II (16 Marks)

Unit II : Poetry

- i) The students will have to answer ONE out of THREE long answer questions of 8 marks = 8 Marks
ii) The students will have to attempt TWO out of FOUR passages for explanation with reference to the context
(Each carries FOUR marks) = 8 Marks

UNIT III (16 Marks)

Unit III :

A) Introduction to Literary Terms

The students will have to answer TWO out of FOUR Literary Terms
(Each carries FOUR marks) = 8 Marks

B) Introduction to Literary Theory

The students will have to answer ONE out of TWO Literary Theories = 8 Marks

UNIT IV (16 Marks)

Unit IV : ESSAYS

The students will have to answer TWO out of THREE long answer questions.
(Each carries EIGHT marks) = 16 Marks

UNIT V (16 Marks)

Unit V : Multiple Choice Questions (MCQ)

The students will have to answer SIXTEEN MCQ's
(Each carries ONE mark) = 16 Marks

Internal Assessment

i) Viva- Voce = 10 Marks

ii) Assignments (Assignments based on prescribed syllabus) = 10 Marks

**Syllabus Prescribed for B.A.Part-II Examination
Functional English
(Optional Subject)
Semester-III**

Total Marks - 100

Theory – 50

Practical – 30

Internal-20

Work-load : 4 lectures and 2 practical per week (For a batch of 10 students)

OBJECTIVES

- 1) To familiarise the learners with the functioning of English sounds through phonetic transcription and listening.
- 2) To enable the learners to achieve accuracy in oral production by encouraging the use of a dictionary of pronunciations.
- 3) To enable the learners to achieve an optimum level of intelligibility and fluency in speech.

Course contents

Theory

Unit-I

- 1) Phonetic Transcription of a given passage of about – 50 Words
- 2) Intonation Patterns in Simple sentences 10 Marks

PRACTICAL : Intensive drilling in phonetic skills.

Books Recommended :

- 1) A Textbook of English phonetics for Indian students By.T. Balasubramaniam (Macmillan)
- 2) An Introduction to the pronunciation of English By. A.C.Gimson (ELBS)
- 3) A History of English Language and Elements of Phonetics. By. Lalitha Ramamurthi (Macmillan)
- 4) Spoken English R.K.Bansal and J.B.Harrison (O.L.)

Unit-II Introduction to Broadcasting

10 Marks

- i) The concept of Mass Communication scope & Process. Its status and brief introduction to its media (Print/ Radio).
- ii) Radio News.
 - a) News sources
 - b) Writing News
 - c) Delivering the news
 - d) Anchoring Radio News.

Books Recommended :

- 1) A Textbook of English phonetics for Indian students By.T. Balasubramaniam (Macmillan)
- 2) An Introduction to the pronunciation of English By. A.C.Gimson (ELBS)
- 3) A History of English Language and Elements of Phonetics. By. Lalitha Ramamurthi (Macmillan)
- 4) Spoken English R.K.Bansal and J.B.Harrison (O.L.)

Unit-III

10 Marks

- i) Radio Reporting
 - a) Radio Reporter
 - b) Live Reporting
 - c) Radio Interview

PRACTICALS : Intensive drilling in phonetic skills.

Books Recommended :

- 1) A Textbook of English phonetics for Indian students By.T. Balasubramaniam (Macmillan)
- 2) An Introduction to the pronunciation of English By. A.C.Gimson (ELBS)
- 3) A History of English Language and Elements of Phonetics. By. Lalitha Ramamurthi (Macmillan)
- 4) Spoken English R.K.Bansal and J.B.Harrison (O.L.)

Unit-IV Features of writings

10 Marks

- a) Use of idioms & Phrases
- b) Common Errors in English

Books Recommended :

- 1) A Remedial English Grammar for Foreign students F.T.Wood (Macmillan)
- 2) Creative English for Communication N. Krishnaswamy & T Sriraman (Macmillan)
- 3) Macmillan Foundation English R.K. Dwivedi & A Kumar (Macmillan)
- 4) Contemporary English Grammar structures and Composition. David Green (Macmillan)
- 5) Learners English Grammar and Composition N.D. V. Prasad (S Chand)

Unit-V Transcoding Information

10 Marks

- a) Dialogue to Paragraph
- b) Paragraph to Dialogue
- c) Logical sequencing of sentences.

Books Recommended

- 1) Remedial English Grammar for Foreign students F.T.Wood (Macmillan)
- 2) Creative English for Communication N. Krishnaswamy & T Sriraman (Macmillan)
- 3) Macmillan Foundation English R.K. Dwivedi & A Kumar (Macmillan)
- 4) Contemporary English Grammar structures and Composition. David Green (Macmillan)
- 5) Learners English Grammar and Composition N.D. V. Prasad (S Chand)

INTERNAL ASSESSMENT

- i) Assignment – Home Assignments given in the class – 20

PRACTICAL

- ii) Reading a given Passage for testing and evaluation – 10
- iii) Introducing self and Personal Interview – 20

Syllabus Prescribed for B.A.Part-II Examination

**Functional English
(Optional Subject)
Semester-IV**

Total Marks - 100

Theory – 50

Practical – 30

Internal-20

OBJECTIVES

- 1) To familiarise the learners with the functioning of English sounds through phonetic transcription and listening.
- 2) To enable the learners to achieve accuracy in oral production by encouraging the use of a dictionary of pronunciations.
- 3) To enable the learners to achieve an optimum level of intelligibility and fluency in speech.

Course content

Theory

Unit-I

10 Marks

1. Assimilation
2. Elision
3. Phonemes & Allophones

PRACTICALS : Practice in Phonetic Transcription of words, speaking and listening.

Books Recommended :

- 1) A Textbook of English phonetics for Indian students By.T. Balasubramaniam (Macmillan)
- 2) English Phonetics for Indian students. (A Work Book By T Balasubramanim (Macmillan)
- 3) Better English pronunciation By. T.D. O Connor (OUP)
- 4) Advanced Learners Dictionary (Fifth Edition OUP 1996) BY. Hornby A.S.
- 5) Exercises in spoken English CIEFL
- 6) Living English Speech By. Standard Allen (O.L.)
- 7) Course in spoken English CIEFL Hyderabad. (A set of 21 cassettes

Unit-II Introduction to Telecasting

10 Marks

1. Types of Interview
2. Anchoring T.V.Interview
3. Writing script for T.V.News
4. Live Reporting of a programmer or show

PRACTICALS : Practice in Phonetic Transcription of sentences, speaking and listening tasks, using a dictionary

Books Recommended :

- 1) A Textbook of English phonetics for Indian students By.T. Balasubramaniam (Macmillan)
- 2) English Phonetics for Indian students. (A Work Book By T Balasubramanim (Macmillan)
- 3) Better English pronunciation By. T.D. O Connor (OUP)
- 4) Advanced Learners Dictionary (Fifth Edition OUP 1996) BY. Hornby A.S.
- 5) Exercises in spoken English CIEFL
- 6) Living English Speech By. Standard Allen (O.L.)
- 7) Course in spoken English CIEFL Hyderabad. (A set of 21 cassettes

Unit-III Aspects of Language

10 Marks

1. Language and Society
2. Dialect & Standard Language
3. Registers and style .

Books Recommended :

- 1) Contemporary English Grammar structures and Composition, David Green (Macmillan)
- 2) Macmillan Foundation English
- 3) Success with Grammar and Composition K.R.Narayana Swami (O.L.)
- 4) Basic English Usage M.Swan (OUP)
- 5) Macmillan Grammar, A Handbook E.A.Augustine K.V.Joseph (M)

Unit-IV General Language skills.

10 Marks

1. Feature writing .
2. Expansion of idea , proverbs
3. Note Taking

Books Recommended :

- 1) A Remedial English Grammar for Foreign students F.T.Wood (Macmillan)
- 2) Creative English for Communication N. Krishnaswamy & T Sriraman (Macmillan)
- 3) Macmillan Foundation English R.K. Dwivedi & A Kumar (Macmillan)
- 4) Contemporary English Grammar structures and Composition. David Green (Macmillan)
- 5) Learners English Grammar and Composition N.D. V. Prasad (S Chand)

Unit-V Business Correspondence.

10 Marks

1. Notices, Agenda, Minutes
2. Job applications letters & Preparing curriculum vitae.
3. Business letters
4. Quotations, Orders and tenders.

INTERNAL ASSESSMENT

- i) Assignment – Home Assignments given in the classroom – 20
PRACTICAL
- ii) Readings a given passage for Testing and evaluation – 10
- iii) Group Discussion on a given topic – 20

**B.A.Part-II Examination
Functional English
Semester-III
(Distribution of Marks)**

Theory – 50
Practical – 30
Internal-20

Min. Passing Marks – 20
Min. Passing Marks - 08
Min. Passing Marks - 12

UNIT – I

1. The examinees shall have to attempt any ONE out of TWO answer question of TEN Marks
1x10 = 10 Marks

UNIT – II Introduction to Broadcasting

2. The examinees shall have to attempt any TWO out of FOUR Short Notes of FIVE Marks each.
2x5 = 10 Marks

UNIT – III

3. The examinees shall have to attempt any Two out of FOUR short Notes of FIVE Marks each.
10x1 = 10 Marks

UNIT – IV Features of Writing

4. The examinees shall have to attempt any TEN questions on Grammatical exercises (one marks each)
10x1 = 10 Marks

Unit – V Transcoding Information

5. The examinees shall have to attempt as per the instruction given in the questions paper.

INTERNAL ASSESSMENT

- i) Assignment on Linguistics topics (Language varieties, language & culture related topics, influence of mother tongue, etc) 0 Marks
10 Marks
- ii) Loud Reading (pronunciation, accent, intonation etc.) 10 Marks

PRACTICAL

- i) Readings a given passage for Testing and evaluation – 10
- ii) Introducing Self and Personal Interview - 20

30 Marks

**B.A.Part-II Examination
Functional English
Semester-IV
(Distribution of Marks)**

Theory – 50
Practical – 30
Internal-20

Min. Passing Marks – 20
Min. Passing Marks - 08
Min. Passing Marks - 12

UNIT – I

1. The examinees shall have to attempt any ONE out of TWO answer question of TEN Marks.
1x10 = 10 Marks

UNIT – II Introduction to Telecasting

2. The examinees shall have to attempt any TWO out of FOUR short notes of FIVE Marks each.
2x5 = 10 Marks

UNIT – III Aspects of Language

3. The examinees shall have to attempt any ONE out of TWO of TEN Marks
10x1 = 10 Marks

UNIT – IV General Language skills.

4. The examinees shall have to attempt any TWO question (one marks each)
2x5 = 10 Marks

Unit – V Business Correspondence

Multiple choice questions (MCQs) based on Unit-I,II,III & IV

INTERNAL ASSESSMENT

- i) Assignment on Linguistics topics (Language varieties, language & culture related topics, influence of mother tongue, etc)
20 Marks

PRACTICAL

30 Marks

- ii) Loud Reading (Pronunciation, accent, intonation etc. 10
iii) Group Discussion on a given topic – 20

**S.G.B Amravati University, Amravati
B.A – Part II (Semester III & IV)
Supplementary English**

Theory : 80 Marks

Internal : 20 Marks

Prescribed Textbook :

Golden Harvest: An English Coursebook for Undergraduates by Board of Editors, Published by Orient Blackswan.

Semester III

Unit One :

1. A Real Good Smile : Bill Naughton
2. What India Inc Wants :
 - a. Our Muddled generation : Dinesh Kumar
 - b. Employers look for potential employees, not exam results : Manish Sabharwal
3. The Thief : Ruskin Bond
4. If : Rudyard Kipling
5. My Mind to Me a Kingdom Is : Edward Dyer

Unit Two :

6. An Accursed House : Emile Gaboriau
7. Freedom at Midnight : Larry Collins and Dominique Lapierre
8. Drama for a Winter Night : Langston Hughes
9. Youssuf : James Russell Lowell

From Unit Five : One - Act Play

Death Trap : Saki

Writing Skills :

Essay Writing & Fax, Email, Report Writing

**Supplementary English Examination
(Distribution of Marks)
Semester III (B.A Part II)**

Time : 3 Hrs

Theory : 80 Marks -----Minimum Passing Marks : 32 Marks

Internal : 20 Marks ----- Minimum Passing Marks : 08 Marks

- Q: 1 :** The examinee shall have to attempt any TWO out of FOUR long answer questions of EIGHT marks each from the Unit One **(2 X 8 = 16 Marks)**
- Q: 2:** The examinee shall have to attempt any TWO out of FOUR long answer questions of EIGHT marks each from the Unit Two **(2 X 8 = 16 Marks)**
- Q: 3:** The examinee shall have to attempt any ONE out of TWO long answer questions of SIXTEEN marks from the prescribed One – Act Play (Unit Five) **(1 X 16 = 16 Marks)**
- Q: 4:** SIXTEEN Multiple Choice Questions (MCQ) based on Unit One & Two **(16 X 1 = 16 Marks)**
- Q:5(A):** General Essay of about 300 words on any ONE out of THREE given topics. **(1 x 10 = 10 Marks)**
- Q:5(B): (i) :** Fax, Email (Any One) **(1 X 6 = 6 Marks)**
- OR**
- (ii) :** Report Writing

Total Marks : 80 Marks

Semester IV

Unit Three :

10. A Simple Philosophy : Seathl
11. The Last Salvation : R.P Sisodia
12. Go, Kiss the World : Subroto Bagchi
13. Flowers are Red : Harry Chopin
14. I Am Getting Old Now : Robert Kroetsch

Unit Four :

15. Mother Teresa : F.G Herod
16. My Struggle for an Education : Booker T. Washington
17. Richard Cory : Edwin Arlington Robinson
18. Father Returning Home : Dilip Chitre

From Unit Five :

A Marriage Proposal : Anton Chekov

Writing Skills :

Essay Writing & Expansion of an Idea

Internal Assessment :

1. Viva – Voce
2. Seminar Presentation

Supplementary English Examination

(Distribution of Marks)

Semester IV (B.A Part II)

Time : 3 Hrs

Theory : 80 Marks -----Minimum Passing Marks : 32 Marks

Internal : 20 Marks ----- Minimum Passing Marks : 08 Marks

- Q:1 :** The examinees shall have to attempt any TWO out of FOUR long answer questions of EIGHT marks each from the Unit Three. **(2 x 8 = 16 Marks)**

Q: 2: The examinees shall have to attempt any TWO out of FOUR long answer questions of EIGHT marks each from the Unit Four.	(2 x 8 = 16 Marks)
Q: 3: The examinees shall have to attempt any ONE out of TWO long answer questions of SIXTEEN marks from the prescribed One - Act Play (Unit Five).	(1 x 16 = 16 Marks)
Q: 4: SIXTEEN Multiple Choice Questions (MCQ) based on Unit Three & Four	(16 X 1 = 16 Marks)
Q: 5: A) General essay of about 300 words on any ONE out of THREE given topics.	(1 X 10 = 10 Marks)
B) Expansion of Idea ONE out of THREE	(1 X 6 = 6 Marks)

Total Marks = 80 Marks

Appendix-B

बी. ए. भाग - २ मराठी (आवश्यक)
सत्र ३ रे

॥ गुण विभागणी ॥

एकूण गुण - १००
लेखी गुण - ८०
अंतर्गत मूल्यमापन - २०
वेळ - ३ तास

<u>अभ्यासक्रमासाठी नेमलेले पाठ्यपुस्तक</u>	--	'मृदगंध' भाग २ (विभाग 'अ', 'ब', आणि 'क' साठी)
विभाग - अ	वैचारिक	-- १६ गुण
विभाग - ब	ललित	-- १६ गुण
विभाग - क	कविता	-- १६ गुण
विभाग - ड	उपयोजित मराठी	-- १६ गुण
	वैचारिक, ललित व कविता या	-- १६ गुण
	विभागांवर वस्तुनिष्ठ बहुपर्यायी प्रश्न	
विभाग 'अ' व 'ब'	यावर प्रत्येकी सोळा गुणांचा एक दीर्घोत्तरी प्रश्न	-- ३२ गुण
विभाग 'क'	यावर प्रत्येकी आठ गुणांचे दोन लघुत्तरी प्रश्न	-- १६ गुण
विभाग 'ड'	मधील उपयोजित मराठीवर प्रत्येकी आठ गुणांचे दोन लघुत्तरी प्रश्न	-- १६ गुण
वस्तुनिष्ठ प्रश्न	- उपरोक्त अभ्यासक्रमातील विभाग 'अ', 'ब' आणि 'क' यावर आधारित वस्तुनिष्ठ स्वरूपाचे एकूण १६ बहुपर्यायी प्रश्न विचारले जातील. प्रत्येक प्रश्नास एक गुण याप्रमाणे हा प्रश्न १६ गुणांचा असेल.	-- १६ गुण
विभाग 'ड' साठी संदर्भग्रंथ म्हणून 'उपयोजित मराठी' संपादक - केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे हा ग्रंथ असेल. या ग्रंथातील प्रकरण २२ वे 'वक्तृत्व कला' व प्रकरण २३ वे 'सूत्रसंचालन' या प्रकरणांवर प्रत्येकी ०८ गुणांचा एक लघुत्तरी प्रश्न विचारण्यात येईल.		
अंतर्गत मूल्यमापन :	एकूण २० गुणांची अंतर्गत मूल्यमापन परीक्षा राहिल.	
	● गुण विभागणी :	
	१) गृहपाठ	-- १० गुण
	२) मौखिक परीक्षा	-- १० गुण
लेखी परीक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उत्तीर्ण होणे आवश्यक राहिल. त्यासाठी किमान गुण खालीलप्रमाणे आवश्यक असतील.		
	● लेखी परीक्षा	-- ८० पैकी ३२ गुण आवश्यक
	● अंतर्गत मूल्यमापन	-- २० पैकी ०८ गुण आवश्यक

- सूचना : १) गृहपाठ हा पाठ्यपुस्तकांव्यतिरिक्त अन्य कोणत्याही भाषिक व वाङ्.मयीन कौशल्य विकसित करणाऱ्या विषयावर असावा.
- २) मौखिक परीक्षा ही गृहपाठावर आधारित असेल.

बी. ए. भाग - २ मराठी (आवश्यक)
सत्र ४ थे

॥ गुण विभागणी ॥

एकूण गुण - १००
लेखी गुण - ८०
अंतर्गत मूल्यमापन - २०
वेळ - ३ तास

अभ्यासक्रमासाठी नेमलेले पाठ्यपुस्तक

-- 'मृदगंध' भाग २ (विभाग 'अ', 'ब', आणि 'क' साठी)

विभाग - अ	वैचारिक	--	१६ गुण
विभाग - ब	ललित	--	१६ गुण
विभाग - क	कविता	--	१६ गुण
विभाग - ड	उपयोजित मराठी	--	१६ गुण
	वैचारिक, ललित व कविता या	--	१६ गुण
	विभागांवर वस्तुनिष्ठ बहुपर्यायी प्रश्न		

विभाग 'अ' व 'ब'	यावर प्रत्येकी सोळा गुणांचा एक दीर्घोत्तरी प्रश्न	--	३२ गुण
विभाग 'क'	यावर प्रत्येकी आठ गुणांचे दोन लघुत्तरी प्रश्न	--	१६ गुण
विभाग 'ड'	मधील उपयोजित मराठीवर प्रत्येकी आठ गुणांचे दोन लघुत्तरी प्रश्न	--	१६ गुण
वस्तुनिष्ठ प्रश्न	- उपरोक्त अभ्यासक्रमातील विभाग 'अ', 'ब' आणि 'क' यावर आधारित वस्तुनिष्ठ स्वरूपाचे एकूण १६ बहुपर्यायी प्रश्न विचारले जातील. प्रत्येक प्रश्नास एक गुण याप्रमाणे हा प्रश्न १६ गुणांचा असेल.	--	१६ गुण

विभाग 'ड' साठी संदर्भग्रंथ म्हणून 'उपयोजित मराठी' संपादक - केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे हा ग्रंथ असेल. या ग्रंथातील प्रकरण ९ वे 'माहितीपत्रक' व प्रकरण १० वे 'निमंत्रणपत्रिका व कार्यक्रमपत्रिका' या प्रकरणांवर प्रत्येकी ०८ गुणांचा एक लघुत्तरी प्रश्न विचारण्यात येईल.

अंतर्गत मूल्यमापन : एकूण २० गुणांची अंतर्गत मूल्यमापन परीक्षा राहिल.

- गुण विभागणी :
- १) गृहपाठ -- १० गुण
- २) मौखिक परीक्षा -- १० गुण

लेखी परीक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उत्तीर्ण होणे आवश्यक राहिल. त्यासाठी किमान गुण खालीलप्रमाणे आवश्यक असतील.

- लेखी परीक्षा -- ८० पैकी ३२ गुण आवश्यक
- अंतर्गत मूल्यमापन -- २० पैकी ०८ गुण आवश्यक

- सूचना : १) गृहपाठ हा पाठ्यपुस्तकांव्यतिरिक्त अन्य कोणत्याही भाषिक व वाङ्.मयीन कौशल्य विकसित करणाऱ्या विषयावर असावा.
- २) मौखिक परीक्षा ही गृहपाठावर आधारित असेल.

संपादित ग्रंथ - 'मृदगंध' भाग २

बी. ए. भाग २ मराठी (आवश्यक)
सत्र ३

विभाग अ) वैचारिक

१)	शुद्ध चारित्र्याचा प्रज्ञावंत राजकारणी	तर्कतीर्थ लक्ष्मणशास्त्री जोशी
२)	मीपण स्वत्वाच्या सीमेत दरवळतं, तोपर्यंतच ते सुगंधी असतं !	आ.ह.साळुंखे
३)	भाषाभिवृद्धीची सामाजिक दृष्टी	श्री.म.माटे

विभाग ब) ललित

१)	आज्ञापत्र	रामचंद्रपंत अमात्य
२)	माझे दत्तक वडील	चिं. वि. जोशी
३)	दिवस असे होते	दया पवार

विभाग क) कविता

१)	संतवाणी	अ) चोखामेळा ब) सोयराबाई
२)	अखेर कमाई	कुसुमाग्रज
३)	पाखरे	केशव मेश्राम
४)	जातं	श्रीकांत देशमुख
५)	सात बाराची नोंद	लक्ष्मण महाडिक
६)	शांतता	सिध्दार्थ भगत

विभाग ड) व्यावहारिक मराठी

१)	वक्तृत्व कला	संदर्भ ग्रंथ : 'उपयोजित मराठी' मधील प्रकरण २२ वे	संपा. केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे
२)	सूत्रसंचालन	संदर्भ ग्रंथ : 'उपयोजित मराठी' मधील प्रकरण २३ वे	

बी. ए. भाग २ - मराठी (आवश्यक)

सत्र - ४

विभाग अ) वैचारिक

१)	स्त्री-पुरुष तुलना	ताराबाई शिंदे
२)	आरसा	डॉ. बाबासाहेब आंबेडकर
३)	विज्ञानयुगात भारत	जयंत नारळीकर

विभाग ब) ललित

१)	गाडगेबाबांच्या कीर्तनातले तत्त्वज्ञान	प्रबोधनकार के.सी. ठाकरे
२)	स्मशानातील सोनं	अण्णा भाऊ साठे
३)	स्त्रीवादी चळवळीने आम्हाला आमच्या अस्तित्वाची जाणीव दिली	विद्युत भागवत

विभाग क) कविता

१)	संतवाणी	अ) एकनाथ ब) कान्होपात्रा
२)	सारेच दीप कसे मंदावले आता	अनिल
३)	जिवलगा	शांता शेळके
४)	जागजागी	भ.मा. परसावळे
५)	पेटवू नका देश	मिर्झा रफी अहमद बेग
६)	माती	राजेश महल्ले

विभाग ड) व्यावहारिक मराठी

१)	माहितीपत्रक	संदर्भ ग्रंथ : 'उपयोजित मराठी' मधील प्रकरण ९ वे	संपा. केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे
२)	निमंत्रणपत्रिका व कार्यक्रमपत्रिका	संदर्भ ग्रंथ : 'उपयोजित मराठी' मधील प्रकरण १० वे	

संत गाडगे बाबा अमरावती विद्यापीठ, अमरावती

बी.ए.भाग-२ मराठी वाङ्मय
सत्र ३ रे

॥ गुण विभागणी ॥

एकूण गुण - १००
लेखी गुण - ८०
अंतर्गत मूल्यमापन - २०
वेळ - ३ तास

अभ्यासक्रमासाठी नेमलेले ग्रंथ -

- १) निवडक मराठी कथा - संपादित
- २) संत तुकारामांचे निवडक अभंग - संपादक - आ.ह. साळुंखे, लोकायत प्रकाशन, सातारा.

अ) निवडक मराठी कथा	४८ गुण
ब) संत तुकारामांचे निवडक अभंग	३२ गुण

	८० गुण

प्रश्ननिहाय गुण विभागणी

- प्रश्न - १ संदर्भासह स्पष्टीकरण - १६ गुण
- निवडक मराठी कथा यावर प्रत्येकी चार गुणांचे दोन संदर्भ विचारले जातील.
 - संत तुकारामांचे निवडक अभंग यावर प्रत्येकी चार गुणांचे दोन संदर्भ विचारले जातील.
- प्रश्न - २ निवडक मराठी कथा यावर एक दीर्घांतरी प्रश्न विचारला जाईल. - १६ गुण
- प्रश्न - ३ निवडक मराठी कथा यावर प्रत्येकी आठ गुणांचे दोन लघुतरी प्रश्न विचारले जातील. - १६ गुण
- प्रश्न - ४ संत तुकारामांचे निवडक अभंग यावर प्रत्येकी आठ गुणांचे दोन लघुतरी प्रश्न विचारले जातील. - १६ गुण
- प्रश्न - ५ वस्तुनिष्ठ बहुपर्यायी प्रश्न - १६ गुण
- (उपरोक्त निवडक मराठी कथा व संत तुकारामांचे निवडक अभंग यावर आधारित प्रत्येकी एक गुण असे १६ वस्तुनिष्ठ बहुपर्यायी प्रश्न असतील.)

अंतर्गत मूल्यमापन :

एकूण २० गुणांची अंतर्गत मूल्यमापन परीक्षा राहिल त्याची गुण विभागणी खालीलप्रमाणे

- १) गृहपाठ - १० गुण
- २) मौखिक परीक्षा - १० गुण

लेखी परीक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उत्तीर्ण होणे आवश्यक राहिल. त्यासाठी किमान गुण खालीलप्रमाणे आवश्यक असतील.

- लेखी परीक्षा - ८० पैकी ३२ गुण आवश्यक
- अंतर्गत मूल्यमापन - २० पैकी ०८ गुण आवश्यक

- सूचना :** १) गृहपाठ हा पाठ्यपुस्तकांव्यतिरिक्त अन्य कोणत्याही साहित्यिक, सामाजिक, सांस्कृतिक, समाज वास्तव वा समस्यांवर आधारित असावा. यामध्ये परिसरातील साहित्यिकाची मुलाखत घेऊन त्याचे शब्दांकन करणे, परिसरातील लोककलांची माहिती व विशेष नोंदवणे, परिसरातील म्हणी-वाक्प्रचार यांचे संकलन करून विशेष नोंदवणे, लोकगीते, लोककथा यांचे संकलन करणे. ग्रामीण साहित्य, दलित साहित्य, स्त्रीवादी साहित्य इ. वर टिपण तयार करणे. परिसरातील वाङ्मयीन चळवळी, परिसराचा सांस्कृतिक वारसा यावर टिपण तयार करणे. परिसराच्या भाषेचे विशेष नोंदवणे. वाङ्मयीन व्यक्तिमत्त्वांचे चित्रण करणे. सांस्कृतिक कार्यक्रमांचे वृत्तांकन करणे. हस्तलिखिताचे मुद्रितशोधन करणे. लोकसंस्कृतीची माहिती नोंदवणे इ. बाबींचा समावेश असेल.
- २) गृहपाठावर आधारित मौखिक परीक्षा घेण्यात यावी.

संत गाडगे बाबा अमरावती विद्यापीठ, अमरावती

बी.ए.भाग-२ मराठी वाङ्मय
सत्र ४ थे

॥ गुण विभागणी ॥

एकूण गुण - १००
लेखी गुण - ८०
अंतर्गत मूल्यमापन - २०
वेळ - ३ तास

अभ्यासक्रमासाठी नेमलेले ग्रंथ -

- १) आत्मकथन -आठवणीचे पक्षी - लेखक प्र.ई.सोनकांबळे, चेतना प्रकाशन.
- २) लीळाचरित्रातील निवडक कथा - संपादक - राजेंद्र राऊत

अ) आत्मकथन - आठवणीचे पक्षी	४८ गुण
ब) लीळाचरित्रातील निवडक कथा	३२ गुण

	८० गुण

प्रश्ननिहाय गुण विभागणी

- प्रश्न - १ संदर्भासह स्पष्टीकरण - १६ गुण
- आठवणींचे पक्षी यावर प्रत्येकी चार गुणांचे दोन संदर्भ विचारले जातील.
 - लीळाचरित्रातील निवडक कथा यावर प्रत्येकी चार गुणांचे दोन संदर्भ विचारले जातील.
- प्रश्न - २ आठवणींचे पक्षी यावर एक दीर्घोत्तरी प्रश्न विचारला जाईल. - १६ गुण
- प्रश्न - ३ आठवणींचे पक्षी यावर प्रत्येकी आठ गुणांचे दोन लघुत्तरी प्रश्न विचारले जातील. - १६ गुण
- प्रश्न - ४ लीळाचरित्रातील निवडक कथा यावर प्रत्येकी आठ गुणांचे दोन लघुत्तरी प्रश्न विचारले जातील. - १६ गुण
- प्रश्न - ५ वस्तुनिष्ठ बहुपर्यायी प्रश्न - १६ गुण
- (उपरोक्त आठवणींचे पक्षी व लीळाचरित्रातील निवडक कथा यावर आधारित प्रत्येकी एक गुण असे १६ वस्तुनिष्ठ बहुपर्यायी प्रश्न असतील.)

अंतर्गत मूल्यमापन :

एकूण २० गुणांची अंतर्गत मूल्यमापन परीक्षा राहिल त्याची गुण विभागणी खालीलप्रमाणे

- १) गृहपाठ - १० गुण
- २) मौखिक परीक्षा - १० गुण

लेखी परीक्षा व अंतर्गत मूल्यमापन या दोन्ही परीक्षांमध्ये स्वतंत्रपणे उत्तीर्ण होणे आवश्यक राहिल. त्यासाठी किमान गुण खालीलप्रमाणे आवश्यक असतील.

- लेखी परीक्षा - ८० पैकी ३२ गुण आवश्यक
- अंतर्गत मूल्यमापन - २० पैकी ०८ गुण आवश्यक

- सूचना :** १) गृहपाठ हा पाठ्यपुस्तकांव्यतिरिक्त अन्य कोणत्याही साहित्यिक, सामाजिक, सांस्कृतिक, समाज वास्तव वा समस्यांवर आधारित असावा. यामध्ये परिसरातील साहित्यिकाची मुलाखत घेऊन त्याचे शब्दांकन करणे, परिसरातील लोककलांची माहिती व विशेष नोंदवणे, परिसरातील म्हणी-वाक्प्रचार यांचे संकलन करून विशेष नोंदवणे, लोकगीते, लोककथा यांचे संकलन करणे. ग्रामीण साहित्य, दलित साहित्य, स्त्रीवादी साहित्य इ. वर टिपण तयार करणे. परिसरातील वाङ्मयीन चळवळी, परिसराचा सांस्कृतिक वारसा यावर टिपण तयार करणे. परिसराच्या भाषेचे विशेष नोंदवणे. वाङ्मयीन व्यक्तिमत्त्वांचे चित्रण करणे. सांस्कृतिक कार्यक्रमांचे वृत्तांकन करणे. हस्तलिखिताचे मुद्रितशोधन करणे. लोकसांस्कृतीची माहिती नोंदवणे इ. बाबींचा समावेश असेल.
- २) गृहपाठावर आधारित मौखिक परीक्षा घेण्यात यावी.

बी.ए.भाग २ मराठी वाङ्मय
सत्र ३

१) निवडक मराठी कथा (संपादित)

अ.क्र.	कथाकार	कथा
१	द.मा. मिरासदार	माझ्या बापाची पेंड
२	शंकर पाटील	देशी उपाय
३	व्यंकटेश माडगुळकर	रामा मैलकुली
४	उद्धव शेळके	माय
५	वामन होवाळ	मजल्याचं घर
६	गंगाधर गाडगीळ	किडलेली माणसे
७	जयंत नारळीकर	ट्रॉयचा घोडा
८	कमल देसाई	माणसाची गोष्ट
९	वा.कृ. चोरघडे	संस्कार
१०	राजन गवस	हुंदका

२) संत तुकारामांचे निवडक अभंग - संपादक - आ. ह. साळुंखे, लोकायत प्रकाशन, सातारा,

बी.ए.भाग २ मराठी वाङ्मय
सत्र ४

१) आत्मकथन - आठवणीचे पक्षी - प्र.ई.सोनकांबळे, चेतना प्रकाशन

२) लीळा चरित्रातील निवडक कथा - संपादक राजेंद्र राऊत, मेधा पब्लिशिंग हाऊस, अमरावती - ६

Appendix-C

बी.ए. द्वितीय वर्ष (अनिवार्य हिन्दी)

तृतीय सत्र

कुल अंक 100

लिखित परीक्षा 80

आंतरिक मूल्यांकन 20

नियोजित पाठ्यपुस्तक 'आभा' राघव पब्लिशर्स अँड डिस्ट्रीब्यूटर्स, नागपुर | यह पुस्तक अध्ययन तथा अध्यापन के लिए निर्धारित की गई है | यह पुस्तक तृतीय तथा चतुर्थ सत्र के लिए निर्धारित की गई है |

१. प्रथम इकाई -गद्य विभाग (1 से 6 पाठ)

२. द्वितीय इकाई -पद्य विभाग (1 से 6 कविता)

३. तृतीय इकाई -व्यावहारिक भाषा और हिन्दी

I. पल्लवन

II. संक्षेपण

४. चतुर्थ इकाई -सामान्य भाषायी ज्ञान

I. समश्रुत भिन्नार्थक शब्द

II. समानार्थी शब्दों में सूक्ष्म अंतर

III. एक शब्द और विभिन्न प्रयोग

IV. अन्वय

V. संधि

VI. समास

VII. पदान्वय

VIII. विग्रह

५. पाँचवी इकाई - संपूर्ण पाठ्यक्रम से वस्तुनिष्ठ/अति लघुत्तरी प्रश्न
अंक विभाजन एवं प्रश्नपत्र का स्वरूप (तृतीय सत्र)

समय 3 घंटे

पूर्णांक-80

प्रश्न क्र. 1अ) दीर्घोत्तरी प्रश्न (एक) प्रथम इकाई से (1 x 8 = 8 अंक)

आ) लघुत्तरी प्रश्न (दो) प्रथम इकाई से (2 x 4 = 8 अंक)

प्रश्न क्र. 2) दो कविताओं का केन्द्रीय भाव द्वितीय इकाई से (2 x 8 = 16)

प्रश्न क्र. 3) अ) पल्लवन - 8 अंक

आ) संक्षेपण -8 अंक

प्रश्न क्र. 4) सामान्य भाषायी ज्ञान

I. समश्रुत भिन्नार्थक शब्द-	2 अंक
II. समानार्थी शब्दों में सूक्ष्म अंतर-	2 अंक
III. एक शब्द और विभिन्न प्रयोग -	2 अंक
IV. अन्वय -	2 अंक
V. पदान्वय -	2 अंक
VI. संधि -	2 अंक
VII. समास-	2 अंक
VIII. विग्रह -	2 अंक

प्रश्न क्र. 5) संपूर्ण पाठ्यक्रम से (वस्तुनिष्ठ/अतिलघुत्तरी) 16 प्रश्न पूछे जायेंगे ।
प्रत्येक प्रश्न के लिए एक अंक होगा । (1 x 16 = 16 अंक)

सूचना :-1) इकाई एक, दो, तीन एवं चार से सभी प्रश्न विकल्प के साथ पूछे जायेंगे ।

2) इकाई एक में जिन पाठों से दीर्घोत्तरी प्रश्न पूछे जायेंगे उनसे लघुत्तरी प्रश्न न
पूछे जायें ।

आंतरिक मूल्यांकन :- कुल अंक 20

- I. साक्षात्कार (लेखक/पत्रकार/कृषक/ प्राध्यापक/नाटककार/पुलिस/ नेता/कामकाजी महिला)-10
अंक
- II. विभागीय गतिविधियों में सहभागिता-05 अंक
- III. भित्तीपत्रक निर्मिती- 05 अंक

बी. ए. द्वितीय वर्ष (अनिवार्य हिन्दी)

चतुर्थ सत्र

कुल अंक 100

लिखित परीक्षा 80

आंतरिक मूल्यांकन 20

नियोजित पाठ्यपुस्तक 'आभा' राघव पब्लिशर्स अँड डिस्ट्रीब्यूटर्स, नागपुर । यह
पुस्तक अध्ययन तथा अध्यापन के लिए निर्धारित की गई है । संपूर्ण पाठ्यक्रम पाँच इकाईयों
में विभाजित है ।

- 1) प्रथम इकाई-गद्य विभाग (7 से 12 पाठ)
- 2) द्वितीय इकाई-पद्य विभाग (7 से 12 कविता)
- 3) तृतीय इकाई- व्यावहारिक भाषा और हिन्दी

- I. विज्ञापन लेखन
II. वृत्तांत लेखन
4) चतुर्थ इकाई-सामान्य भाषायी ज्ञान
I. पदनाम
II. पारिभाषिक शब्दावली
III. समूहार्थक शब्द
IV. ध्वन्यात्मक शब्द
V. सम्मानसूचक शब्द
VI. अनेक शब्दों के लिए एक शब्द
VII. वाक्य परिवर्तन
VIII. हिन्दी और मराठी में प्रयुक्त समान शब्दों में अंतर
5) इकाई पाँच- संपूर्ण पाठ्यक्रम से वस्तुनिष्ठ / अतिलघुत्तरी प्रश्न

अंक विभाजन एवं प्रश्नपत्र का स्वरूप (चतुर्थ सत्र)

समय 3 घंटे

पूर्णांक-80

प्रश्न क्र. 1अ) दीर्घोत्तरी प्रश्न (एक) प्रथम इकाई से (1 x 8 = 8 अंक)

आ) लघुत्तरी प्रश्न (दो) प्रथम इकाई से (2 x 4 = 8 अंक)

प्रश्न क्र. 2) दो कविताओं का केन्द्रीय भाव द्वितीय इकाई से (2 x 8 = 16)

प्रश्न क्र. 3) व्यावहारिक भाषा और हिन्दी

I. विज्ञापन लेखन - 8 अंक

II. वृत्तांत लेखन - 8 अंक

प्रश्न क्र. 4) सामान्य भाषायी ज्ञान

I. पदनाम- 2 अंक

II. पारिभाषिक शब्दावली- 2 अंक

III. समूहार्थक शब्द - 2 अंक

IV. ध्वन्यात्मक शब्द- 2 अंक

V. सम्मानसूचक शब्द- 2 अंक

VI. अनेक शब्दों के लिए एक शब्द 2 अंक

VII. वाक्य परिवर्तन 2 अंक

VIII. हिन्दी और मराठी में प्रयुक्त समान शब्दों में अंतर- 2 अंक

प्रश्न क्र. 5) संपूर्ण पाठ्यक्रम से (वस्तुनिष्ठ/अतिलघुत्तरी) 16 प्रश्न पूछे जायेंगे ।
प्रत्येक प्रश्न के लिए एक अंक होगा । (1 x 16 = 16 अंक)

सूचना :-1) इकाई एक, दो, तीन एवं चार से सभी प्रश्न विकल्प के साथ पूछे जायेंगे ।

3) इकाई एक में जिन पाठों से दीर्घोत्तरी प्रश्न पूछे जायेंगे उनसे लघुत्तरी प्रश्न न
पूछे जायें ।

आंतरिक मूल्यांकन :- कुल अंक 20

I. निबंध परियोजना (हिन्दी का महत्त्व/हिन्दी की दशा और दिशा/तकनीकी
हिन्दी/वैश्वीकरण और हिन्दी) - 10 अंक

II. श्रवण कौशल-05 अंक

III. आशु भाषण कौशल-05 अंक

बी.ए. द्वितीय वर्ष प्रयोजनमूलक हिन्दी

तृतीय सत्र

कुल अंक 100

लिखित परीक्षा 80

आंतरिक मूल्यांकन 20

- 1) इकाई 1 हिन्दी के प्रयोजनमूलक भाषारूप, विशेषताएँ, विविधरूप :-
 - I. वैज्ञानिक और तकनीकी हिन्दी
 - II. प्रशासनिक और कार्यालयी हिन्दी
 - III. विधि की हिन्दी
 - IV. वाणिज्य और व्यावसायिक हिन्दी
 - V. जनसंचार माध्यमों की हिन्दी
- 2) इकाई 2 जनसंचार माध्यम : स्वरूप एवं भेद
 - ❖ जनसंचार :- अर्थ, परिभाषा, जनसंचार प्रक्रिया का स्वरूप
 - ❖ जनसंचार माध्यम :- विभिन्न रूप
 - I. परंपरागत जनसंचार माध्यम
 - II. आधुनिक जनसंचार माध्यम
 - III. जनसंचार माध्यमों की भाषा

3) इकाई 3 समाचार लेखन :

सिद्धान्त और व्यवहार :- समाचार से तात्पर्य, परिभाषा

समाचार : स्वरूपगत विशेषताएँ और लक्षण, समाचार के भेद, समाचार- लेखन प्रविधि ।

अंक विभाजन एवं प्रश्नपत्र का स्वरूप (तृतीय सत्र)

समय 3 घंटे

पूर्णांक-80

- प्रश्न क्र. 1 इकाई एक से (दो) दीर्घोत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे । ($2 \times 8 = 16$)
- प्रश्न क्र. 2 इकाई दो से (दो) दीर्घोत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे । ($2 \times 8 = 16$)
- प्रश्न क्र. 3 इकाई तीन से (दो) दीर्घोत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे । ($2 \times 8 = 16$)
- प्रश्न क्र. 4 इकाई एक, दो और तीन से (चार) लघुत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे । ($4 \times 4 = 16$)
- प्रश्न क्र. 5 संपूर्ण पाठ्यक्रम से वस्तुनिष्ठ/अतिलघुत्तरी) 16 प्रश्न पूछे जायेंगे । प्रत्येक प्रश्न के लिए एक अंक होगा । ($1 \times 16 = 16$ अंक)

आंतरिक मूल्यांकन :- कुल अंक 20

- I. विभागीय गतिविधियों में सहभागिता- 05 अंक
- II. समाचार लेखन- 05 अंक
- III. जनसंचार माध्यमों में प्रकाशित विभिन्न हिन्दी समाचारों का संकलन- 05 अंक
- IV. प्रयोजनमूलक हिन्दी पर भित्तीपत्रक निर्मिती- 05 अंक

बी.ए. द्वितीय वर्ष प्रयोजनमूलक हिन्दी

चतुर्थ सत्र

कुल अंक 100

लिखित परीक्षा 80

आंतरिक मूल्यांकन 20

- 1) इकाई 1 कार्यालयी कार्यविधिकी भाषा :-
 - क) प्रशासन व्यवस्था एवं कार्यालय संगठन
 - I. केन्द्रीय शासन
 - II. राज्य शासन

2) इकाई 2 सरकारी पत्राचार : सिद्धान्त और व्यवहार

❖ सरकारी पत्राचार से तात्पर्य, सरकारी पत्राचार की सामान्य विशेषताएँ

❖ सरकारी पत्राचार :- विभिन्न रूप और स्वरूप

I. सरकारी पत्र

II. अर्धसरकारी पत्र

III. सरकारी पत्र के अन्य रूप

3) इकाई 3 विज्ञापन लेखन :- सिद्धान्त और व्यवहार

विज्ञापन :- अर्थ एवं परिभाषा, विज्ञापन की स्वरूपगत विशेषताएँ, विज्ञापन लेखक का दायित्व, विज्ञापन लेखन प्रक्रिया एवं प्रविधि, विज्ञापन संरचना और उसके अंग, विज्ञापन की भाषा, विज्ञापनीय भाषा की विशेषताएँ, विज्ञापन के प्रकार

अंक विभाजन एवं प्रश्नपत्र का स्वरूप (चतुर्थ सत्र)

समय 3 घंटे

पूर्णांक-80

प्रश्न क्र. 1 इकाई एक से (दो) दीर्घोत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे | (2 x 8 =16)

प्रश्न क्र. 2 इकाई दो से (दो) दीर्घोत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे | (2 x 8 =16)

प्रश्न क्र. 3 इकाई तीन से (दो) दीर्घोत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे | (2 x 8 =16)

प्रश्न क्र. 4 इकाई एक, दो और तीन से चार लघुत्तरी प्रश्न विकल्प के साथ पूछे जायेंगे | (4x4=16)

प्रश्न क्र. 5) संपूर्ण पाठ्यक्रम से (वस्तुनिष्ठ/अतिलघुत्तरी) 16 प्रश्न पूछे जायेंगे | प्रत्येक प्रश्न के लिए एक अंक होगा | (1 x 16 = 16 अंक)

आंतरिक मूल्यांकन :- कुल अंक 20

I. समाचार पत्रों में प्रकाशित विज्ञापनों का संकलन - 05 अंक

II. केन्द्र तथा राज्य शासन के द्वारा प्रकाशित विज्ञापनों का संकलन - 05 अंक

III. बैंक व्यवसायिक या किसी सरकारी कर्मचारी से साक्षात्कार -10 अंक

बी.ए.द्वितीय वर्ष- तृतीय तथा चतुर्थ सत्र (प्रयोजनमूलक हिन्दी)

• संदर्भ ग्रंथ सूची -:

1. हिन्दी के प्रयोजनमूलक भाषा रूपड - .डॉ सोनटक्के माधव .
2. अनुप्रायोगिक हिन्दी- डॉ गोस्वामी कुमार कृष्ण.
3. व्यावहारिक हिन्दी और रचना- डॉगोस्वामी कुमार कृष्ण.
4. राजभाषा हिन्दी- कैलाशचंद भाटिया
5. प्रयोजनमूलक व्यावहारिक हिन्दी.डॉ.सिंहल ओमप्रकाश .
6. प्रयोजनमूलक हिन्दी- डॉ गोदरे विनोद .
7. हिन्दी में व्यावहारिक अनुवाद- डॉ रस्तोगी आलोक .
8. अनुवाद विज्ञान- डॉतिवारी भोलानाथ .
9. प्रयोजनमूलक भाषा- डॉगोदरे विनोद .
10. प्रयोजनमूलक हिन्दी के विविध आयाम- डॉ.माधव सोनटक्के
11. राजभाषा हिन्दी और राजकीय पत्र व्यवहार- डॉ घनश्याम .
12. प्रयोजनात्मक और प्रयोजनमूलक हिन्दी- डॉ रामप्रकाश .
13. व्यावसायिक हिन्दी- डॉतिवारी भोलानाथ .
14. संक्षेपण और पल्लवन- डॉ भाटिया कैलाश .
15. अनुचिंतन प्रो.शंकर बुंदेले
16. अनुसृजन-प्रो.शंकर बुंदेले
17. प्रायोगिक अनुवाद विज्ञान- डॉ सराफ मनोहर .
18. अनुवाद भाषाएँ-ई.एन.विश्वनाथ
19. अनुवाद विज्ञान- डॉ पालीवाल रीतारानी .
20. प्रयोजनी हिन्दी स्वरूप और व्यापकता- गोपाल शर्मा

बी.ए. द्वितीय वर्ष (हिन्दी साहित्य)

तृतीय सत्र

कुल अंक 100
लिखित परीक्षा 80
आंतरिक मूल्यांकन 20

नियोजित पाठ्यपुस्तक 'नटरंग' राघव पब्लिशर्स अॅन्डडिस्ट्रीब्यूटर्स, नागपुर । यह पुस्तक अध्ययन तथा अध्यापन के लिए निर्धारित की गई है । संपूर्ण पाठ्यक्रम चार इकाइयों में विभाजित है ।

- 1) प्रथम इकाई -एकांकी संकलन 1 से 10 एकांकी
- 2) द्वितीय इकाई -हिन्दी साहित्य का इतिहास :-

- I. हिन्दी साहित्य अध्ययन की परंपरा
- II. हिन्दी साहित्य का काल विभाजन
- III. आदिकाल :- समय सीमा, नामकरण और प्रवृत्तियाँ (इन सभी का सामान्य परिचय)

- 3) तृतीय इकाई :-साहित्यकारों का परिचय

- I. आचार्य रामचंद्र शुक्ल (आलोचक)
- II. प्रेमचंद (कथाकार)
- III. रामधारी सिंह 'दिनकर' (कवि)
- IV. डॉ.शंकर शेष (नाटककार)
- V. कृष्ण सोबती (महिला लेखिका)

- 4) चतुर्थ इकाई-साहित्य शास्त्र

- I. छंद
- II. अलंकार
- III. काव्य हेतु
- IV. काव्य प्रयोजन

अंक विभाजन एवं प्रश्नपत्र का स्वरूप (तृतीय सत्र)

समय 3 घंटे

पूर्णांक-80

प्रश्न क्र. 1 अ) संदर्भ सहित व्याख्या (दो) प्रथम इकाई से । (2 × 8 = 16)

आ) दीर्घोत्तरी प्रश्न (दो) प्रथम इकाई से । (2× 8 = 16)

प्रश्न क्र. 2 अ) दीर्घोत्तरी प्रश्न (एक) द्वितीय इकाई से । (1 × 8 = 8)

आ) लघुत्तरी प्रश्न (दो) द्वितीय इकाई से । (2× 4 = 8)

प्रश्न क्र. 3 अ) दीर्घोत्तरी प्रश्न (एक) तृतीय इकाई से । (1 × 8 = 8)

प्रश्न क्र. 4) अ) लघुत्तरी प्रश्न (दो) चतुर्थ इकाई से । (2× 4 = 8)

प्रश्न क्र. 5) संपूर्ण पाठ्यक्रम से (वस्तुनिष्ठ/अतिलघुत्तरी) 16 प्रश्न पूछे जायेंगे । प्रत्येक प्रश्न के लिए एक अंक होगा । (1 × 16 = 16 अंक)

सूचना :-

- I. इकाई एक, दो, तीन एवं चार से सभी प्रश्न विकल्प के साथ पूछे जायेंगे ।
- II. जिन एकांकियों से संदर्भ सहित व्याख्या पूछी गई हो उनसे दीर्घोत्तरी प्रश्न न पूछे जायें ।

आंतरिक मूल्यांकन :- कुल अंक 20

- 1) वृत्तपत्रों में प्रकाशित पांच लघुकथाओं का संकलन- 10 अंक
- 2) गृहपाठ -05 अंक
- 3) समूह चर्चा - 05 अंक

बी.ए. द्वितीय वर्ष (हिन्दी साहित्य)

चतुर्थ सत्र

कुल अंक 100
लिखित परीक्षा 80
आंतरिक मूल्यांकन 20

नियोजित पाठ्यपुस्तक 'काव्यदर्पण' राघव पब्लिशर्स अॅन्डडिस्ट्रीब्यूटर्स, नागपुर । यह पुस्तक अध्ययन तथा अध्यापन के लिए निर्धारित की गई है । संपूर्ण पाठ्यक्रम चार इकाइयों में विभाजित है ।

१) प्रथम इकाई -काव्यदर्पण से 1 से 6 कवियों की प्रथम तीन कविताएँ

2) द्वितीय इकाई -हिन्दी साहित्य का इतिहास

I. भाक्तिकाल:- उद्भव, विकास, प्रमुख धाराएँ और प्रवृत्तियाँ ।
(सामान्य परिचय)

II. रीतिकाल:- उद्भव, विकास, प्रमुख धाराएँ और प्रवृत्तियाँ ।
(सामान्य परिचय)

3) तृतीय इकाई -साहित्य शास्त्र

I. रस, अर्थ, परिभाषा और अंग

II. शब्द शक्ति

III. काव्य के लक्षण

IV. काव्य तत्त्व

अंक विभाजन एवं प्रश्नपत्र का स्वरूप (चतुर्थ सत्र)

समय 3 घंटे

पूर्णांक-80

प्रश्न क्र. 1 अ) संदर्भ सहित व्याख्या (दो) प्रथम इकाई से । (2 x 8 = 16)

आ) दीर्घोत्तरी प्रश्न (दो) प्रथम इकाई से । (2x 8 = 16)

प्रश्न क्र. 2 अ) दीर्घोत्तरी प्रश्न (एक) द्वितीय इकाई से । (1 x 8 = 8)

आ) लघुत्तरी प्रश्न (दो) द्वितीय इकाई से । (2x 4 = 8)

प्रश्न क्र. 3अ) दीर्घोत्तरी प्रश्न (एक) तृतीय इकाई से । (1 x 8 = 8)

आ) लघुत्तरी प्रश्न (दो) तृतीय इकाई से । (2x 4 = 8)

प्रश्न क्र. 4) संपूर्ण पाठ्यक्रम से (वस्तुनिष्ठ/अतिलघुत्तरी) 16 प्रश्न पूछे जायेंगे । प्रत्येक प्रश्न के लिए एक अंक होगा । (1x16 =16 अंक)

सूचना :-

I. इकाई एक, दो एवं तीन से सभी प्रश्न विकल्प के साथ पूछे जायेंगे ।

II. जिन कवित्तों से संदर्भ सहित व्याख्या पूछी जाये उनसे दीर्घोत्तरी प्रश्न न पूछे जायें ।

आंतरिक मूल्यांकन :- कुल अंक 20

I. निबंध परियोजना (कविता, उद्भव, विकास और प्रवृत्तियाँ) -10 अंक

II. वृत्तपत्रों में प्रकाशित पाँच लघुकथाओं का संकलन - 05 अंक

III. मराठी के भक्तकवियों की पाँच रचनाओं का संकलन - 05 अंक

बी.ए.द्वितीय वर्ष- तृतीय तथा चतुर्थ सत्र (हिन्दी साहित्य)

• संदर्भ ग्रंथ सूची :-

1. हिन्दी साहित्य का इतिहास शुक्ल रामचंद्र आचार्य -
2. हिन्दी साहित्य का इतिहास -डॉ जैसवाल अमरप्रसाद.
3. हिन्दी साहित्य की प्रवृत्तियाँ- जयकिसन प्रसाद
4. हिन्दी साहित्य का इतिहास-डॉ. विजयपाल सिंह
5. हिन्दी भाषा स्वरूप और विकास- डॉ भाटिया कैलाशचंद्र.
6. हिन्दी उद्भव विकास और रूप- डॉ बाहरी हरदेव .
7. नाटक और रंगमंच की भूमिका -डॉ लाल लक्ष्मीनारायण.
8. हिन्दी नाटककार- डॉ. नलिन जयनाथ -
9. आलोचना के बदलते मानदंड और हिन्दी साहित्य डॉ. सिंह शिवचरण-
10. आधुनिक समीक्षा- डॉमिश्र स्वरूप भगवत.
11. हिन्दी नाटक रंग शिल्प दर्शन- डॉ गौतम विकल.
12. नयी समीक्षा के प्रतिमान- डॉ जैन निर्मला .
13. महाकवि जायसी और उनका काव्य- डॉ अहमद इकबाल .
14. कबीर एक अनुशीलन- डॉ वर्मा रामकुमार .
15. सूरदास और उनका काव्य- डॉ शर्मा मुंशीराम .
16. बिहारी काव्य का मूल्यांकन . डॉ किशोरीलाल
17. घनानंद और स्वछंद काव्यधारा .डॉ मनोहरलाल .
18. गोस्वामी तुलसीदास- आचार्य रामचंद्र शुक्ल
19. प्रेमचंद्र एक अध्ययन- डॉ गुरु राजेश्वर .
20. प्रसादोत्तर नाटक एवं लक्ष्मीनारायण मिश्र -डॉ गौतम विकल .
21. भारतीय काव्यशास्त्र के सिद्धांत डॉ. झारी कृष्णदेव .

22. रस सिद्धांत और सौन्दर्य शास्त्र- निर्मला जैन
23. नई कहानी का स्वरूप विवेचन- डॉ रश्मि इन्दु .
24. नई कहानी संदर्भ और प्रकृति- देवी शंकर अवस्थी
25. समकालीन हिन्दी कहानी- डॉ पुष्प .पाल सिंह
26. संत कबीर और महात्मा बसवेश्वर के साहित्य में सामाजिक चेतना- डॉ गाजले संतोषकुमार .
27. समय के हस्ताक्षर एवं मध्यकाल के अनमोल रतन- डॉ ज्योति व्यास
28. हिन्दी निर्गुण संत काव्य- डॉ शुक्ल रमा .
29. संत कबीर और संत तुकड़ोजी के हिन्दी साहित्य का तुलनात्मक अध्ययन- डॉ जगताप संगीता .
30. हिन्दी एकांकी और एकांकीकार .सूदडाँ रमा
31. नागार्जुन के उपन्यासों का तात्त्विक मूल्यांकन- डॉ मेंडे .सी यादव .
32. डॉअध्ययन तुलनात्मक का नाटकों के मतकरी रत्नाकर और शेष शंकर .- डॉ.रवीन्द्र शिरसाट
33. महाराष्ट्र की हिन्दी सन्त काव्य परंपरा और सन्त तुकड़ोजी काव्य डॉ-प्रवीण देशमुख
34. स्वातंत्र्योत्तर हिन्दी उपन्यासोंमें जातीय चित्रण- डॉ. गजानन वानखडे

Appendix-D

वाङ्.मय स्नातक भाग-२
संस्कृत आवश्यक

सत्र - ३

पुस्तक - संस्कृत सोपान - भाग-२ (प्रथम विभाग)
परिमल प्रकाशन, पुसद .

वेळ ३ तास

गुण - लेखी परीक्षा - ८०

अंतर्गत मूल्यमापन - २०

एकूण गुण - १००

घटक - १ गद्य - पाठ १ व २	-	१६ गुण
घटक - २ गद्य - पाठ ३ व ४	-	१६ गुण
घटक - ३ गद्य - पाठ १ व २	-	१६ गुण
घटक - ४ पद्य - पाठ ३ व ४	-	१६ गुण
घटक - ५ संस्कृत काव्यांवर आधारित प्रश्नावली - १६ गुण		

प्रश्नपत्रिकेचे स्वरूप

लेखी परीक्षा

गुण - ८०

प्रश्न १ ला	अ) ४ पैकी २ गद्य उताऱ्यांचा अनुवाद (५ ते ६ ओळींचे उतारे)	१० गुण
प्रश्न २ रा	ब) दीर्घात्तरी प्रश्न (दोन पैकी एक) अ) ४ पैकी २ गद्य उताऱ्यांचा अनुवाद (५ ते ६ ओळींचे उतारे)	०६ गुण १० गुण
प्रश्न ३ रा	ब) प्रश्न दोन पैकी एक अ) ४ पैकी २ श्लोकांचा अनुवाद (४ ओळींचे श्लोक)	०६ गुण १० गुण
प्रश्न ४ था	ब) प्रश्न (दोन पैकी एक) अ) ४ पैकी २ श्लोकांचा अनुवाद (४ ओळींचे)	०६ गुण १० गुण
प्रश्न ५ वा	ब) प्रश्न (दोन पैकी एक) घटक ५ वर आधारित २० पैकी १६	०६ गुण १६ गुण
वस्तुनिष्ठ प्रश्नांची उत्तरे		
अन्तर्गत मूल्यमापन—		
१) स्वाध्याय		१० गुण
२) मौखिक		१० गुण

वाङ्.मय स्नातक भाग-२

सत्र - ४

पुस्तक - संस्कृत सोपान - भाग-२ (द्वितीय विभाग)
परिमल प्रकाशन, पुसद .

वेळ ३ तास

गुण - लेखी परीक्षा - ८०

अंतर्गत मूल्यमापन - २०

एकूण गुण - १००

घटक - १ गद्य - पाठ १ व २	-	१६ गुण
घटक - २ गद्य - पाठ ३ व ४	-	१६ गुण
घटक - ३ गद्य - पाठ १ व २	-	१६ गुण
घटक - ४ पद्य - पाठ ३ व ४	-	१६ गुण
घटक - ५ संस्कृत काव्यांवर आधारित प्रश्नावली - १६ गुण		

प्रश्नपत्रिकेचे स्वरूप		लेखी परीक्षा गुण - ८०
प्रश्न १ ला	अ) ४ पैकी २ चा अनुवाद (५ ते ६ ओळींचे उतारे)	१० गुण
	ब) प्रश्न (दोन पैकी एक)	०६ गुण
प्रश्न २ रा	अ) ४ पैकी २ चा अनुवाद (५ ते ६ ओळींचे उतारे)	१० गुण
	ब) प्रश्न दोन पैकी एक	०६ गुण
प्रश्न ३ रा	अ) ४ पैकी २ श्लोकांचा अनुवाद (४ ओळींचे श्लोक)	१० गुण
	ब) प्रश्न (दोन पैकी एक)	०६ गुण
प्रश्न ४ था	अ) ४ पैकी २ श्लोकांचा अनुवाद (४ ओळींचे)	१० गुण
	ब) प्रश्न (दोन पैकी एक)	०६ गुण
प्रश्न ५ वा	वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण
अन्तर्गत मूल्यमापन—		
१) स्वाध्याय		१० गुण
२) मौखिक		१० गुण

वाङ्.मय स्नातक भाग-२

**सत्र - ३
संस्कृत साहित्य**

पुस्तक - १) मालविकाग्नि मित्रम् (नाटक)	
२) लघुसिद्धान्त कौमुदी (स्वरसंचिन प्रकरणम्)	
वेळ ३ तास	गुण - लेखी परीक्षा - ८० अंतर्गत मूल्यमापन - २० एकूण गुण - १००
घटक - १ - मालविकाग्नि मित्रम् अंक १ व २	
घटक - २ - मालविकाग्नि मित्रम् अंक ३ व ४	
घटक - ३ - मालविकाग्नि मित्रम् अंक ५ व ६	
घटक - ४ - लघुसिद्धान्त कौमुदी स्वरसंधी प्रकरण.	
घटक - ५ - कवींची माहिती - (१) भवभुती (२) भारवि (३) माघ, (४) भर्तृहरि, (५) जयदेव	

प्रश्नपत्रिकेचे स्वरूप

लेखी परीक्षा ८० गुण	वेळ ३ तास
सूचना - प्रश्न १ ते ३ संपूर्ण मालविकाग्निमित्रम् नाटकावर आधारित प्रश्न ५ वा कवीवर आधारित.	
प्रश्न १ ला ८ पैकी ५ श्लोकांचा अनुवाद करा	२० गुण
प्रश्न २ रा दीर्घांतरी प्रश्न २ पैकी १	१२ गुण
प्रश्न ३ रा संदर्भासह स्पष्टीकरण ६ पैकी ४	२० गुण
प्रश्न ४ था ५ पैकी ३ सुत्रांचे उदाहरणासह स्पष्टीकरण	१२ गुण
प्रश्न ५ वा २० पैकी १६ वस्तुनिष्ठ प्रश्न कवींच्या माहिती वर आधारित	१६ गुण

अन्तर्गत मूल्यमापन—

१) स्वाध्याय	१० गुण
२) मौखिक	१० गुण
संदर्भ ग्रंथ १) मालविकाग्निमित्रम् - डॉ.रमाशंकर पाण्डेय, (हिन्दी) संस्कृत प्रतिष्ठान चौखम्बा प्रकाशन, वाराणसी.	
२) मालविकाग्नि मित्रम् - डॉ.एम.आर.काळे (इंग्लिश)	
३) मालविकाग्नि मित्रम् - मंगरूळकर, हातवळणे व केळकर - देशमुख प्रकाशन, बुधवार पुणे	
४) लघुसिद्धान्त कौमुदी - प्राचार्या डॉ.निला सोमलवार, कौमुदी प्रकाशन.	
५) संस्कृत साहित्याचा सोपपतिक इतिहास, डॉ.विनायक वामन करंबेळकर श्री शारदा प्रकाशन, नागपूर	
६) संस्कृत कवींचा इतिहास- प्राचार्या डॉ.निला सोमलवार, कौमुदी प्रकाशन.	

वाङ्.मय स्नातक भाग-२

सत्र - ४

संस्कृत साहित्य

पुस्तक - १) श्री मयूर कविकृत सूर्यशतकम् २) काव्य प्रकाश (प्रथमोल्लास)	गुण - लेखी परीक्षा - ८० गुण - लेखी परीक्षा - ८० एकूण गुण - १००
घटक - १ - सूर्यशतकम् श्लोक १ ते २५	
घटक - २ - सूर्यशतकम् श्लोक २६ ते ५०	
घटक - ३ - सूर्यशतकम् श्लोक ५१ ते ७५	
घटक - ४ - सूर्यशतकम् श्लोक ७६ ते समाप्तीपर्यंत	
घटक - ५ कविंची माहिती - (१) कालीदास (२) बाणभट्ट (३) अश्वघोष (४) शुद्रक (५) श्रीहर्ष	

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला ८ पैकी ५ श्लोकांचा अनुवाद करा	२० गुण
प्रश्न २ रा दीर्घोत्तरी प्रश्न २ पैकी १	१२ गुण
प्रश्न ३ रा ८ पैकी ५ श्लोकांचा अनुवाद करा	२० गुण
प्रश्न ४ था टिपा लिहा ५ पैकी ३	१२ गुण
प्रश्न ५ वा वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण
अन्तर्गत मूल्यमापन—	
१) स्वाध्याय	१० गुण
२) मौखिक	१० गुण

संदर्भ ग्रंथ सूची

- १) श्री मयूर कविकृत सूर्यशतकम् - डॉ.माणिक पाटील, नचिकेत प्रकाशन, नागपूर.
- २) काव्य प्रकाश - प्राचार्य डॉ.निला सोमलवार, कौमुदी प्रकाशन.
- ३) काव्य प्रकाश - डॉ.सत्यव्रत सिंग - चौखम्बा विद्याभवन वारणसी- चौखम्बा विद्याभवन
- ४) संस्कृत साहित्याचा सोपपत्तिक इतिहास- डॉ.विनायक वामन करंबळेकर श्री शारदा प्रकाशन, नागपूर
- ५) संस्कृत साहित्य का इतिहास - डॉ.बळदेव उपाध्याय, चौखम्बा प्रकाशन,

B.A. PART - II
URDU COMPULSORY
SEMESTER - III

Time : Three Hours

Max. Marks : 80

TEXT PRESCRIBED : SHUA - E ADAB (Part - II)

Edited by : Dr. Mohd. Samiullah, Dr. Roohina Tabassum

Published by: TAFSA Computers, Amravati.

UNITWISE DISTRIBUTION OF MARKS

UNIT I : (Prose) The following TWO Lessons from Text

ماہ لیاقتی آلودگی۔ مذہب اور سیاست

There Shall be FOUR short Answer type Questions out of Eight of 4 marks each

16

UNIT - II (Poetry) The following poems from Text

غزل: سراج اور نگ آبادی - میر تقی میر - غالب

The examinee Shall explain FOUR Couplets out of Eight of 4 marks each

16

UNIT III : (Prose) The following lessons from Text

اردو کا ارتقاء - - - - - چھینک کی۔

There Shall be FOUR short Answer type Questions out of Eight of 4 marks each

16

UNIT IV : (Prose) The following lesson from Text

لال باغ

There Shall be ONE Long Answer type Questions out of TWO of 16 marks.

16

UNIT V : Communication Skill

i) An Essay on general Topic 8 marks

16

ii) Translation of a passage from English to Urdu 8 mark

Internal Assessment based on Syllabus

i) Oral Test carrying 10 marks

ii) Written Test carrying 10 marks

B.A. PART - II
URDU COMPULSORY
SEMESTER - IV

Time : Three Hours

Max. Marks : 80

TEXT PRESCRIBED : SHUA - E ADAB (Part - II)

Edited by : Dr. Mohd. Samiullah, Dr. Roohina Tabassum

Published by: TAFSA Computers, Amravati.

UNITWISE DUSTRIBUTION OF MARKS

UNIT I : (Prose) The following TWO Lessons from Text

ذرائع ابلاغ کی اہمیت - تعصب

There Shall be FOUR short Answer type Questions out of Eight of 4 marks each

16

UNIT - II (Poetry) The following poems from Text

غزل: حسرت موہانی - جگر مراد آبادی - جاوید اختر

The examinee Shall explain FOUR Couplets out of Eight of 4 marks each

16

UNIT III : (Prose) The following lessons from Text

تلمیحات

There Shall be FOUR short Answer type Questions out of Eight of 4 marks each

16

UNIT IV : (Prose) The following lesson from Text

سیر فرنگ (رومتہ الکبریٰ)

There Shall be ONE Long Answer type Questions out of TWO of 16 marks.

16

UNIT V : Communication Skill

i) An Essay on general Topic 8 marks

16

ii) Translation of a passage from English to Urdu 8 mark

Internal Assesment based on Syllabus

i) Oral Test carrying 10 marks

ii) Written Test carrying 10 marks

B.A. PART - II
URDU LITERATURE
SEMESTER - III

Time : Three Hours

Max. Marks 80

TEXT PRESCRIBED : 1. (PROSE) IBNUL WAQAT

by : Nazeer Ahmad (Educational Book House, Aligrah)

ابن الوقت: ڈپٹی • احمد - (ایجوکیشنل • ہاؤس، علی گڑھ)

2. POETRY : MUSADASE HALI (First Part) by. Khwaja Altaf Husain Hali

مدرس حالی: خواجہ الطاف حسین حالی (پہلا حصہ)

3. History of Urdu Literature (from 1857 to 1914)

UNITWISE DUSTRIBUTION OF MARKS

UNIT I : (Prose) Passages for explanation from Novel IBNUL WAQAT 8 marks each two out of four passages	16
UNIT II : (Poetry) Poetry Passages for explanation 4 marks each Four out of Eight passages	16
UNIT III : (Prose) The examinee Shall Write a Character from Novel One out of Three of 8 marks	8
UNIT IV : (Poetry) The examinee Shall Anwer a ONE Question out of TWO of 8 marks	8
UNIT V : Life and works of poet and Novelist (Long Answer Type)	16
UNIT VI : A long answer question on History of Urdu Literature.	16

Internal Assesment based on Syllabus

- Oral Test carrying 10 marks
- Written Test carrying 10 marks

B.A. PART - II
URDU LITERATURE
SEMESTTER - IV

Time : Three Hours

Max. Marks 80

TEXT PRESCRIBED : 1. (PROSE) UMRAO JAN ADA

by : Mrza Hadi Ruswa (Educational Book House, Aligrah)

امراؤ جان ادا : مرزا ہادی رسوا - (ایجوکیشنل ہاؤس، علی گڑھ)

2. POETRY : MUSADASE HALI (Second Part) by. Khwaja Altaf Husain Hali

مسدس حالی: خواجہ الطاف حسین حالی (دوسرا حصہ)

3. History of Urdu Literature (from 1857 to 1914)

UNITWISE DUSTRIBUTION OF MARKS

UNIT I : (Prose) Passages for explanation from Novel UMRAO JAN ADA 8 marks each two out of four passages	16
UNIT II : (Poetry) Poetry Passages for explanation 4 marks each Four out of Eight passages	16
UNIT III : (Prose) The examinee Shall Write a Character from Novel One out of Three of 8 marks	8
UNIT IV : (Poetry) The examinee Shall Anwer a ONE Question out of TWO of 8 marks	8
UNIT V : Life and works of poet and Novelist (Long Answer Type)	16
UNIT VI : A long answer question on History of Urdu Literature.	16

Internal Assesment based on Syllabus

- Oral Test carrying 10 marks
- Written Test carrying 10 marks

Semester III

B.A.PART - II
PERSIAN LITERATURE

Time: 3 hours

Total Marks : 80

Internal Assesment

Total Marks : 20

Distribution of Marks :

Unit I	Prose	16
Unit II	Poetry	16
Unit III	History Of Persian Literature	16
Unit IV	Rapid Reading	16
Unit V	Grammer	16
	Total	80

The distribution of internal assessment marks shall be as follows.

Home Assignment : 10 Marks

Two Unit Tests: 5 marks each

Unit I : Prose : Following selections from "Hadiqua-e-Farsi" Part II

Published by Advocate B. S. Taji New Town , Badnera

انتخاب از چہار مقالہ

II. Poetry : Following selections from "Hadiqua-e-Farsi" Part I

قصیدہ: منوچہری دامغانی

غزلیات: عربی شیرازی غزل نمبر ۱، ۲، ۳، ۴

منظومات: محمود خاں افشار: زارع نسیم شمال: خطاب بہ فرنگیان

III. History of Persian Literature:

بک ہندی

Book Recomendend:

فارسی شاعری کے اسالیب کا مطالعہ

از ڈاکٹر انجم ضیاء الدین تاجی، ڈاکٹر محمد یحییٰ جمیل، اسباق: بی بی کیشور، پونے

IV. Rapid Reading : Following selections from Hadiqua-e-Farsi Part I

ذکر خواجہ نظام الملک ابو علی حسن طوسی

V: Grammer :

بنیادی قواعد زبان فارسی (فعل مجہول)

Question paper will be set on the following pattern:

Note: Questions will be asked in Persian and answers may be written either in Urdu, Hindi or English.

Q.No.1		
(A)	The students shall have to translate two passages out of three taken from انتخاب از چهارمقاله	16
Q.No.2		
(A)	The students shall have to translation four couplets out of seven couplets to be given from غزلیات عربی شیرازی	8
(B)	The students shall have to translation one sets of couplets out of three sets , each consists of four couplets from قصیده منوچهری، منظومات جدید زارع، خطاب بہ فرنگیان	8
Q.No.3	16 Multiple Choice Questions based on Unit III i.e. History of Persian Literature.	16
Q.No.4	The students shall have to translate one passage out of two from ذکر خواجہ نظام الملک ابوعلی حسن طوسی	8
	The students shall have to answer one question out of two based on above lesson.	8
Q.No.5	Questions based on grammer of Persian Language.	16



Semester IV

Time: 3 hours

B.A.PART - II
PERSIAN LITERATURE

Total Marks : 80

Internal Assesment

Total Marks : 20

Distribution of Marks :

Unit I	Prose	16
Unit II	Poetry	16
Unit III	History Of Persian Literature	16
Unit IV	Rapid Reading	16
Unit V	Grammer	16

Published By Advocate B.S. Taji New Town, Badnera

داستانہای کوتاه از محمد مجازی (۱) شکار (۲) مریم و گل (۳) ماه من

II. Poetry : Following selections from "Hadiqua-e-Farsi" Part II

مثنوی: رزم و ستم و اسفند یار

غزلیات: نظیری نیشاپوری - غزل نمبر ۳۱، ۳۲، ۳۳

منظومات: لائوتی: (۱) دختران میراوشیج: (۱) منت دودمان (۲) گل زوروس

III. History of Persian Literature: مہک دور بارگشت

Book Recommended:

فارسی شاعری کے اسالیب کا مطالعہ

از ڈاکٹر انجم ضیاء الدین تاجی، ڈاکٹر محمد یحییٰ رحیل، اسحاق بیگی کیشور، پوسے

IV. Rapid Reading : Following selections from Hadiqua-e-Farsi Part II

بیاحت نامہ از ابراہیم بیگ

V. Grammar : قواعد فارسی زبان، مقرر داہر مرکب جملے

صنائع بدائع

Question paper will be set on the following pattern:

Note: Questions will be asked in Persian and answers may be written either in Urdu, Hindi or English.

Q.No.1	
(A)	The students shall have to translate two passages out of three taken from داستانہای کوتاه از محمد مجازی: شکار، مریم و گل، ماه من 16
Q.No.2	
(A)	The students shall have to translation four couplets out of seven couplets to be given from غزلیات نظیری نیشاپوری 8
(B)	The students shall have to translation one sets of couplets out of three sets , each consists of four couplets from مثنوی، منظومات جدید 8
Q.No.3	16 Multiple Choice Questions based on Unit III i.e. History of Persian Literature. 16
Q.No.4	A. The students shall have to translate one passage out of two from بیاحت نامہ از ابراہیم بیگ 8 B. The students shall have to answer one question out of two based on above lesson. 8
Q.No.5	A. Questions based on grammar of Persian Language. 8 B. Students have to define four rhetorics out of seven 8

Appendix-G

बी.ए.भाग-२
पाली आणि प्राकृत (आवश्यक)
सेमिस्टर-३

वेळ ३ तास		लेखी परीक्षा - ८० अंतर्गत मूल्यमापन -२० एकूण - १००
युनिट-१	मज्झिमनिकाय १) मखादेव सुत्त २) वासेट्ठ सुत्त	१६ गुण
युनिट-२	धम्मपद १) सहस्स वग्ग २) तव्हा वग्गो	१६ गुण
युनिट-३	थेरिगाथा १) पटाचारा थेरी २) रोहिणी थेरी	१६ गुण
युनिट-४	सुत्तनिपात १) मेत्तसुत्त २) पराभवसुत्त	१६ गुण
युनिट-५	१ ते ४ युनिटवरील वस्तुनिष्ठ प्रश्न	१६ गुण

संदर्भ ग्रंथ

- १) मज्झिमनिकायपालि - नालंदा संस्करण, इगतपुरी
- २) थेरीगाथा - डॉ.विमलकिर्ती
- ३) सुत्तनिपात - डॉ. भिक्खू धर्मरक्षित
- ४) धम्मपद - डॉ.आर.जे.वानखडे
- ५) पालि गज्जो पज्जो संग्रहो - डॉ. बंडू शालीक मानवटकर

अंतर्गत मूल्यमापन -

- १) स्वाध्याय-१०
- २) मौखिक - १०

२० गुण

बी.ए.भाग-२
पाली व प्राकृत (आवश्यक)
सेमिस्टर-३

वेळ ३ तास	प्रश्नपत्रिकेचे स्वरूप	८० गुण
प्रश्न-१	अ) भाषांतर करा (कोणतेही एक) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न-२	अ) संदर्भासह स्पष्टीकरण करा (दोन गाथांचे) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न -३	अ) सामान्य प्रश्न सोडवा (दोन पैकी एक) ब) टिपा लिहा (कोणत्याही दोन)	०८ गुण ०८ गुण
प्रश्न -४	अ, ब - व्याकरण विषयक रूपे लिहा (कोणतेही आठ)	१६ गुण
प्रश्न -५	वस्तुनिष्ठ प्रश्न सोडवा. (बारा पैकी आठ)	१६ गुण

बी.ए.भाग-२
पाली आणि प्राकृत (आवश्यक)
सेमिस्टर-४

वेळ ३ तास		लेखी परीक्षा - ८० अंतर्गत मूल्यमापन -२० एकूण - १००
युनिट-१	जातक १) जिज्झजातक २) मणिचोर जातक	१६ गुण
युनिट-२	धम्मपद १) मग्गवग्गो २) पण्डितवग्गो	१६ गुण
युनिट-३	थेरगाथा १) मिगजाल थेर २) सोपाक थेर	१६ गुण
युनिट-४	चरियापिटक १) सिविराज चरिय २) अकित्ती चरिय	१६ गुण
युनिट-५	१ ते ४ युनिट वरील वस्तुनिष्ठ प्रश्न	१६ गुण

संदर्भ ग्रंथ

- | | | |
|-----------------------------|---|-------------------------|
| १) जातक | - | नालंदा संस्करण इगतपुरी |
| २) थेरगाथा | - | डॉ. विमलकिर्ती |
| ३) पालि व्याकरण | - | प्रा.शेषराव मेश्राम |
| ४) धम्मपद | - | डॉ.भदन्त आनंद कौसल्यायन |
| ५) चरियापिटक | - | डॉ.शेषराव मेश्राम |
| ६) पालि गज्जो पज्जो संग्रहो | - | डॉ.बंडू शालीक मानवटकर |

अंतर्गत मूल्यमापन -

- ३) स्वाध्याय-१०
४) मौखिक - १०

२० गुण

बी.ए.भाग-२
पाली व प्राकृत (आवश्यक)
सेमिस्टर-४

वेळ ३ तास		८० गुण
	प्रश्नपत्रिकेचे स्वरूप	
प्रश्न-१	अ) भाषांतर करा (दोन पैकी एक) ब) सामान्य प्रश्न (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न-२	अ) संदर्भासह स्पष्टीकरण करा (दोन गाथा सोडवा ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न -३	अ) सामान्य प्रश्न सोडवा (दोन पैकी एक) ब) टिपा लिहा (कोणत्याही दोन)	०८ गुण ०८ गुण
प्रश्न -४	अ, ब - व्याकरण विषयक रूपे लिहा (कोणतेही आठ)	१६ गुण
प्रश्न -५	वस्तुनिष्ठ प्रश्न सोडवा. (१२ पैकी ८)	१६ गुण

बी.ए.भाग-२
पाली आणि प्राकृत (ऐच्छिक)
सेमिस्टर-३

वेळ ३ तास		लेखी परीक्षा - ८० अंतर्गत मूल्यमापन -२० एकूण - १००
युनिट-१	विनयपिटक १) अजपाल जातक २) मुचलिन्द कथा	१६ गुण
युनिट-२	धम्मपद १) पुष्पवग्ग २) बुध्द वग्ग	१६ गुण
युनिट-३	सुत्तनिपात १) धनियसुत्त २) कसिभारद्वाज सुत्त	१६ गुण
युनिट-४	संधी, संधीचे प्रकार	१६ गुण
युनिट-५	१ ते ४ युनिट वरील वस्तुनिष्ठ प्रश्न	१६ गुण
संदर्भ ग्रंथ		
१) विनयपिटक	- नालंदा संस्करण	
२) सुत्तनिपात	- डॉ. विमलकिर्ती	
३) पाली महाव्याकरण	- भिक्षु जगदीश काश्यप	
४) पाली वाङ्मय	- डॉ. रजनी बी गेडाम	
५) पाली व्याकरण	- डॉ. शेषराव मेश्राम	
६) धम्मपद	- डॉ. भदन्त आनंद कौसल्यायन	
अंतर्गत मूल्यमापन -		
७) स्वाध्याय-१०		
८) मौखिक - १०		

	२० गुण	

बी.ए.भाग-२
पाली व प्राकृत (ऐच्छिक)
सेमिस्टर-३

वेळ ३ तास		८० गुण
	प्रश्नपत्रिकेचे स्वरूप	
प्रश्न-१	अ) भाषांतर करा (दोन पैकी एक) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न-२	अ) संदर्भासह स्पष्टीकरण करा (चार पैकी दोन गाथा) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न -३	अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक) ब) टिपा लिहा (कोणत्याही दोन)	१० गुण ०६ गुण
प्रश्न -४	अ व ब - व्याकरण विषयक रूपे लिहा (कोणतेही आठ)	१६ गुण
प्रश्न -५	वस्तुनिष्ठ प्रश्न सोडवा. (१२ पैकी ८)	१६ गुण

बी.ए.भाग-२
पाली आणि प्राकृत (ऐच्छिक)
सेमिस्टर-४

वेळ ३ तास		लेखी परीक्षा - ८० अंतर्गत मूल्यमापन -२० एकूण - १००
युनिट-१	मज्झिमनिकाय १) मधुर सुत्त २) जीवकसुत्त	१६ गुण
युनिट-२	सुत्तनिपात १) राहुलसुत्त २) धम्मिकसुत्त	१६ गुण
युनिट-३	थेरगाथा १) सुनित थेर २) अग्गिक भारद्वाज थेर	१६ गुण
युनिट-४	सामान्य माहिती १) प्रथम संगिती २) द्वितीय संगिती ३) तृतीय संगिती	१६ गुण
युनिट-५	जातक, सुत्तनिपात, मज्झिमनिकाय या ग्रंथावरील वस्तुनिष्ठ प्रश्न	१६ गुण

संदर्भ ग्रंथ

- १) सुत्तनिपात - डॉ.विमलकीर्ती
 २) मञ्जिमनिकाय - द्वारिकादास शास्त्री
 ३) सुत्तनिपात - डॉ.सविता मेंडे
 ४) पाली वाङ्मय - डॉ.रजनी बी गोडाम
 ५) पालि साहित्याचा इतिहास - डॉ. मालती साकरे

अंतर्गत मूल्यमापन -

- ६) स्वाध्याय-१०
 ७) मौखिक - १०

२० गुण

बी.ए.भाग-२
 पाली व प्राकृत (ऐच्छिक)
 सेमिस्टर-४

वेळ ३ तास		८० गुण
	प्रश्नपत्रिकेचे स्वरूप	
प्रश्न-१	अ) भाषांतर करा (दोन पैकी एक) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न-२	अ) संदर्भासह स्पष्टीकरण करा (दोन गाथांचे) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)	०८ गुण ०८ गुण
प्रश्न -३	अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक) ब) टिपा लिहा (कोणत्याही दोन)	१० गुण ०६ गुण
प्रश्न -४	अ व ब - व्याकरण विषयक रूपे लिहा (कोणतेही आठ)	१६ गुण
प्रश्न -५	वस्तुनिष्ठ प्रश्न सोडवा. (१२ पैकी ८)	१६ गुण

Appendix-H

बी.ए.सेमिस्टर -३
 भारतीय संगीत पाठ्यक्रम
 गायन / स्वरवाद्य
 प्रश्नपत्र - ५ (क्रियात्मक)

पूर्णांक - ५०
 बाह्य मूल्यांकन - ३०
 अंतर्गत मूल्यांकन - २०

रागज्ञान

गुण- ३०

- अ) पाठ्यक्रमातील राग -
 i) आसावरी ii) भैरवी iii) वृंदावनी सारंग iv) बिहाग v) मालकंस vi) देस
 ब) वरील पैकी तीन रागात स्वरमालिका (सरगम गीत)
 क) वरील पैकी दोन रागात लक्षणगीते (लक्षणगीते व सरगम गीते यांचे राग वेगवेगळे असावे)
 ड) वरील पैकी सर्व रागात- छोटेख्याल.
 इ) वरील पैकी कोणत्याही दोन रागात २ छोटेख्याल- आलाप.तानांसह.
 फ) खालील पैकी कोणत्याही एका रागात - विलंबित ख्यालाची बंदिश. आवश्यक
 i) यमन, ii) भैरव, iii) भूपाली
 ह) विलंबित ख्यालाचे राग सोडून कोणत्याही एका रागात तराना
 ल) कोणतेही एक लोकगीत
 १) तालज्ञान- खालील तालांची मात्रा-बोल-खंड चिन्हासह माहिती व हातावर टाळी देवून मूळलय व दूगुन लयीमध्ये म्हणण्याची क्षमता
 i) रुपक ii) तीव्रा iii) झपताल iv) सूलताल v) चौताल
 २) 'हार्मोनियम' या वाद्यावर पाठ्यक्रमातील कोणत्याही एका रागात सरगमगीत वाजविणे.

क्रियात्मक अंतर्गत गुण :	अ) प्रात्यक्षिक वही तयार करणे (सादरीकरणप्रमाणे)	-०५ गुण
	ब) घटक / वार्षिक चाचणी परीक्षा	- ०५ गुण
	क) घेतलेला प्रकल्प व त्याचे सादरीकरण (बॅच प्रमाणे)	-१० गुण

एकूण २० गुण

बी.ए.सेमिस्टर -३
भारतीय संगीत पाठ्यक्रम
गायन / स्वरवाद्य

प्रश्नपत्र -६(शास्त्र)

गुण - ५०

- युनिट १ - पाठ्यक्रमातील गीतप्रकार स्वरलिपीबद्ध करणे. १० गुण
युनिट २ - अ) पाठ्यक्रमातील रागांची शास्त्रीय माहिती (आरोह-अवरोह-पकडसहित)लिहा १० गुण
ब) खालील संगीतज्ञांचे जीवन व कार्य लिहा-
i)सदारंग - अदारंग
ii)बैजू - बख्यू
iii)बाबा अल्लाउद्दीन खॉं
iv)उस्ताद अब्दुल करीम खॉं
युनिट ३ -- अ) पाठ्यक्रमातील तालांचा सविस्तर परिचय देऊन मुळलयव दूगुन लयीत लिपीबद्ध करणे
i)त्रिताल ii) केहरवा iii) दादरा iv) एकताल v) रुपक vi) तीव्रा vii) झपताल
viii)सूलताल ix) चौताल १० गुण
ब) 'पं.विष्णु दिगंबर पलुस्कर' ह्यांच्या स्वरलिपी व ताललिपी पध्दतीचे अध्ययन
क) 'व्हायोलीन' या वाद्याचाआकृतिसह परिचय.
युनिट ४ - अ) खालील राग प्रकारांची विस्तृत माहिती लिहा
पूर्वांगवादी-उत्तरांगवादी राग, संधीप्रकाश राग, अर्धदर्शक स्वर, परमेलप्रवेशक राग,
ब) 'तराना व लोकगीत' या गीतप्रकारांची विस्तृत माहिती १० गुण
युनिट ५ - संपूर्ण पाठ्यक्रमावर आधारित वस्तुनिष्ठ प्रश्न १० गुण

गुण विभाजन	१) स्वरमालिका	-०४
	२) लक्षणगीत	- ०४
	३) छोटाख्याल	- ०५
	४) विलंबित ख्याल	-०५
	५) लोकगीत	- ०२
	६) तालाभ्यास	- ०५
	७) हार्मोनियम वादन	- ०५

एकूण - ३०

बी.ए.सेमिस्टर -४
भारतीय संगीत पाठ्यक्रम
गायन / स्वरवाद्य

प्रश्नपत्र - ७ (क्रियात्मक)

पूर्णांक - ५०

बाह्य मूल्यांकन - ३०

अंतर्गत मूल्यांकन - २०

३० गुण

१) रागज्ञान

पाठ्यक्रमातील राग -

i) बागेश्री ii) भिमपलासी iii) कामोद iv) केदार v) तिलककामोद

अ) वरील पैकी कोणत्याही दोन रागात सरगमगीत व सर्व रागात छोटेख्याल व (दोन छोटेख्याल आलाप-तानांसह)

ब) पाठ्यक्रमातील वरील पैकी कोणत्याही एका रागात विलंबित ख्यालाची बंदिश

क) बिहाग आणि मालकंस या रागापैकी कोणताही एक विलंबित ख्याल आलाप-तानांसह

ड) पाठ्यक्रमातील कोणत्याही एका रागात धृपद दुगुन चौगुन सह (विलंबित ख्यालाचे राग सोडून)

इ) गझल (कोणतीही एक)

२) तालज्ञान - खालील तालांची मात्रा-बोल-चिन्हांसह माहिती व हातावर टाळी देवून मूळलय व दुगुन, चौगुन म्हणण्याची क्षमता i)त्रिताल, ii) केहरवा, iii)दादरा, iv)एकताल, v)रुपक, vi)तीव्रा, vii)झपताल, viii)सूलताल, ix)चौताल.

३) 'हार्मोनियम' या वाद्यावर राष्ट्रगीत वाजविणे.

क्रियात्मक अंतर्गत गुण : अ) प्रात्यक्षिक वही तयार करणे (सादरीकरणप्रमाणे)

-०५ गुण

ब) घटक / वार्षिक चाचणी परीक्षा

- ०५ गुण

क) घेतलेला प्रकल्प व त्याचे सादरीकरण

-१० गुण

(बॅच प्रमाणे)

एकूण २० गुण

बी.ए.सेमिस्टर -४
भारतीय संगीत पाठ्यक्रम
गायन / स्वरवाद्य
प्रश्नपत्र -८(शास्त्र)

युनिट १ – पाठ्यक्रमातील गीतप्रकार लिपीबद्ध करणे	गुण – ५०
युनिट २ - अ) पाठ्यक्रमातील रागांची शास्त्रीय माहिती (आरोह-अवरोह-पकडसहित) लिहा ब) रागसमयसिद्धान्त – विस्तृत अध्ययन (आकृतिसह)	१० गुण
क) खालील संगीतज्ञांचे जीवन व कार्य – i)गोपालनायक ii)मोगूबाई कुर्डीकर iii) डॉ.एन.राजम iv)पं.रामाश्रयज्ञा (रामरंग)	१० गुण
युनिट ३ –अ) पाठ्यक्रमातील तालांचा सविस्तर परिचय देऊन मूळलय व दुगून , चौगून सह लिपीबद्ध करणे	१० गुण
i)त्रिताल ii) केहरवा iii) दादरा iv) एकताल v) रुपक vi) तीव्रा vii)झपताल viii) सूलताल ix) चौताल. ब) ‘सितार’ या वाद्याचा आकृतिसह परिचय क) ‘पखवाज’ या वाद्याचा आकृतिसह परिचय	१० गुण
युनिट ४ -- अ) भारतीय वाद्य व वर्गीकरणाचा संक्षिप्त अभ्यास ब) मोगलकाळ ते आधुनिक कालखंडातील संगीताचा संक्षिप्त इतिहास क) आविर्भाव- तिरोभाव, नायकी- गायकी, वाग्येयकार, गमक, अतित-अनाघात वतिहाई ह्यांची परिभाषा ड) धृपद व गझल या गीतप्रकारांची माहिती	१० गुण
युनिट ५ -- संपूर्ण पाठ्यक्रमावर आधारित वस्तुनिष्ठ प्रश्न. गुण विभाजन	१० गुण
१) स्वरमालिका -०३	
२) छोटारख्याल - ०४	
३) विलंबित ख्याल -०५	
४) घृपद -०५	
५) गझल -०३	
६) तालाभ्यास - ०५	
७) हार्मोनियम वादन - ०५	

एकूण – ३०

संदर्भ ग्रंथ सूची

- १) हिन्दुस्थानी संगीत क्रमिक पुस्तक मालिका भाग-५ – पं.वि.ना.भातखंडे, संगीत प्रकाशक कार्यालय, हाथरस
- २) अनुपरागविलस भाग-२ – गंधर्व कुमार , मौज प्रकाशन, मुंबई
- ३) स्वकीया – पं.गुणवंत माधवलाल व्यास , व्यासश्रुती संस्थान,रायपुर.
- ४) शास्त्रीय संगीत के प्रचलीत राग - संस्कार प्रकाशन, ६ / ४०० अभ्युदयनगर, काळा चौक मुंबई
- ५) भावगीतांचे नोटेशन- अशोक सहस्त्रबुध्दे , मनोरमा प्रकाशन, दादर, मुंबई
- ६) संगीत शास्त्र विजयिनी- पं.नारायण मंगरुळकर,
- ७) २२ प्रृति – डॉ.विध्याधर गोपाळ ओक, संस्कार प्रकाशन, मुंबई
- ८) मालनीया गुंद लावोरी – डॉ.विकास कशाळकर, संस्कार प्रकाशन, मुंबई
- ९) रागरचनांजली - आश्वीनी भिडे देशपांडे - राजहंस प्रकाशन, पुणे
- १०) हिन्दुस्थानी म्युझिक - अशोक रानडे , नॅशनल बुक ट्रस्ट, नवी दिल्ली.
- ११) पं.वि.ना.भातखंडे यांचे संगीतशास्त्र आणि बंदिशीची मिमांसा – डॉ.भोजराज चौधरी, मेघा पब्लिकेशन, अमरावती.
- १२) कहत गुनीजन –डॉ.साधना शिलेदार, विजय प्रकाशन, नागपूर.
- १३) भारतीय संगीत (गायन) शास्त्र (सैध्दातिक) – प्रा.सौ.मानिक मेहरे, राघव पब्लिशर्स अँड डीस्ट्रीब्युटर नागपूर.
- १४) बंदिशीच्या बंदिशी – पं.देवीदासपंत काळे गुरुजी प्रा.सौ.कमल भोंडे, अमरावती.
- १५) नादकमल रचनाकार- प्रा.सौ.कमल मु भोंडे- मुरलीधर अ. भोंडे, अमरावती.
- १६) भारतीय संगीतातील दोन सदारंग - अदारंग, डॉ.स्मिता पतंजलि मादुस्कर, सुतीती पब्लिशर्स,पुणे
- १७) सदारंगाच्या बंदिशी एक अध्ययन- प्रा.डॉ.सौ.वर्षा ध कुळकर्णी, प्रा.धनंजय कुळकर्णी, यवतमाळ.
- १८) संगीतकार उस्ताद अब्दुल करीम खॉ. – डॉ.जयंत खोत, के एल.पचौरी प्रकाशन, गाझियाबाद.
- १९) अभिनव गितांजलि भाग-१,४ व ५ – पं.रामाश्रय ज्ञा, संगीत सदन इलाहाबाद

B.C.A..Part-I (Sem-I & II) Exam.-2011

Prospectus No. 20111221

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

PROSPECTUS
OF
B.C.A.PART-I (SEMESTER-I & II)
SEMESTER-I EXAMINATIONS-2010
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I N D E X
B.C.A.Part-I (Semester-I & II)
(Prospectus No.20111221)

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SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

(1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects, papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.

(2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc. refer the University OrdinanceBooklet the various conditions/provisions pertaining to examinations as prescribed in the following Ordinances-

Ordinance No. 1	:	Enrolment of Students.
Ordinance No.2	:	Admission of Students
Ordinance No. 4	:	National Cadet Corps
Ordinance No. 6	:	Examination in General (relevant extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No.9	:	Conduct of Examinations (Relevant extracts)
Ordinance No.10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission Candidates to Degrees
Ordinance No.109	:	Recording of a change of name of a University Student in the records of the University
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba Amravati University

PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM

The pattern of question paper as per unit system will be boradly based on the following pattern.

- (1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.
- (2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.
- (3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.
- (4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.
- (5) Each short answer type question shall Contain 4 to 8 short sub question with no internal choice.

DIRECTION

No. : 43 / 2010

Date : 03/07.2010

Subject : Examinations leading to the Degree of Bachelor of Computer Application (Three Year Degree Course-Semester Pattern), Direction, 2010.

Whereas, University Grants Commission, New Delhi vide D.O.No.F-2/2008/(XI Plan), Dtd.31 Jan.2008 regarding new initiatives under the 11th Plan – Academic Reforms in the University has suggested for improving quality of higher education and to initiate the Academic Reform at the earliest.

AND

Whereas, the Academic Council while considering the above letter in its meeting held on 30.4.2008, vide item No.55 has resolved to refer the same to Dean's Committee, and the Dean's Committee in its meeting held on 19.07.2008 has decided to refer the matter to all Board of Studies.

AND

Whereas the recommendations of various Board of Studies in the faculty of Science regarding Upgradation and Revision of various syllabi and introduction and implementation of Semester Pattern Examination System at under graduate level was considered by the faculty of Science in its meeting held on 7.12.2009 and constituted a Committee of all Chairmen of Board of Studies and one member nominated by Chairmen of respective B.O.S. under the Chairmanship of Dean of faculty to decide the policy decision regarding semester pattern examination system.

AND

Whereas, the Academic Council in its meeting held on 20.2.2010 vide item No.15, has resolved to constitute a Committee of Chairman of Board of Studies in Mathematics, Statistics, Computer Science and Electronics under the Chairmanship of Dean, faculty of Science for framing the syllabus of Bachelor of Computer Application (Computer Science) i.e. B.C.A. (Computer Science).

AND

Whereas, the faculty of Science in its emergent meeting held on 11th May, 2010 vide item No.30 regarding Scheme of Teaching and Examination and B.C.A. course as per Semester pattern has resolved to refer to concerned Board of Studies, and the faculty further resolved to induct the Chairman, B.O.S. in Mathematics, Electronics & Statistics.

AND

The Combined meeting of the Committees appointed by the Academic Council, faculty of Science and B.O.S. in Computer Science in its meeting held on 24 & 25 June 2010 has resolved to accept and recommend a draft syllabi, scheme of teaching and examination and provision to be incorporated in the Ordinance to Examination leading to the Degree of Bachelor of Computer Application to be implemented from the Academic Session 2010-11 for B.C.A. Part-I (Sem-I & II) and onwards, which is accepted by the Hon'ble Vice-Chancellor u/s 14(7) of the Maharashtra Universities Act, 1994 on dated 1.7.2010.

AND

Whereas, Ordinance No.17 of 2003 in respect of Examinations leading to the Degree of Bachelor of Computer Application is in existence in the University as per annual pattern examination system.

AND

Whereas, new scheme of examination as per semester pattern is to be implemented from the Academic Session 2010-11 for Semester-I & onwards which is regulated by an Ordinance and framing of an Ordinance for the above examination is likely to take some time.

AND

Whereas, the admission of students in the semester pattern at B.C.A.. Part-I (Semester-I) are to be made in the Academic Session 2010-11.

Now, therefore, I, Dr. Kamal Singh, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

1. This Direction may be called, "Examinations leading to the Degree of Bachelor of Computer Application (Three Year Degree Course-Semester Pattern), Direction, 2010".
2. This direction shall come into force with effect from the date of its issuance.
3. (i) The following shall be the examination leading to the Degree of Bachelor of Computer Application in the faculty of Science-
 - (1) The B.C.A. (Part-I), Semester -I Examination;
 - (2) The B.C.A. (Part-I), Semester -II Examination;
 - (3) The B.C.A. (Part-II), Semester -III Examination;
 - (4) The B.C.A. (Part-II), Semester -IV Examination;
 - (5) The B.C.A. (Part-III), Semester -V Examination; and
 - (6) The B.C.A. (Part-III), Semester -VI Examination;
- (ii) The period of Academic Session shall be such as may be notified by the University.

4. (i) The examination of Semester-I, II, III, IV, V & VI shall be conducted by the University and shall held by the end of each semester separately.
- (ii) The main examination of Semester-I, III & V and that of Semester-II, IV & VI shall be held in Winter and Summer respectively.
- (iii) The supplementary examination for Semester-I, III & V shall be held in Summer and that of Semester-II, IV & VI in Winter respectively.
5. Subject to their compliance with the provisions of this Direction and of other Ordinances in force from time to time, the following persons shall be eligible for admission to the examinations, namely:-
 - (a) A student of a College who has prosecuted a regular course of study for not less than one academic year prior to that examination;
 - (b) A teacher in a Educational Institution eligible under the provisions of Ordinance No.18, and
 - (c) A women candidate who has not pursued a regular course of study.

Provided that in the case of the persons eligible under clauses (b) and (c) an applicant to the examination shall have attended a full course of laboratory instructions in a College in the subject in which laboratory work is prescribed. The candidate shall submit a Certificate to that effect signed by the Principal of the college.

6. **(I) Every applicant for admission to Examination shall-**
 In the case of the Bachelor of Computer Application Part-I, Semester-I Examination, have passed not less than one academic Year previously the 12th standard Examination of the Maharashtra State Board of Secondary and Higher Secondary Education with English and other modern Indian Languages or subject I.T. together with Mathematics or three years diploma course in Electronics and Computer Engg. or +2 level minimum competency vocational course in Electronics Technology or students passing the 12th Standard Examination of Maharashtra State Board of Secondary and Higher Secondary Education and offering Vocational stream with Mathematics shall be eligible for admission to the Bachelor of Computer Application Part-I, Semester-I course or an Examination recognized as equivalent thereto in such subjects and with such standards of attainments as may be prescribed.
- (II) In the case of B.C.A.. Part-II, (Semester-III & IV) Examination :-**
 have passed not less than one academic year previously the B.C.A.. Part-I (Sem-I & II) Examination of the University or an examination recognised as equivalent thereto, and
- (III) In the case of the B.C.A.. Final, (Sem-V & VI) Examination:-**
 have passed not less than one academic year previously the B.C.A.. Part-II (Sem-III & IV) Examination Examination of the University or an examination recognised as equivalent thereto;
7. Subject to his/her compliance with the provisions of this Direction and other Ordinances (pertaining to Examination in General) in force from time to time, the applicant for admission, at the end of the course of study of a particular semester to an examination specified in column (1) of the table below, shall be eligible to appear at it, if,
 - (i) he/she satisfied the condition in the table and the provisions there under.
 - (ii) he/she has prosecuted a regular course of study in a college affiliated to the University.
 - (iii) he/she has in the opinion of the Principal shown the satisfactory progress in his/her studies.

TABLE

Name of the Exam to appear	The student should have completed the Session / term satisfactorily	The student should have passed
1	2	3
B.C.A. Part-I (Sem-I & II)	Sem-I & II	Qualifying examination.
B.C.A.-II Semester-III	Semester-I & II	One half of the total head prescribed for Sem-I & Sem-II examination
B.C.A.-II Semester-IV	Semester-III	One half of the total head prescribed for Sem-I & Sem-II examination
B.C.A.-III Semester-V	Semester-III & IV	(i) passed the Sem-I & II examination and (ii) One half of the total head prescribed for Sem-III & Sem-IV examination
B.C.A.-III Semester-VI	Semester-V	(i) passed the Sem-I & II examination and (ii) One half of the total head prescribed for Sem-III & Sem-IV examination

(Note : For Calculating the Heads, the theory and the practical shall be consider as a separate head and on calculation fraction if any shall be ignored.)

8. Without prejudice to the other provisions of Ordinance No. 6 relating to the Examination in General, the provisions of Paragraph 5, 8, 10 and 31 of the said ordinance shall apply to every collegiate candidate.
9. The fee for the examination shall be as prescribed by he University from time to time.
10. The Scope of the subjects of all semester opted by the students shall be as indicated in the respective syllabi from time to time. The medium of instruction and examination shall be English.
11. The maximum marks allotted to each subject and paper and the minimum marks which an examinee must obtain in order to pass the examination shall be as per Appendices A, B, C, D, E and F appended to this Direction.

12. The practical examination of all semesters shall be conducted at the end of each semester externally by the University.
13. Successful examinees at the B.C.A. Final (Sem-VI) Examination who obtain not less than 60% marks in aggregate of Sem-I, II, III, IV, V & VI Examination taken together shall be placed in the First Division, those obtaining less than 60% but not less than 45% in the Second Division, and all other successful examinees in the pass Division.
14. There shall be no classification of successful examinees at the Sem-I to Sem-V Examinations.
15. An examinee successful in the minimum period prescribed for the examination, obtaining not less than 75% of the maximum marks prescribed in the subject shall be declared to have passed the examination with Distinction in the subject. Distinction shall not be awarded to an examinee availing of the provision of the exemptions and compartments at any of the examination.
16. Provisions of Ordinance No.18/2001 in respect of an Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute No.18, Ordinance 2001 shall apply to the Examination under this Direction.
17. As soon as possible after the examinations the Board of Examination shall publish a list of successful examinees at the B.C.A. Part-I, Semester-I & II, B.C.A. Part-II, Semester-III & IV & B.C.A. Final, Semester-V & VI Examination. Such list at the B.C.A. Final Examination shall be arranged in three Divisions. The names of the examinees passing the examination as a whole in the minimum prescribed period and obtaining the prescribed number of places in each subject in the First or Second Division shall be arranged in Order of Merit as provided in the Examinations in General Ordinance No. 6.
18. No Person shall be admitted to B.C.A. Part-I, Semester-I & II, B.C.A. Part-II, Semester-III & IV & B.C.A. Final, Semester-V & VI Examinations, if he has already passed the same examination of this University or an equivalent examination of any other Statutory University.
19. Successful Examinees at the B.C.A. Part-I, Semester-I & II, B.C.A. Part-II, Semester-III & IV Examination shall be entitled to receive a Certificate signed by the Registrar and successful examinee at the end of & B.C.A. Final, Semester-VI Examination, shall on payment of the prescribed fees, receive a Degree in the Prescribed form, signed by the Vice-Chancellor.

Date : 1/7/2010

Sd/-
(Dr.Kamal Singh)
Vice-Chancellor
Sang Gadge Baba Amravati University
Amravati

**Bachelor of Computer Application(B.C.A.)
Three Year Degree Course
Teaching and Examination Scheme
B.C.A. Part- I (Semester – I)**

Appendix-A

S. N.	Subject Code	Paper	Teaching Scheme				Examination Scheme						Total Marks
			Th		Pr	Total Periods Per Week	Duration of Papers (Hrs.)		Max. Marks		Min. Marks		
			L	T			Th	Pr	Th	Pr	Th	Pr	
1	1ST1	Computer Based	5	---	---	5	3	---	60	---	21	---	60
2	1ST2	Computer Based	5	---	---	5	3	---	60	---	21	---	60
3	1ST3	Electronic Based	5	---	---	5	3	---	60	---	21	---	60
4	1ST4	Statistics Based	5	---	---	5	3	---	60	---	21	---	60
5	1ST5	Math Based	5	---	---	5	3	---	60	---	35	---	60
6	1ST6	Communication Skill	4	1	---	5	3	---	50	---	18	---	50
7	1SP1	Lab-I based on 1ST1 & 1ST2	---	---	4	4	---	4	---	50	---	18	50
8	1SP2	Lab-II based on 1ST3	---	---	4	4	---	4	---	50	---	18	50
9	1SP3	Lab-III based on 1ST4	---	---	4	4	---	4	---	50	---	18	50
Total			29	1	12	42			300	150			450

**Teaching and Examination Scheme
B.C.A. Part- I (Semester – II)**

Appendix-B

S. N.	Subject Code	Paper	Teaching Scheme				Examination Scheme						Total Marks
			Th		Pr	Total Periods Per Week	Duration of Papers (Hrs.)		Max. Marks		Min. Marks		
			L	T			Th	Pr	Th	Pr	Th	Pr	
1	2ST1	Computer Based	5	---	---	5	3	---	60	---	21	---	60
2	2ST2	Computer Based	5	---	---	5	3	---	60	---	21	---	60
3	2ST3	Electronic Based	5	---	---	5	3	---	60	---	21	---	60
4	2ST4	Statistics Based	5	---	---	5	3	---	60	---	21	---	60
5	2ST5	Math Based	5	---	---	5	3	---	60	---	35	---	60
6	2ST6	Communication Skill	4	1	---	5	3	---	50	---	18	---	50
7	2SP1	Lab-I based on 2ST1 & 2ST2	---	---	4	4	---	4	---	50	---	18	50
8	2SP2	Lab-II based on 2ST3	---	---	4	4	---	4	---	50	---	18	50
9	2SP3	Lab-III based on 2ST4	---	---	4	4	---	4	---	50	---	18	50
Total			29	1	12	42			300	150			450

**Teaching and Examination Scheme
B.C.A. Part- II (Semester – III)**

Th: Theory, L: Lecturer, T: Tutorial, Pr: Practical

Appendix-C

S. N.	Subject Code	Paper	Teaching Scheme			Examination Scheme						Total Marks	
			Th		Pr	Total Periods Per Week	Duration of Papers (Hrs.)		Max. Marks		Min. Marks		
			L	T			Th	Pr	Th	Pr	Th		Pr
1	3ST1	Computer Based	5	---	---	5	3	---	60	---	21	---	60
2	3ST2	Computer Based	5	---	---	5	3	---	60	---	21	---	60
3	3ST3	Computer Based	5	---	---	5	3	---	60	---	21	---	60
4	3ST4	Computer Based	5	---	---	5	3	---	60	---	21	---	60
5	3ST5	Electronic Based	5	---	---	5	3	---	60	---	21	---	60
6	3SP1	Lab-I based on 3ST1 & 3ST2	---	---	4	4	---	4	50	---	---	14	50
7	3SP2	Lab-II based on 3ST3 & 3ST4	---	---	4	4	---	4	50	---	---	14	50
8	3SP3	Lab-III based on 3ST5	---	---	4	4	---	4	50	---	---	14	50
Total			25	---	12	37	---	300	150	---	---	---	450

**Teaching and Examination Scheme
B.C.A. Part- II (Semester – IV)**

Th: Theory, L: Lecturer, T: Tutorial, Pr: Practical

Appendix-D

S. N.	Subject Code	Paper	Teaching Scheme			Examination Scheme						Total Marks	
			Th		Pr	Total Periods Per Week	Duration of Papers (Hrs.)		Max. Marks		Min. Marks		
			L	T			Th	Pr	Th	Pr	Th		Pr
1	4ST1	Computer Based	5	---	---	5	3	---	60	---	21	---	60
2	4ST2	Computer Based	5	---	---	5	3	---	60	---	21	---	60
3	4ST3	Computer Based	5	---	---	5	3	---	60	---	21	---	60
4	4ST4	Computer Based	5	---	---	5	3	---	60	---	21	---	60
5	4ST5	Electronic Based	5	---	---	5	3	---	60	---	21	---	60
6	4SP1	Lab-I based on 4ST1 & 4ST2	---	---	4	4	---	4	50	---	---	14	50
7	4SP2	Lab-II based on 4ST3 & 4ST4	---	---	4	4	---	4	50	---	---	14	50
8	4SP3	Lab-III based on 4ST5	---	---	4	4	---	4	50	---	---	14	50
Total			25	---	12	37	---	300	150	---	---	---	450

**Teaching and Examination Scheme
B.C.A. Part- III (Semester – V)**

Th: Theory, L: Lecturer, T: Tutorial, Pr: Practical

Appendix-E

S. N.	Subject Code	Paper	Teaching Scheme			Examination Scheme						Total Marks	
			Th		Pr	Total Periods Per Week	Duration of Papers (Hrs.)		Max. Marks		Min. Marks		
			L	T			Th	Pr	Th	Pr	Th		Pr
1	5ST1	Computer Based	5	---	---	5	3	---	60	---	21	---	60
2	5ST2	Computer Based	5	---	---	5	3	---	60	---	21	---	60
3	5ST3	Computer Based	5	---	---	5	3	---	60	---	21	---	60
4	5ST4	Computer Based	5	---	---	5	3	---	60	---	21	---	60
5	5ST5	Computer Based	5	---	---	5	3	---	60	---	21	---	60
6	5SP1	Lab-I based on 5ST1 & 5ST2	---	---	4	4	---	4	---	50	---	14	50
7	5SP2	Lab-II based on 5ST3 & 5ST4	---	---	4	4	---	4	---	50	---	14	50
8	5SP3	Lab-III based on 5ST5	---	---	4	4	---	4	---	50	---	14	50
Total			25	--	12	37	---	300	150	---	---	---	450

**Teaching and Examination Scheme
B.C.A. Part- III (Semester – VI)**

Th: Theory, L: Lecturer, T: Tutorial, Pr: Practical

Appendix-F

S. N.	Subject Code	Paper	Teaching Scheme			Examination Scheme						Total Marks	
			Th		Pr	Total Periods Per Week	Duration of Papers (Hrs.)		Max. Marks		Min. Marks		
			L	T			Th	Pr	Th	Pr	Th		Pr
1	6ST1	Computer Based	5	---	---	5	3	---	60	---	21	---	60
2	6ST2	Computer Based	5	---	---	5	3	---	60	---	21	---	60
3	6ST3	Computer Based	5	---	---	5	3	---	60	---	21	---	60
4	6ST4	Computer Based	5	---	---	5	3	---	60	---	21	---	60
5	6ST5	Computer Based	5	---	---	5	3	---	60	---	21	---	60
6	6SP1	Lab-I based on 6ST1 & 6ST2	---	---	4	4	---	4	---	50	---	14	50
7	6SP2	Lab-II based on 6ST3 & 6ST4	---	---	4	4	---	4	---	50	---	14	50
8	6SP3	Lab-III based on 6ST5	---	---	4	4	---	4	---	50	---	14	50
Total			25	--	12	37	---	300	150	---	---	---	450

NOTE :

- The strength of students for Practical and tutorial for Under Graduate classes shall be 16 with an addition of 10% with the permission of Vice-Chancellor.
- A period will be counted of 48 minutes duration at Under Graduate Level.
- Distribution of Marks of Practical within the limit of Max. Marks shall be prescribed by B.O.S.

CERTIFICATE

Name of the College/ Institution :

Name of the Department :

This is to certify that this book contains the bonafide record of the practical work of
Shri / Kumari / Shrimati

of B.C.A. Part – I / II / III / Semester during the Academic year.....

Dated:// 20....

Signature of the Teacher
Who taught the examinee

1.
2.
- 3.
- 4.

Head of the Department

(**Note** :In absence of certificate for record book (Appendix-G), examinee should not be allowed to appear for the practical examination.)

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**Syllabus Prescribed for B.C.A.Part-I
Semester-I**

1ST1-Computer Fundamentals

- UNIT – I :** **Introduction to computer :** History characteristics, classification of computer, block diagram of computer, Generations of computer, types of computer : Micro, mini, main and super.
- UNIT – II :** **Input/Output Devices :**
Input Devices : Keyboard, MICR, OCR, Bar coding, mouse.
Output Devices : Printers, types of printers, dot matrix printer, laser printer, inkjet printer, VDU (CRT,LCD).
- UNIT – III :** **Memory :** Memory cell, primary memory, secondary memory.
Primary Memories : RAM, Cache, ROM family;
Secondary Memories : CD, DVD, Flash Memory.
- UNIT – IV :** **Number System :**
Introduction : Types of number system, decimal, binary, octal & hexadecimal and their inter conversions code : BCD code, ASCII code, EBCDIC code, fixed point & floating point representation of number.
- UNIT – V :** **Programming Concept :** Algorithm, flowchart, programming languages, assembler, interpreter, compiler.
Programming process : Program design, coding, compilation, execution, testing, debugging, documentation, Structured programming, Features and approaches.

BOOKS:

- 1) Computer Fundamental : B.Ram, Nas Age Publi.
- 2) Fundamentals of Computer : V.Rajaraman, PHI Publi.
- 3) Computer Fundamentals : Preeti Sinha, BPB Publi.
- 4) Computer Fundamentals and C. Program : Dhamdhere.

Practicals :-

Minimum 8 practicals based on MS-Word, MS-Excel, MS-Power Point.

1ST2-C-Programming

- UNIT – I :** **Introduction to C :** Brief history of C Language, structure of C Program, C tokens : Character set, keywords, Identifiers, constant, variables, basic data types, data type modifiers, enumerated data type, symbolic constant.
- UNIT – II :** **Operators and Expressions in C :** Arithmetic, Relational, logical, assignment, compound, increment, decrement, conditional operator, comma operator, bitwise operators. Precedence and the associativity of operators. Type conversion and type cast operator.
- UNIT – III :** **I/O Operations in C :**
Formatted I/O : Printf(), scanf()
Unformatted I/O : getchar(), putchar(), gets(), puts(), getch(), putch(), getche(), putche().
- UNIT – IV :** **Controlled structures in C :**
if, if--else, elseif ladder, nested if, switch, goto label, for, while, do---while, nesting of loops, break, continue.
- UNIT – V :** **Arrays :** Declaration and initialization of one and two dimensional arrays.
Pointers : Declaration and initialization, pointer arithmetic, pointer comparison, array of pointers.

Books Recommended :-

- (1) Programming in C – E. Balguruswamy, TMH Publications.
- (2) Programming in C – Ravichandran
- (3) Programming with C – Venugopal and Prasad, TMH Publications.
- (4) C Programming – Holzner, PHI Publication.
- (5) Let us C – Yashvant Kanetkar, BPB Publication.

Practicals :- Minimum 08 practicals based on Unit-I to Unit-V.

1ST3 – Digital Techniques-I

Unit-I : Number System :

Binary, Octal, Hexadecimal, Decimal to binary, decimal to octal, decimal to hexadecimal, binary to decimal, octal to decimal, hexadecimal to decimal, binary to hexadecimal, binary to octal, hexadecimal to binary and octal to binary conversions. Addition and subtraction in binary, octal and hexadecimal 1's and 2's compliment method of binary subtraction.

Logic operators and logic gates :

OR, AND, NOT, NAND and EX-OR operators. OR, AND, NOT NAND, NOR, EX-OR and EX-NOR gates.

Unit-II : Logic Families :

Classification of Logic families, characteristics (Fan-in, Fan-out, Noise immunity, propagation delay, power dissipation) construction and working of DTL, TTL, ECL, & CMOS Logic.

Unit-III : Boolean algebra :

Boolean laws, Boolean identities, Demorgans theorems.

Implementation of Boolean equations :

SOP, POS, Simplification of Boolean equation using Boolean laws & theorems, simplification of boolean equation using K-map (Upto 4 variable K map).

Unit-IV : Arithmetic Logic Unit :

Half adder, Half subtractor, Full adder, Full subtractor, 4-bit binary parallel adder, subtraction using 1's & 2's complement method, Controlled 4-bit parallel adder/subtractor (1's & 2's Complement), study of ALU IC-74181.

Unit-V : Combinational Logic Circuit :

Basics of decoder, 2:4 decoder, 3:8 decoder, 4:16 decoder, extension of decoder to demultiplexer, Basics of Multiplexer, 2:1 mux, 4:1 mux, and 16:1 multiplexer.

TEXT BOOKS :

1. Digital Electronics and Microcomputer - R.K.Gaur-Dhanpati publications.
2. Digital fundamentals - Floyd - Universal Book stall, Delhi.

1ST4-Numerical Methods

UNIT – I : Introduction :

A simple mathematical model, Numerical data, Analog and digital computing, process of numerical computing, characteristics of numerical computing, new trends in numerical computing.

UNIT – II : Rounding off Errors :

Errors in Computing, significant digits, Inherent errors, numerical errors, modelling errors, errors definition, round off errors. Error propagation, total numerical error.

UNIT – III: Routs of Equation :

Bracketing Methods – Graphical methods, Bisection method, false position method, numerical problems.

UNIT – IV : Open Methods – Simple fixed point method, Newton-Raphson method & its limitations, the secant method.

UNIT – V : Solution of Linear Equations :

Existence of solution, solution by elimination, Basic Gauss elimination method, Gauss elimination with pivoting, Gauss-Jordan method.

Note : Minimum 16 experiments should be performed based on Unit-I to Unit-V.

Reference Books :-

- (1) Numerical Methods for Engineers : Stevenc Chapra & Raymond P. Canale. Publication-Tata Mc-Graw Hill.
- (2) Numerical Methods : E.Balguruswamy. Publication-Tata Mc-Graw Hill.
- (3) Fundamentals of Mathematical Statistics : S.C.Gupta & V.K.Kapoor. Publication – Sultan Chand & Sons.
- (4) Numerical Analysis by S.S.Shastrri.

1ST5- MATHEMATICS

DISCRETE MATHEMATICS

UNIT – I: Functions and Relations

- (i) Elementary counting principle.
- (ii) Function and counting.
- (iii) Combinatorial argument.
- (iv) Principle of inclusion and exclusion.
- (v) Infinite sets and countability.
- (vi) Properties of countable sets.

UNIT – II: Generating Functions

- (i) Ordinary and Exponential generating functions.
- (ii) Basic properties of generating functions.
- (iii) Enumerators.
- (iv) Azilication to partitions, Ferrer’s Graph, dual partitions.
- (v) Probability generating functions.
- (vi) Application to solving recurrence relation.

UNIT – III: Recurrence Relation

- (i) Introduction
- (ii) Linear recurrent relation with constant coefficient.
- (iii) Homogeneous solution and total solutions.
- (iv) Particular solution and total solutions.

UNIT – IV: Boolean Algebra - I

- (i) Logic
- (ii) Partial Order relations.
- (iii) Lattices – definition and elementary properties.
- (iv) Principle of duality.
- (v) Lattices as algebraic systems.

UNIT – V: Boolean Algebra - II

- (i) Distributive and complemented lattices.
- (ii) Boolean lattices and Boolean algebras.
- (iii) Uniqueness of finite Boolean algebra.
- (iv) Boolean functions and Boolean expressions.
- (v) Disjunctive normal forms and simplification

BOOKS:

- 1) Elements of Discrete Mathematics by C.L.Liu
- 2) Discrete Mathematics by Olympia Nicodemi
- 3) Discrete Mathematical Structures for Computer Science by Alan Doerr and Kenneth Lavassuer.
- 4) Discrete Mathematics with application by H.F.Mottson jr.
- 5) Discrete and combinatorial mathematics by A.P.Hillmon., C.L.Alexanerson and R.M.Grassl
- 6) A first step in Graph Theory by Raghunathan, Numkar and Solapurkar
- 7) Graph Theory with Applications to Computer Science and Engineering by Narsinghs Deo.
- 8) Discrete Mathematical Structures for Computer Science by B.Kolman and R.S.Busby.
- 9) Foundation of Discrete Mathematics by K.D.Joshi (New International Ltd. Publisher, 1996 (Reprint)
- 10) “Boolean Algebra and Swithching circuits”by Medelson, Tata McGraw Hill Publication Co-Ltd,4/12 Asaf Ali Road, New Delhi.

1ST6-Communication Skill

The theory paper for Semester-I shall consist of Unit-I to Unit-V carrying 10 marks each of total 50 marks. There will be one question on each unit with sub-questions based on syllabus. All the five questions are compulsory.

UNIT – I	: Grammer and Vocabulary	-10
	1.1 Articles and Preposition	-02
	1.2 Appropriate forms of verbs	-02
	1.3 Synonyms and Antonyms	-04
	1.4 Error Detection	-02
UNIT – II	: Language Proficiency	-10
	2.1 Types of Sentences	-02
	2.2 Clauses	-03
	2.3 Do as directed	-05
UNIT – III	: Forms of Written Communication	-10
	3.1 Job Application	-05
	3.2 Preparing Curriculum Vitae	-05
UNIT – IV	: Creative Writing	-10
	4.1 Preparing Advertisement	-05
	4.2 Composing Messages (Notices, e-mails, telegrams)	-05
UNIT – V	: Imaginative Approach	-10
	5.1 Story Building	-03
	5.2 Essay Writing	-07

Practicals :-

1SP1 - Lab-I based on 1ST1 & 1ST2

The distribution of marks in practical examination is given as :

(1) Program writing / execution (based on 1ST1)	15 Marks
(2) Program writing / execution (based on 1ST2)	15 Marks
(3) Practical Record	10 Marks
(4) Viva-voce	10 Marks

Total	50 Marks

1SP2- Lab-II based on 1ST3

The distribution of marks in practical examination is given as :

(1) Experiments (Construction, testing and performance)	30 Marks
(2) Practical Record	10 Marks
(3) Viva-voce	10 Marks

Total	50 Marks

1SP3 - Lab-III based on 1ST4

The distribution of marks in practical examination is given as :

(1) Practical Problems	30 Marks
(2) Practical Record	10 Marks
(3) Viva-voce	10 Marks

Total	50 Marks

Syllabus Prescribed for B.C.A.Part-I

Semester-II

2ST1-Operating System

- UNIT – I :** **Software :** Types of software, system software, application software, utility software, assembler, compiler, interpreter.
Operating System : Definition, types of Operating System, Batch O/S, multi programming, multitasking, introduction to unix, unix kernel, shell application layer, introduction to linux.
- UNIT – II :** **Introduction to Operating System :** DOS : Booting processing, formatting, directory structure, FAT.
Internal DOS Commands : REN, CD, MD, RD, DIR, DEL, COPY, TYPE, DATE, TIME, COPYCON, External DOS Commands – FORMAT, XCOPY, CHKDSK, PATH, ATTRIB, AUTOEXEC.BAT, CONFIG.SYS.
- UNIT – III :** **Functions of Operating System :** Types of operating system, process management, states of processes, process scheduling algorithms.
- UNIT – IV :** File Management, space allocation techniques, directory types and structures.
- UNIT – V :** Memory Management, partitions, paging, segmentation, virtual memory management, demand paging, page replacement algorithm.

Books Recommended :-

- (1) System Software and Operating System : D.M.Dhamdhere (TMH)
- (2) Operating System, 3/e, Nutt Pearson.
- (3) Operating System Concept : silbershaz (Addision Education)
- (4) System Software : Leyland Beck (Pearson Education)
- (5) Operating System : William Stalling
- (6) Operating System : A.S.Godbole (TMH)
- (7) Operating System : Cowley (TMH)
- (8) Modern Operating Systems : Tenenenbaum (Pearson Education)
- (9) Operating System : Peterson.

Practical : Minimum 08 practicals based on DOS.

2ST2-Advanced C

- UNIT – I :** **String Handlings :** Declaring and initializing string variables, string handling functions : gets(), strcpy(), strcat(), strlen(), strcmp(), strncpy(), strlwr(),strupr(), strcmp(), strcat(), strstr(), strrev(), strstr(), Array of pointers to strings.
- UNIT – II :** **Function in C :**
Definition, prototype, local and global variables, storage classes function definition, function calling, call by value, call by pointer, return values and their types, functions with arrays, function recursion, pointer to functions.
- UNIT – III :** **Structures :**
Definition and declaration, initialization, array of structures, nested structure, pointer to structures.
Union : Definition, declaration, and initialization of union, comparison of union with structure.
- UNIT – IV :** **File Handling :**
Streams and files in C, defining and opening a file (fopen()), file opening modes (options), closing a file (fclose()), I/O operations on File : fof(), fscanf(), fprintf(), getw(), putw(), fgetc(), fputc(), fgets(), fputs(), fread(), fwrite(), sizeof() operator.
- UNIT – V :** **Random Access :** fseek(), ftell(), frewind().
Handling Errors : feof(), ferror().
Dynamic Allocation of memory, alloc(), malloc(),
C Graphics : Line, circle.

Books Recommended :-

- (1) Programming in C – E. Balguruswamy, TMH Publications.
- (2) Programming in C – Ravichandran
- (3) Programming with C – Venugopal and Prasad, TMH Publications.
- (4) C Programming – Holzner, PHI Publication.
- (5) Let us C – Yashvant Kanetkar, BPB Publication.

Practicals :- Minimum 08 practicals based on Unit-I to Unit-V.

2ST3 – Digital Techniques-II

- Unit-I :** **Multivibrators & Flip flops :**
Construction & working of Astable, monostable and Bistable transistorized multivibrators, RS, CLK RS, D, JK, JKMS Flip Flops (Logic diagram, Truth table, construction & working), Concept of edge trigger Flip-Flop, Concept of preset & clear terminal.
- Unit-II :** **Counters :**
Asynchronous & synchronous Counter, Up-down counters (Up to 4-bits), modified asynchronous counter, Applications of counters, IC version of counters – 7493IC & 7490IC.
- Unit-III :** **Shift registers :**
Types of shift registers, SISO, SIPO, PISO & PIPO registers (Construction & working), left shift-right shift, registers, IC version of shift register – 7495, Application of shift register. Ring counter, Johnson's counter.
- Unit-IV :** **Memory :**
Concept of primary & secondary memory, memory hierarchy, classification of memories, Floppy disk, Winchester disk, CD, DVD, Semiconductor memories : RAM, ROM, PROM, EPROM, EAROM, EEPROM.
- Unit-V :** **A/D & D/A converters :**
Need of A/D & D/A converters.
D/A converters : Weighted registers, R-2R ladder type, Specifications, IC version DAC0808.
A/D converters : Counter type, successive approximation type, Specifications, IC version, ADC0808.

Books Recommended :

1. Elements of Electronics by Bagade and Singh (S.Chand and company)
2. Electronic devices, application and integrated circuits by Mathur(Kulshrestha,Chadha,Umesh Publication)
3. Pulse, Digital, Switching wave forms by Millman and Taub (Mcgraw Hill-Kogakusha)
4. Basic Electronics -by B.L.Theraja (S.Chand and company)
5. Electronic Instrumentation and measurements system – Cooper (Prentics Hall)
6. Electrical and electronic measurements and instrumentation. A.K.Sawhney (Dhanpat Rai and sons)
7. Principles of electronics instrumentation- A.I.Diefenderfer.
8. A text book of electrical technology B.L.Theraja (S.Chand & Company Ltd.)
9. Functional Circuits in Electronics by Sh.S.G. Pimple (Macmillan Publication, India)
10. Micro Electronic Circuits (Fourth Edition) By Sedra and Smith (Oxford publication)

2ST4-Numerical Methods

- UNIT – I :** **Curve Fitting :**
Least Square Regression : Linear regression, polynomial regression, multiple linear regression.
- UNIT – II :** **General** Linear Least Squares, non-linear regression, fitting of transcendental equations.
- UNIT – III :** **Interpolation :**
Polynomial forms, linear interpolation, Newton's divided difference interpolation polynomials, Lagrange's interpolating polynomials, interpolation with equidistant points.
- UNIT – IV :** Inverse interpolation, spline interpolation, Chebyshev interpolation polynomial.
- UNIT – V :** Numerical Integration : Meaning of numerical integration, trapezoidal rule, Simpson's 1/3 Rule, Simpson's 3/8 rule.

Note : Minimum 16 experiments should be performed based on Unit-I to Unit-V.

Reference Books :-

- (1) Numerical Methods for Engineers : Steven C. Chapra & Raymond P. Canale. Publication-Tata Mc-Graw Hill.
- (2) Numerical Methods : E.Balguruswamy. Publication-Tata Mc-Graw Hill.
- (3) Fundamentals of Mathematical Statistics : S.C.Gupta & V.K.Kapoor. Publication – Sultan Chand & Sons.
- (4) Numerical Analysis by S.S.Shastrri.

2ST5-MATHEMATICS-II DISCRETE MATHEMATICS-II

- UNIT I :** **Graph Theory (a)**
(i) Definition and elementary results
(ii) Types of Graphs
(iii) Isomorphism
(iv) Adjacency and incidence matrix
(v) Degree sequence and Havel- Halcmi theorem (without proof)
(vi) Sub graphs, induced sub graphs.
(vii) Complement of a graph, self-complementary graphs
(viii) Union, intersection, ring-sum of two graphs.
(ix) Connected, disconnected graph
- UNIT II :** **Graph Theory (b)**
(i) Edge sequences, Trail, path, circuit's definitions and elementary results.
(ii) Isthmus, cut vertex
(iii) Vertex and edge connectivity
(iv) Menger's theorem (without proof)
(v) Dijkstra's shortest path algorithm
- UNIT III :** **Graph Theory (c)**
(i) Eulerian graphs, Definitions and examples
(ii) Characterization of Eulerian graph in terms of degree
(iii) Fleury's algorithm
(iv) Hamiltonian graph, definition and examples
(v) Sufficient conditions for Hamiltonian graph (without proof)
- UNIT IV :** **Graph Theory (d)**
(i) Definition of a tree equivalent Characterization elementary results.
(ii) Centre, radius and diameter of a tree,
(iii) Spanning trees, fundamental circuits and cut sets .
(iv) Binary trees and elementary results
- UNIT V :** **Graph Theory (e)**
(i) Kruskal's algorithm for weighted spanning tree.
(ii) Different types of directed graphs
(iii) Connectedness
(iv) Directed trees , arborescence and polish notion
(v) Networks and flows : Definition, examples and construction of flows only.

BOOKS:

- 1) Elements of Discrete Mathematics by C.L.Liu
- 2) Discrete Mathematics by Olympia Nicodemi
- 3) Discrete Mathematical Structures for Computer Science by Alan Doerr and Kenneth Lavassuer.
- 4) Discrete Mathematics with application by H.F.Mottson jr.
- 5) Discrete and combinatorial mathematics by A.P.Hillmon., C.L.Alexanerson and R.M.Grassl
- 6) A first step in Graph Theory by Raghunathan, Numkar and Solapurkar
- 7) Graph Theory with Applications to Computer Science and Engineering by Narsinghs Deo.
- 8) Discrete Mathematical Structures for Computer Science by B.Kolman and R.S.Busby.
- 9) Foundation of Discrete Mathematics by K.D.Joshi (New International Ltd. Publisher, 1996 (Reprint)
- 10) "Boolean Algebra and Swithching circuits"by Medelson, Tata McGraw Hill Publication Co-Ltd,4/12 Asaf Ali Road, New Delhi.

2ST6-Communication Skill

The theory paper for Semester-I shall consist of Unit-I to Unit-V carrying 10 marks each of total 50 marks. There will be one question on each unit with sub-questions based on syllabus. All the five questions are compulsory.

UNIT – I	: Comprehension Skill	-10
	1.1 Generating Ideas with quick response	-05
	1.2 Attempting Precis	-05
UNIT – II	: Command Over Language	-10
	2.1 Using other forms of verbs.	-03
	2.2 Voice	-02
	2.3 Idoms and Phrases	-05
UNIT – III	: Analytical Ability	-10
	3.1 Paraphrasing of the poem	-05
	3.2 Expansion of ideas	-05
UNIT – IV	: Drafting Language	-10
	4.1 Domestic Letter	-05
	4.2 Drafting Reports	-05
UNIT – V	: General Awareness	-10
	5.1 One Word Substitute	-02
	5.2 Short Notes	-03
	(Audio-visual aids, Interview, Barriers of Communication, Verbal/Non Verbal Communication)	
	5.3 Personal Response in 100 words	05
	(Pollution, Current Affairs, Education)	

For References the following books are recommended for Semester-I & II :-

- (1) MacMillans English Grammer
- (2) Developing Communication Skills by Krishna Mohan, Beena Ayyar.
- (3) English for Practical Purposes by Z.N.Patil, B.S.Valke.
- (4) English Grammar Composition and Effective Business Communication by M.A.Pink, S.E.Thomas (Editor S.Chand)

Practicals :-

2SP1 - Lab-I based on 2ST1 & 2ST2

The distribution of marks in practical examination is given as :

(1) Program writing / execution (based on 2ST1)	15 Marks
(2) Program writing / execution (based on 2ST2)	15 Marks
(3) Practical Record	10 Marks
(4) Viva-voce	10 Marks

Total 50 Marks

2SP2- Lab-II based on 2ST3

The distribution of marks in practical examination is given as :

(1) Experiments (Construction, testing and performance)	30 Marks
(2) Practical Record	10 Marks
(3) Viva-voce	10 Marks

Total 50 Marks

2SP3 - Lab-III based on 2ST4

The distribution of marks in practical examination is given as :

(1) Practical Problems	30 Marks
(2) Practical Record	10 Marks
(3) Viva-voce	10 Marks

Total 50 Marks

A- 3714

(Compulsory English)

**B. Com. –I
Semester – I**

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed for study : RAYS OF LETTERS

(As per model curriculum of the U.G.C. for B.Com. Part- I and published by Raghav Publisher and Distributors, Mahal, Nagpur.)

Unit I : PROSE

- | | | |
|------------------------------------|---|-------------|
| 1. The Eyes are not Here | — | Ruskin Bond |
| 2. The Romance of a
Busy Broker | — | O. Henry |

**Unit II
: PROSE**

- | | | |
|-------------------|---|----------------|
| 3. Bores | — | E.V. Lucas |
| 4. The Lost Child | — | Mulk Raj Anand |

Unit III : POETRY

- | | | |
|-------------------------------------|---|--------------------|
| 1. The World is too
Much With us | — | William Wordsworth |
| 2. Once Upon a time | — | Gabriel Okara |
| 3. If | — | Rudyard Kipling |

Unit IV : GRAMMAR (strictly based on the prescribed text)

- A. Change the Narration
- B. Articles
- C. Synonyms & Antonyms
- D. Tense Forms

**Unit V : BUSINESS CORRESPONDENCE AND WRITING SKILLS
(As given in the prescribed text.)**

- A. Letter Writing (Formal & Informal)
 - i) Formal
Applications for Job/Complaint/Order
 - ii) Informal/ Personal Letters
- B) Resume Writing

Distribution of Marks (80 : 20)

A) Theory 80 Marks

Textual Components :

Que. 1– PROSE

Any two long answer questions to be attempted out of four
each carrying eight marks .
Marks

2X8=16

Que. 2- POETRY

Any Four short answer questions to be attempted out of Six
each carrying four marks.

4X4=16 Marks

A- 3715

Que. 3 GRAMMAR (TEXTUAL)

- a) Change the narration
Two questions carrying two marks each Articles 2X2 = 4 Marks
- b) Articles
Four questions carrying one mark each 4X1 = 4 Marks
- c) Synonyms & Antonyms
Four questions carrying one mark each 4X1 = 4 Marks
- d) Tense Forms
Four questions carrying one mark each 4X1 = 4 Marks

Que. 4 BUSINESS CORRESPONDENCE AND WRITING SKILLS

a) Letter Writing

- i) Formal Letter
(Application for Job/Complaint/Order)
(Any one out of two) 5X1 = 5 Marks
- ii) Informal Letters/Personal Letters
(Any one out of two) 5X1 = 5 Marks

b) Resume Writing

6 Marks

B) Internal Assessment —

20 Marks

- (i) Class Test — 10 Marks.
- (ii) Home Assignment — 10 Marks.

A- 3716

**B.Com. –I
Semester – II
(Compulsory English)**

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed for study : RAYS OF LETTERS

(As per model curriculum of the U.G.C. for B.Com. Part- I and published by Raghav Publisher and Distributors, Mahal, Nagpur.)

Unit I : PROSE

- | | | |
|-----------------------------------|---|---------------------|
| 1. Each is Great in His Own Place | — | Swami Vivekananda |
| 2. The Postmaster | — | Rabindranath Tagore |

Unit II : PROSE

- | | | |
|------------------------------------|---|---------------------|
| 3. How I Became a Public Speaker | — | George Bernard Shaw |
| 4. Prospects of Democracy in India | — | Dr. B.R. Ambedkar |

Unit III : POETRY

- | | | |
|--------------------------------|---|-----------------|
| 1. Success is Counted Sweetest | — | Emily Dickinson |
| 2. Laugh and Be Merry | — | John Masefield |
| 3. The Impossible Dream | — | Joe Darion |

Unit IV : GRAMMAR (strictly based on the prescribed text)

- A. Change the Voice
- B. Idioms & Phrases
- C. One Word Substitute
- D. Prepositions

Unit V : BUSINESS CORRESPONDENCE AND WRITING SKILLS

- A) E- mail
- B) Newspaper Reports

Distribution of Marks : (80 : 20 Marks)

Textual Components :

Que. 1– PROSE

Any two long answer questions to be attempted out of four each carrying eight marks .

2X8=16 Marks

Que. 2- POETRY

Any Four short answer questions to be attempted out of Six each carrying four marks.

4X4=16 Marks

Que. 3 MULTIPLE CHOICE QUESTIONS

(10 questions from Prose and six questions from Poetry, each carrying one mark.
Marks

16X1= 16

Que. 4 GRAMMAR (TEXTUAL)

- a) Change the Voice
Four questions carrying one marks each
- b) Idioms & Phrases
Four questions carrying one mark each
- c) One Word Substitute
Four questions carrying one mark each
- d) Preposition
Four questions carrying one mark each

4X1=4 Marks

4X1 = 4 Marks

4X1 = 4 Marks

4X1 = 4 Marks

A- 3717

Que. 5 - BUSINESS CORRESPONDENCE AND WRITING SKILLS

- | | |
|--|-----------------|
| a) E- Mail
(Any one out of two) | 6X1 = 6 Marks |
| b) Newspaper Reports
(Any one out of two) | 10X1 = 10 Marks |

B) Internal Assessment —

20 Marks

- | | |
|------------------------|-----------|
| (i) Class Test — | 10 Marks. |
| (ii) Home Assignment — | 10 Marks. |

A- 3718
B.Com. – I
Semester – I
(Supplementary English)

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed :

Practical English Prose and Verse edited by G.E.B. COE Orient Longman.

Unit I : PROSE

The following prose lessons are prescribed for study.

- | | | | |
|----|--------------------------------|---|-------------|
| 1. | A Slip of Tongue | — | J.E.B. Gray |
| 2. | Socrates and the School Master | — | F.L. Brayne |

Unit II : PROSE

- | | | | |
|----|----------------|---|----------------|
| 3. | Good Manners | — | J.C. Hill |
| 4. | The Bottle Imp | — | R.L. Stevenson |

Unit III : POETRY

The following poems are prescribed for study.

- | | | | |
|----|-------------------|---|----------------------|
| 1. | The Daffodils | — | William Wordsworth |
| 2. | Break Break Break | — | Alfred Lord Tennyson |
| 3. | The Wild Swans | — | W.B. Yeats |
| 4. | All in June | — | W.H. Davies |

- Unit IV :** a) Comprehension of an Unseen Passage
b) Precis Writing

Unit V : COMPOSITION :-

An essay of about 300 words on Social, Economic, Commercial and Information Technology Issues.

Distribution of Marks

A) Theory 80 Marks

Que. 1: PROSE

Any two long answer questions to be attempted out of four each carrying eight marks

2X8=16 Marks

Que. 2 : POETRY

Any four short answer questions to be attempted out of Six each carrying four marks.

4X4=16 Marks

Que. 3 : MULTIPLE CHOICE QUESTIONS

Eight Multiple Choice Questions based on Prose, each carrying one mark

: 8 Marks

Eight Multiple Choice Questions based on Poetry, each carrying one mark

: 8 Marks

Que. 4 :

(a) Comprehension of an Unseen Passage

: 8 Marks

(b) Precis Writing

: 8 Marks

Que. 5 :

An essay of about 300 words to be attempted out of the five given topics.

: 16 Marks

B) Internal Assessment —

20 Marks

(i) Class Test — 10 Marks

(ii) Home Assignment — 10 Marks

A- 3719

**B.Com. – I
Semester – II
(Supplementary English)**

Theory :- 80 Marks

Time :- 3 Hours

Text Prescribed :

Practical English Prose and Verse edited by G.E.B. COE Orient Longman.

Unit I : PROSE

The following prose lessons are prescribed for study.

- | | | | |
|----|-------------------------------|---|---------------------|
| 1. | Playing the English Gentleman | — | Mahatma Gandhi |
| 2. | The Home Coming | — | Rabindranath Tagore |

Unit II : PROSE

- | | | | |
|----|----------------------|---|-------------|
| 3. | The Miracle of Radio | — | H. Shipp |
| 4. | Robin | — | Jim Corbett |

Unit III : POETRY

The following poems are prescribed for study.

- | | | | |
|----|--|---|---------------|
| 1. | Adlestrop | — | Edward Thomas |
| 2. | The Soldier | — | Rupert Brooke |
| 3. | To the Indian Who Died in South Africa | — | T.S. Eliot |
| 4. | That Whitsun | — | Philip Larkin |

Unit IV : a) Comprehension of an Unseen Passage
b) Precis Writing

Unit V : COMPOSITION :-

An essay of about 400 words on Social, Economic, Commercial and Information Technology Issues.

Distribution of Marks

A) Theory 80 Marks

Que. 1 : PROSE

Any two long answer questions to be attempted out of four each carrying eight marks

2X8=16 Marks

Que. 2 POETRY

Any four short answer questions to be attempted out of Six each carrying four marks.

4X4 =16 Marks

Que. 3 :

Eight Multiple Choice Questions based on Prose, each carrying one mark

: 8 Marks

Eight Multiple Choice Questions based on Poetry, each carrying one mark

: 8 Marks

Que. 4 :

(a) Comprehension of an Unseen Passage

: 8 Marks

(b) Precis Writing

: 8 Marks

Que. 5 :

An essay of about 400 words to be attempted out of the five given topics.

: 16 Marks

B) Internal Assessment —

20 Marks

(i) Class Test — 10 Marks

(ii) Home Assignment — 10 Marks

A- 3720

हिन्दी अनिवार्य
बी.कॉम. प्रथम वर्ष
प्रथम सत्र

समय - ३ घण्टे)

(पूर्णांक - ८०)

पाठ्य पुस्तक - “ गुंजन ”

सम्पादक - डॉ.अरुण घोसरे

- डॉ.तीर्थराज राय

प्रकाशक - राघव पब्लिशर्स एंड डिस्ट्रिब्यूटर्स, नागपुर

पाठ्यपुस्तक का इकाईयों में अंक विभाजन एवं प्रश्नों का स्वरूप निम्नानुसार है -

इकाई एक	-	गद्य खण्ड - (प्रथम सात पाठों से)		
		अ) दीर्घोत्तरी प्रश्न (एक)	—	(०८ अंक)
		ब) लघुत्तरी प्रश्न (चार)	—	(१६ अंक)
इकाई दो	-	पद्य खण्ड - (प्रथम छः कविताओं से)		
		अ) दो कविताओं के केन्द्रीय भाव	—	(१६ अंक)
इकाई तीन	-	व्यावहारिक भाषा एवं व्याकरण		
		१) संधि विग्रह (दो)	—	(०२ अंक)
		२) शब्द शुद्धि (दो)	—	(०२ अंक)
		३) एकार्थक शब्द (दो)	—	(०२ अंक)
		४) अनेक शब्दों के लिए एक शब्द (दो)—		(०२ अंक)
		५) विराम चिन्ह (दो)	—	(०२ अंक)
		६) हिन्दी के संख्यावाचक शब्दोंकी मानक वर्तनी (दो)—		(०२ अंक)
इकाई चार	-	पत्र लेखन (एक)	—	(०८ अंक)
		व्यावसायिक अथवा कार्यालयीन पत्र (शब्द सीमा लगभग १५० शब्द)		
इकाई पाँच	-	वस्तुनिष्ठ प्रश्न	—	(२० अंक)
		(प्रत्येक प्रश्न पर एक अंक)		

-
- सूचना - १. प्रथम चार इकाईयों से विकल्प के साथ प्रश्न पूछे जायेंगे ।
२. वस्तुनिष्ठ प्रश्न इकाई एक और दो से ही पूछे जायेंगे ।
३. दीर्घोत्तरी प्रश्न का उत्तर लगभग ५० पंक्तियों में अपेक्षित है ।
४. लघुत्तरी प्रश्न का उत्तर लगभग २५ पंक्तियों में अपेक्षित है ।
५. जिन पाठों से दीर्घोत्तरी प्रश्न पूछे जायेंगे, उनमें से लघुत्तरी प्रश्न न पूछे जायें ।
६. पत्र लेखन - शब्द सीमा लगभग १५० शब्द ।

आन्तरिक मूल्यांकन - (२० अंक)

- | | | |
|-------------------|---|----------|
| १. गृहपाठ | - | (१० अंक) |
| २. इकाई मूल्यांकन | - | (१० अंक) |

A- 3721

हिन्दी अनिवार्य
बी.कॉम. प्रथम वर्ष
द्वितीय सत्र

समय - ३ घण्टे)

(पूर्णांक - ८०)

पाठ्य पुस्तक - ठगुंजनठ

सम्पादक - डॉ.अरुण घोसरे

- डॉ.तीर्थराज राय

प्रकाशक - राघव पब्लिशर्स एंड डिस्ट्रिब्यूटर्स, नागपुर

पाठ्यपुस्तक का इकाईयों में अंक विभाजन एवं प्रश्नों का स्वरूप निम्नानुसार है -

इकाई एक	-	गद्य खण्ड - (पाठ आठ से चौदह तक)		
		अ) दीर्घोत्तरी प्रश्न (एक)	—	(०८ अंक)
		ब) लघुत्तरी प्रश्न (चार)	—	(१६ अंक)
इकाई दो	-	पद्य खण्ड - (सात से बारह कविताओं से)		
		अ) दो कविताओं के केन्द्रीय भाव	—	(१६ अंक)
इकाई तीन	-	व्यावहारिक भाषा एवं व्याकरण		
		१) देवनागरी लिपि	—	(०६ अंक)
		(सामान्य परिचय, मानक वर्णमाला, विशेषताएँ, वर्तनी का मानक रूप)		
		२) पदनाम (तीन)	—	(०३ अंक)
		३) परिभाषिक प्रशासनिक शब्दावली	—	(०३ अंक)
इकाई चार	-	निबंध (एक : व्यावसायिक विषयों पर)	—	(०८ अंक)
इकाई पाँच	-	वस्तुनिष्ठ प्रश्न (२०)	—	(२० अंक)
		(प्रत्येक प्रश्न पर एक अंक)		

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- सूचना - १. प्रथम चार इकाईयों से विकल्प के साथ प्रश्न पूछे जायेंगे ।
२. वस्तुनिष्ठ प्रश्न इकाई एक और दो से ही पूछे जायेंगे ।
३. दीर्घोत्तरी प्रश्न का उत्तर लगभग ५० पंक्तियों में अपेक्षित है ।
४. लघुत्तरी प्रश्न का उत्तर लगभग २५ पंक्तियों में अपेक्षित है ।
५. जिन पाठों से दीर्घोत्तरी प्रश्न पूछे जायेंगे, उनमें से लघुत्तरी प्रश्न न पूछे जायें ।
६. निबंध लेखन - शब्द सीमा लगभग ५०० शब्द ।

आन्तरिक मूल्यांकन - (२० अंक)

- | | | |
|-------------------|---|----------|
| १. गृहपाठ | - | (१० अंक) |
| २. इकाई मूल्यांकन | - | (१० अंक) |

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वाणिज्य स्नातक भाग- १

(सत्र - १)

संस्कृत आवश्यक

पुस्तक : गीर्वाणसारथिः - भाग १ (प्रथम विभाग),
मुख्य संपादक - डॉ. भगवान पंडा,
सह संपादक - डॉ. रुपाली कविश्वर, अथर्व प्रकाशन, जळगाव

गुण - लेखी परीक्षा - ८०
अन्तर्गत मूल्यमापन - २०
एकूण गुण - १००

घटक - १ : गद्य पाठ १ व २ - १६ गुण
घटक - २ : गद्य पाठ ३ व ४ - १६ गुण
घटक - ३ : पद्य पाठ १ व २ - १६ गुण
घटक - ४ : पद्य पाठ ३ व ४ - १६ गुण
घटक - ५ : प्रश्नावली भाग १ - १६ गुण

प्रश्नपत्रिकेचे स्वरूप

लेखी परीक्षा - ८०

वेळ - ३ तास

पूर्ण गुण - ८०

प्रश्न १.(अ) ४ पैकी २ अनुवाद करा (५ ते ६ ओळींचे उतारे) - १० गुण
(ब) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न २.(अ) ४ पैकी २ अनुवाद करा (५ ते ६ ओळींचे उतारे) - १० गुण
(ब) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न ३.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळींचे) - १० गुण
(ब) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न ४.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळींचे) - १० गुण
(ब) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न ५. २० पैकी १६ वस्तुनिष्ठ प्रश्न - १६ गुण

अन्तर्गत मूल्यमापन -

१) स्वाध्याय - १० गुण
२) मौखिक - १० गुण

पूर्ण गुण - २०

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वाणिज्य स्नातक भाग- १

(सत्र - २)

संस्कृत आवश्यक

पुस्तक : **गीर्वाणसारथिः** - भाग १ (द्वितीय विभाग)

मुख्य संपादक - डॉ. भगवान पंडा,

सह संपादक - डॉ. रुपाली कविश्वर, अथर्व प्रकाशन, जळगाव

गुण - लेखी परीक्षा - ८०
अन्तर्गत मूल्यमापन - २०
एकूण गुण - १००

घटक — १ : गद्य पाठ १ व २ - १६ गुण
घटक — २ : गद्य पाठ ३ व ४ - १६ गुण
घटक — ३ : पद्य पाठ १ व २ - १६ गुण
घटक — ४ : पद्य पाठ ३ व ४ - १६ गुण
घटक — ५ : प्रश्नावली भाग २ - १६ गुण

प्रश्नपत्रिकेचे स्वरूप

लेखी परीक्षा - ८०

वेळ - ३ तास

पूर्ण गुण - ८०

प्रश्न १.(अ) ४ पैकी २ अनुवाद करा (५ ते ६ ओळींचे उतारे) - १० गुण
(प्र) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न २.(अ) ४ पैकी २ अनुवाद करा (५ ते ६ ओळींचे उतारे) - १० गुण
(प्र) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न ३.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळींचे) - १० गुण
(प्र) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न ४.(अ) ४ पैकी २ श्लोकांचा अनुवाद करा (४ ओळींचे) - १० गुण
(प्र) दीर्घोत्तरी प्रश्न (दोन पैकी एक) - ०६ गुण
प्रश्न ५. २० पैकी १६ वस्तुनिष्ठ प्रश्न - १६ गुण

अन्तर्गत मूल्यमापन -

पूर्ण गुण - २०

१) स्वाध्याय - १० गुण
२) मौखिक - १० गुण

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गीर्वाणसारथिः (भाग - १)

अनुक्रमणिका

पहिलेसत्र

गद्य विभाग

- १) सर्वधर्मपरिषदि विवेकानन्दः
- २) स्वामिभक्तिः
- ३) प्रतिमागृहवर्णनम्
- ४) लक्ष्मीमदः

पद्य विभाग

- १) कर्मयोगः
- २) हंसविलापः
- ३) दिलीपसिंहसंवादः
- ४) सुभाषितानि

प्रश्नावली भाग - १

दुसरेसत्र

गद्य विभाग

- १) वानरयूथकथा
- २) दिलीपभरतसंवादः
- ३) समस्यायाः परिहाराय....
- ४) विनयाधिकरणम्

पद्य विभाग

- १) अयं मे हस्तो भगवान्
- २) विदुरोपदेशः
- ३) वैद्यकीयसुभाषितानि
- ४) प्रुद्धावतरणम्

प्रश्नावली भाग - २

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वाणिज्य विद्याशाखा

मराठी (आवश्यक) बी. कॉम. भाग-१

पुस्तकाचे नाव : अनुबंध भाग – १

संपादक : डॉ. अशोक नामदेव पळवेकर, डॉ. पंडित गोबरा राठोड, डॉ. अनंत सिरसाट

प्रकाशकाचे नाव : राघव पब्लिशर्स अँड डिस्ट्रिब्यूटर्स , नागपूर

सत्र – १

अनुक्रमणिका

घटक : अ - वैचारिक

- | | | |
|----------------------------------|---|------------------------|
| १) नवीन ग्रथांची आवश्यकता | : | लोकहितवादी |
| २) शेती सुधारण्याचे उपाय | : | जोतीराव फुले |
| ३) भारतीय लोकशाहीचे भवितव्य काय? | : | डॉ. बाबासाहेब आंबेडकर |
| ४) भाषा आणि लोकजीवन | : | डॉ. कुसुमावती देशपांडे |

घटक : ब - ललित

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|-------------------|---|-----------------|
| ५) वेणु | : | बाबा पद्मनजी |
| ६) इहलोकचा स्वर्ग | : | हरी नारायण आपटे |
| ७) सांजवात | : | आनंदीबाई शिर्के |
| ८) युवा कोण? | : | बाबा आमटे |
| ९) कवितेचा जन्म | : | बाबुराव बागूल |
| १०) लाट | : | हमीद दलवाई |

घटक : क – कविता

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|-----------------------------------|---|-------------------------------|
| ९) संतवाणी | : | ज्ञानेश्वर / जनाबाई / तुकाराम |
| १०) स्वर्ग, पृथ्वी आणि मनुष्य | : | केशवसुत |
| ११) धर्मांतर म्हणजे देशांतर नव्हे | : | लक्ष्मीबाई टिळक |
| १२) हिरीताचं देणं घेनं | : | बहिणाबाई चौधरी |
| १३) शीगवाला | : | नारायण सुर्वे |
| १४) निरभ्र | : | तुळशीराम काजे |
| १५) मनातल्या मनात मी | : | सुरेश भट |
| १६) वटहुकूम | : | श्रीपाद भालचंद्र जोशी. |

घटक : ड - उपयोजित लेखन

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|-------------------------------------|---|------------|
| १) प्रसारमाध्यमांसाठी लेखन | : | संतोष शेणई |
| २) अपठित उतारा - प्रश्नोत्तरे | : | |
| ३) सारांश लेखन - १/३ शब्दांत सारांश | : | |

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मराठी (आवश्यक)

बी.कॉम. प्रथम वर्ष

प्रथम सत्र

वेळ : ३ तास

एकूण गुण : ८०

सूक्ष्म वाचनाकरिता पाठ्यपुस्तक : अनुबंध भाग – १

प्रकाशकाचे नाव : राघव पब्लिशर्स अँड डिस्ट्रिब्यूटर्स, नागपूर, हे पुस्तक अभ्यासक्रमासाठी राहिले.
उपयोजित लेखन (प्रसारमाध्यमांसाठी लेखन आणि अपठित उतारा - प्रश्नोत्तरे व सारांश लेखन)

प्रश्न विभागणी :

प्रश्न :१)	वैचारिक विभाग	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :२)	वैचारिक विभाग	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :३)	ललित विभाग	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :४)	ललित विभाग	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :५)	कविता विभाग	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :६)	कविता विभाग	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :७)	प्रसारमाध्यमांसाठी लेखन	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :८)	अपठित उतारा - प्रश्नोत्तरे व सारांश लेखन	:	लघूत्तरी एक प्रश्न	— ०६ गुण

(वरील सर्व प्रश्नांना अंतर्गत पर्याय राहतील.)

प्रश्न :९)	वस्तुनिष्ठ प्रश्न (प्रत्येकी एक गुण)			— १६ गुण
	(पाठ्यपुस्तकातील विभाग अ,ब,क,ड यावर प्रत्येकी चार गुणांचे चार वस्तुनिष्ठ प्रश्न विचारले जातील.)			

अंतर्गत मूल्यमापन :

१)घटक चाचणी (Class Test)	:	एक	— १० गुण
२)स्वाध्याय (Home - Assignment)	:	एक	— १० गुण

वाणिज्य विद्याशाखा

मराठी (आवश्यक) बी. कॉम. - भाग - १

पुस्तकाचे नाव : अनुबंध भाग - १

संपादक : डॉ. अशोक नामदेव पळवेकर, डॉ. पंडित गोबरा राठोड, डॉ. अनंत सिरसाट

प्रकाशकाचे नाव : राघव पब्लिशर्स अँड डिस्ट्रिब्युटर्स , नागपूर

सत्र = २

अनुक्रमणिका

घटक : अ - वैचारिक

- | | | |
|---------------------------------------|---|------------------------|
| १) स्वातंत्र्य : संकल्पना आणि व्यवहार | : | डॉ. आ. ह. साळुंखे |
| २) प्रशासक नेता | : | प्रा. सुरेश व्दादशीवार |
| ३) सारे युग वाट पाहाते आहे | : | डॉ. प्रल्हाद लुलेकर |
| ४) ती मीच आहे ! | : | मलाला |

घटक : ब - ललित

- | | | |
|--------------------|---|----------------|
| ५) गोदो | : | नामदेव कांबळे |
| ६) अवधूत | : | रमेश अंधारे |
| ७) दिंडी गेली पुढे | : | किशोर सानप |
| ८) महालूट | : | सदानंद देशमुख |
| ९) जन्मचिंतन | : | अनंत नानोटी |
| १०) पीळ | : | ऐश्वर्य पाटेकर |

घटक : क - कविता

- | | | |
|------------------------------|---|------------------------|
| ११) माय | : | स. ग. पाचपोळ |
| १२) सावज | : | नारायण कुळकर्णी कवठेकर |
| १३) अद्याप | : | प्रभा गणोरकर |
| १४) जखम | : | उषाकिरण आत्राम |
| १५) देणं | : | जयराम खेडेकर |
| १६) कबीर | : | लोकनाथ यशवंत |
| १७) ते आले, त्यानंतरची गोष्ट | : | प्रभू राजगडकर |
| १८) दरवेशी | : | अजीम नवाज राही |
| १९) यापुढे माझी लढाई | : | सिध्दार्थ भगत |
| २०) अभंग | : | वीरा राठोड |

घटक : ड - उपयोजित लेखन

- | | | |
|---|---|--------------------|
| १) कार्यालयीन पत्रव्यवहार
स्वरूप वैशिष्ट्ये आणि प्रकार | : | डॉ. कल्याणी दिवेकर |
| २) आशयलेखन व भाषांतर | : | |

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**मराठी (आवश्यक)
बी.कॉम. प्रथम वर्ष
द्वितीय सत्र**

वेळ : ३ तास

एकूण गुण : ८०

सूक्ष्म वाचनाकरिता पाठ्यपुस्तक : अनुबंध भाग – १

प्रकाशकाचे नाव : राघव पब्लिशर्स अँड डिस्ट्रिब्युटर्स, नागपूर, हे पुस्तक अभ्यासक्रमासाठी राहिल.

उपयोजित लेखन (कार्यालयीन पत्रव्यवहार : स्वरूप, वैशिष्ट्ये आणि प्रकार. तसेच आशयलेखन व भाषांतर)

प्रश्न विभागणी :

प्रश्न :१)	वैचारिक विभाग	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :२)	वैचारिक विभाग	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :३)	ललित विभाग	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :४)	ललित विभाग	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :५)	कविता विभाग	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :६)	कविता विभाग	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :७)	कार्यालयीन पत्रव्यवहार (स्वरूप, वैशिष्ट्ये आणि प्रकार)	:	दीर्घोत्तरी एक प्रश्न	— १० गुण
प्रश्न :८)	आशयलेखन व भाषांतर (वरील सर्व प्रश्नांना अंतर्गत पर्याय राहतील.)	:	लघूत्तरी एक प्रश्न	— ०६ गुण
प्रश्न :९)	वस्तुनिष्ठ प्रश्न (प्रत्येकी एक गुण) (पाठ्यपुस्तकातील विभाग अ,ब,क,ड यावर प्रत्येकी चार गुणांचे चार वस्तुनिष्ठ प्रश्न विचारले जातील.)			— १६ गुण

अंतर्गत मूल्यमापन :

१) वर्ग चाचणी (Class Test)	:	एक	— १० गुण
२) स्वाध्याय (Home - Assignment):	:	एक	— १० गुण

A- 3730

पाली (आवश्यक)
बी.कॉम. प्रथम वर्ष
प्रथम सत्र

वेळ : ३ तास

गुण : ८०

गज्जो विभागो

Unit I :

जातक कथा – बकजातक १६ गुण
सिलविमंसनजातक

Unit II :

महावग्ग – धम्मचक्कपवत्तनसुत्त ०८ गुण
खदकपाठ – सरणत्तय ०८ गुण
दससिक्खापद १६ गुण

पज्जो विभागो

Unit III :

धम्मपद – यमकवग्गो १६ गुण
अप्पमादवग्गो

Unit IV :

थेरीगाथा – अम्बपाली थेरी १६ गुण
पुण्णिका थेरी

Unit V : व्याकरण

१) पाली वर्णमाला व वर्णपरिवर्तन १६ गुण
२) काळ

अन्तर्गत मुल्यमापन

१) वर्ग चाचणी : एक १० गुण
२) स्वाध्याय : गृहपाठ १० गुण

A- 3731

**पाली (आवश्यक)
बी.कॉम. प्रथम वर्ष
प्रथम सत्र**

वेळ : ३ तास

गुण : ८०

- प्रश्न १** अ,ब,क-गद्य पाठावरील मुळ पाली उताऱ्याचे तीन पैकी दोनचे मराठी भाषांतर करा.
१६ गुण
- प्रश्न २** पद्य पाठावरील मुळ पाली गाथांचे चार पैकी दोन गाथांचे ससंदर्भ भाषांतर करा
१६ गुण
- प्रश्न ३** (अ) गद्य पाठावरील दिर्घोत्तरी प्रश्न दोन पैकी एक सोडवा १० गुण
(ब) पद्य पाठावरील लघुत्तरी प्रश्न दोन पैकी एक सोडवा ०६ गुण
१६ गुण
- प्रश्न ४** खालील प्रश्नांची योग्य पर्याय निवडुन उत्तरे लिहा १६ गुण
(प्रत्येक प्रश्नाला एक गुण)
- प्रश्न ५** व्याकरण सोडवा १६ गुण
१) पाली वर्णमाला लिहा
२) स्वाध्याय

अन्तर्गत मुल्यमापन

- १) वर्ग चाचणी १० गुण
२) स्वाध्याय १० गुण

पाठ्य ग्रंथ

“ बुध्दवाणी ”

संपादक - डॉ.रेखा जे. वानखडे

प्रकाशक - सुगम प्रकाशन - ग्रीन पार्क कॉलनी, शंकर नगर, अमरावती.

A- 3732
पाली (आवश्यक)
बी.कॉम. प्रथम वर्ष
द्वितीय सत्र

वेळ : ३ तास

गुण : ८०

गज्जो विभागो		
Unit I :		
जातक कथा	– गिज्जजातक कल्याणधम्मजातक	१६ गुण
Unit II :		
माज्झिम निकाय	– पियजातिकसुत्त मखादेवसुत्त	१६ गुण
पज्जो विभागो		
Unit III :		
धम्मपद	– तन्हावग्गो बुध्दवग्गो	१६ गुण
Unit IV :		
थेरीगाथा	– सुनित थेर आनंद थेर	१६ गुण
Unit V :	व्याकरण	
१) सन्धि	स्वर सन्धी, व्यंजन सन्धी	१६ गुण
२) क्रियापद	भू, गम, पठ, चज, चर	
अन्तर्गत मुल्यमापन		
१) वर्ग चाचणी		१० गुण
२) स्वाध्याय		१० गुण

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**पाली (आवश्यक)
बी.कॉम. प्रथम वर्ष
द्वितीय सत्र**

वेळ : ३ तास

गुण : ८०

प्रश्न १	गद्य पाठावरील मुळ पाली उताऱ्याचे तीन पैकी दोनचे मराठी भाषांतर करा.	१६ गुण
प्रश्न २	पद्य पाठावरील मुळ पाली गाथांचे चार पैकी दोन गाथांचे ससंदर्भ भाषांतर करा	१६ गुण
प्रश्न ३	(अ) गद्य पाठावरील दिर्घोत्तरी प्रश्न दोन पैकी एक सोडवा (ब) पद्य पाठावरील लघुत्तरी प्रश्न दोन पैकी एक सोडवा	१० गुण ०६ गुण
प्रश्न ४	खालील प्रश्नांची योग्य पर्याय निवडुन उत्तरे लिहा (प्रत्येक प्रश्नाला एक गुण)	१६ गुण
प्रश्न ५	व्याकरण सोडवा १) संधी विग्रह करा (कोणतेही चार) २) क्रियापद भू, गम, पठ, चज, चर	०८ गुण ०८ गुण

अन्तर्गत मुल्यमापन

१)	घटक चाचणी	१० गुण
२)	स्वाध्याय	१० गुण

पाठ्य ग्रंथ

“ बुध्दवाणी ”

संपादक - डॉ.रेखा जे. वानखडे

प्रकाशक - सुगम प्रकाशन - ग्रीन पार्क कॉलनी, शंकर नगर, अमरावती.

A- 3734

B.Com. Part - I

Semester – I

COMPUTER FUNDAMENTAL AND OPERATING SYSTEM -I

Time : 3 Hours

Theory : Marks 60

Practical: Marks 40

Objective: The objectives of this course are to impart basic knowledge about Computer, Word Processing.

Unit-I

Fundamentals of Computer: Introduction to Computer- Definition, Evolution, Characteristics, Generations, Types & Applications of Digital Computer.

Unit-II

Computer Organization: Block Diagram of Computer, Input Unit, Output Unit.

CPU: Memory Unit, Arithmetic Logic Unit, Control Unit.

Computer Software: Concept of Software and Hardware.

Types of Software: System Software, Application Software, and Firmware.

Unit-III

Memory organization of Computer:

Primary Memory: Concept, Types: RAM, SRAM, DRAM.

Read-Only Memory: PROM, EPROM, EEPROM.

Secondary Memory: Concept, Types: Hard Disk, Optical Disk, Pen Drive, Memory Card, Data Card, Blue Ray Disc.

Unit-IV:

Input/Output Devices of Computer System:

Input Devices: Keyboard, MICR, OCR, Bar Coding, Mouse.

Output Devices: Printers, Types of Printers: Dot Matrix Printer, Laser Printer, and Inkjet Printer. Monitor: CRT, LCD, LED.

Unit-V:

Word Processing Working with Text [MS-WORD 2007]:

Concept of Word processing, MS-Word Screen Components, Working with Ribbon, Creating, Opening, Saving and Printing a Document.

Formatting Document: Paragraph Format, Aligning Text and Paragraph, Line Spacing, Bullets and Numbering, Border and Shading, Header & Footer, Multiple Columns, Change Case, Subscript, Superscript.

BOOKS RECOMMENDED :

1. Fundamentals of Computers –V. Rajarman(PHI)
2. Computer Fundamentals-B.Ram (WE)
3. Introduction to IBMPC & Applications-Taxali.
4. MS-OFFICE (PHI)

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5. MS-OFFICE (BPB)
6. MS-OFFICE (TMH)
7. Yeats : Systems Analysis & Design ; Macmillan India, New Delhi.
8. Basics of Computer and Business Mathematics, By Dr. Rajiv Ashtikar, Dr. Santosh Sadar and Prof. Vilas Chopade : Payal Prakashan, Nagpur.
9. Computer Fundamentals & Operating System : Supriya Bhagade-Pimpalapur & Co. Pub.,Nagpur.
10. संगणक मूलतत्त्वे आणि चलन प्रणाली -Prof. S.M.Kolte, Pimpalapur & Co. Publishers, Nagpur.

Practicals based on Microsoft Word 2007.

Note : B.Com. Sem. I & II Practical Batch will be of 20 students.

SCHEME					
Year	Paper	Total Marks		Min. Passing Marks	
		T	P	T	P
B.COM.Sem.I	Computer Fundamentals & Operating System-I	60	*40	24	16

*Division of Marks for Practical

Record preparation	10 Marks
Practical	15 Marks
Discription	10 Marks
Viva	05 Marks

TOTAL **40 Marks**

(Use Answer Book for practical provided by the University)

A- 3736

B.Com. Part - I

Semester – II

COMPUTER FUNDAMENTAL AND OPERATING SYSTEM -II

Time : 3 Hours

Theory : Marks 60

Practical : Marks 40

Objective: The objectives of this course are to impart basic knowledge about Computer, MS-Word Processing 2007 and MS-PowerPoint 2007.

Unit-I

Operating System:

Operating System Basics: Introduction, Main Functions, Structure, Types of Operating System. Concepts of Popular Operating Systems: MS DOS, MS WINDOWS, MS Window NT, UNIX, LINUX, MACINTOSH.

Window 7: Introduction, Features, Types and Elements of Windows.

Window Screen : Desktop, Computer, Documents, Recycle Bin, Internet Explorer, Task Bar, Properties, Management of the Files & Folders.

Unit-II

Operating System [Advance]:

Program and Features: Installing and uninstalling various programs, Accessories.

Functions of operating system- Memory management, CPU Management, File Management, I/O Device Management, Data Management, Security.

Unit-III

Modern communications (Concepts only):

Communications: FAX, Voice mail, and information services; e- Mail, Group Communication: Tele conferencing, Video conferencing, File exchange;

Bandwidth; Modem; Network Topologies: Network types LAN, MAN, WAN and their Architecture, Dial up access.

Unit-IV

Word Processing working with Table and Graphics: [MS-WORD 2007]

Working with Tables; Create, Add Rows & Columns, Convert Table to Text, Using Graphics & Objects; Insert Clip Arts, Links, Shapes, Text Box, WordArt, Drop Cap, Procedure and Application of Mail Merge.

Unit-V:

PowerPoint Presentation:

Working with MS-PowerPoint 2007 : Concept of Presentation, MS-PowerPoint Screen, Creating, Opening and Saving Presentations, Inserting Text, Clips & WordArt to Slides, Working with Different Slide Views, Background features, Gallery, Color Layout, Slide Effects, Slide Show and Printing.

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BOOKS RECOMMENDED :

1. Fundamentals of Computers –V. Rajarman(PHI)
2. Computer Fundamentals-B.Ram (WE)
3. Introduction to IBMPC & Applications-Taxali.
4. MS-OFFICE (PHI)
5. MS-OFFICE (BPB)
6. MS-OFFICE (TMH)
7. Yeats : Systems Analysis & Design ; Macmillan India, New Delhi.
8. Basics of Computer and Business Mathematics, By Dr. Rajiv Ashtikar, Dr. Santosh Sadar and Prof. Vilas Chopade : Payal Prakashan, Nagpur.
9. Computer Fundamentals & Operating System : Supriya Bhagade-Pimpalpure & Co. Pub.,Nagpur.
10. संगणक मूलतत्वे आणि चलन प्रणाली -Prof. S.M.Kolte, Pimpalpure & Co. Publishers, Nagpur.

Practicals based on Microsoft Word 2007 & Microsoft Power Point 2007

Note : B.Com. Sem. I & II Practical Batch will be of 20 students.

SCHEME

Year	Paper	Total Marks		Min. Passing Marks	
		T	P	T	P
B.COM.Sem.I	Computer Fundamentals & Operating System-I	60	*40	24	16

*Division of Marks for Practical

Record preparation	10 Marks
Practical	15 Marks
Discription	10 Marks
Viva	05 Marks

TOTAL **40 Marks**

(Use Answer Book for practical provided by the University)

A- 3738
B.Com. Part - I
Semester – I

PRINCIPLES OF ECONOMICS

Time : 3 Hours

Marks : 80

Unit-I : INTRODUCTION :

- 1.1 Definition of Economics : Adam Smith, Marshall & Robbins.
- 1.2 Definition of J.K. Mehta, Amartya Sen & Mahanobis.
- 1.3 Economic Laws : Nature, Characteristics, Limitation & Importance.
- 1.4 Micro Economics-Meaning, Scope, Merits & Demerits, Importance.
- 1.5 Macro Economics-Meaning, Scope, Merits & Demerits, Importance.

Unit-II : UTILITY APPROACH :

- 2.1 Meaning and Definition.
- 2.2 Marginal diminishing Utility Theory.
- 2.3 Equi Marginal Utility Theory.
- 2.4 Demand : Meaning, Definition, Change in Demand.
- 2.5 Law of Demand & its Exceptions.

Unit-III : ELASTICITY OF DEMAND :

- 3.1 Concept and Types.
- 3.2 Measurements.
- 3.3 Determinants and Importance.
- 3.4 Indifference Curve : Meaning, Definition & Rate of Marginal Substitute. (MRS)
- 3.5 Characteristics of Indifference Curve.

Unit-IV : PRODUCTION FUNCTION :

- 4.1 Meaning and Definition.
- 4.2 Law of Variable proportion.
- 4.3 ISO quants : Concept & Characteristics.
- 4.4 Internal economies & diseconomies.
- 4.5 External economies & diseconomies.

Unit-V : COST AND REVENUE :

- 5.1 Meaning & Types of Cost.
- 5.2 Short run Cost Curve.
- 5.3 Long run Cost Curve.
- 5.4 Meaning & Types of revenue.
- 5.5 Total, Average & Marginal revenue Curve.

BOOKS RECOMMENDED :

1. Ahuja H.L. : Business Economics : S.Chand & Co.New Delhi.
2. Business Economics : Pimpalkar, Bapat, Joshi, Orient-Longmans.
3. Koustsoyanni A Modern Micro Economics:Macmillan New Delhi.
४. अर्थशास्त्राचे सिध्दांत – प्रा. जी.एन्.झामरे, पिंपळापूर प्रकाशन.
५. व्यावसायिक अर्थशास्त्र – डॉ.रा.य.माहोरे,अंशुल पब्लिकेशन, नागपूर.
६. अर्थशास्त्रके सिध्दांत – जोशी, सिंग, श्रीवास्तव, जयपूर.
७. आधुनिक सुक्ष्मअर्थशास्त्र – के.पी.एम्.सुंदरम्.
८. व्यवसायिक अर्थशास्त्र – प्रा.एच.आर.तिवारी, डॉ.के.के.पाटील, डॉ.प्री.प्री.तायवाडे आणि वाय.पी.सिंग - अद्वैत प्रकाशन, अकोला.
9. Business Economics : Dr.Sudhir Bodhankar, Dr, Medha Kanetkar, Shri Sainath Prakashan, Nagpur.
10. Business Economics : Dr. (Mrs.) Pushpa Tayade-Shree MangeshPrakashan, Ramdaspath, Nagpur-10.
11. Business Economics (English Edition) : Dr.G.N.Zamare-Pimpalpure & Co.Publishers, Nagpur.
१२. व्यावसायिक अर्थशास्त्र (मराठी आवृत्ती) :डॉ.जी.एन.झामरे-Pimpalpure & Co. Publishers, Nagpur.

A- 3739
B.Com. Part - I
Semester – II
BUSINESS ECONOMICS

Time : 3 Hours

Marks : 80

Unit-I : BUSINESS AND MANEGERIAL ECONOMICS :

- 1.1 Meaning and characteristics of Business Economics.
- 1.2 Meaning, Definition and characteristics managerial Economics.
- 1.3 Nature and Scope of Managerial Economics.
- 1.4 Objectives and Importance of managerial Economics.
- 1.5 Relation of manegerial Economics with Business Economics and Business Management.

Unit-II: MARKET STRUCTURE :

- 2.1 Meaning and classification of Markets.
- 2.2 Working of Price Mechanism.
- 2.3 Monopoly : Meaning and Characteristics.
- 2.4 Price determination under monopoly
- 2.5 Price discrimination under monopoly.

Unit-III: MARKET STRUCTURE :

- 3.1 Monopolistics competition : Meaning and Characteristics.
- 3.2 Price determination in monopolistic competition.
- 3.3 Oligopoly : Meaning and Characteristics.
- 3.4 Price determination under Oligopoly.
- 3.5 Perfect competition : Meaning, Characterstics and determination.

Unit-IV: FACTORS PRICING :

- 4.1 Nature of demand & supply of factors inputs.
- 4.2 Marginal productivity theory.
- 4.3 WAGES : Meaning & Types.
- 4.4 Determination of wages and Exploitation of Labour.
- 4.5 RENT : Concept, Ricardian and modern theories of Rent, Quasi Rent.

Unit-V : FACTORS PRICING :

- 5.1 INTEREST : Concept and time preference.
- 5.2 Loanable funds and Liquidity preference theory of Interest.
- 5.3 PROFIT : Meaning and Definition.
- 5.4 Dynamic & Risk bearing theory of Profit.
- 5.5 Innovation theory of Profit.

BOOKS RECOMMENDED :

1. Ahuja H.L. : Business Economics : S.Chand & Co.New Delhi.
2. Business Economics : Pimpalkar, Bapat, Joshi, Orient-Longmans.
3. Koustsoyianni A Modern Micro Economics:Macmillan New Delhi.
४. अर्थशास्त्राचे सिध्दांत – प्रा. जी.एन्.झामरे, पिंपळापूरे प्रकाशन.
५. व्यावसायिक अर्थशास्त्र – डॉ.रा.य.माहोरे,अंशुल पब्लीकेशन, नागपूर.
६. अर्थशास्त्रके सिध्दांत – जोशी, सिंग, श्रीवास्तव, जयपूर.
७. आधुनिक सूक्ष्मअर्थशास्त्र – के.पी.एम्.सुंदरम्.
8. व्यवसायिक अर्थशास्त्र – प्रा.एच.आर.तिवारी, डॉ.के.के.पाटील, डॉ.बी.बी.तायवाडे आणि वाय.पी.सिंग - अद्वैत प्रकाशन, अकोला.
9. Business Economics : Dr.Sudhir Bodhankar, Dr, Medha Kanetkar, Shri Sainath Prakashan, Nagpur.
10. Business Economics : Dr. (Mrs.) Pushpa T
11. ayade-Shree Mangesh Prakashan, Ramdaspath, Nagpur-10.
12. Business Economics (English Edition) : Dr.G.N.Zamare-Pimpalapur & Co. Publishers, Nagpur.
१३. व्यावसायिक अर्थशास्त्र (मराठी आवृत्ती) :डॉ.जी.एन्.झामरे-Pimpalapur & Co. Publishers, Nagpur.

A- 3740
B.Com. Part - I
Semester – I
ADVANCED ACCOUNTANCY

Time : 3 Hours

Marks : 80

Objectives : To impart basic Accounting Knowledge as applicable to business.

Unit-I 1.1 Meaning, definition, scope, need and development of Book keeping & Accounting. Objectives, principles Concepts and conventions of Accounting. Branch Accounts.

1.2 Accounting Transactions :

Classification of Accounts, Rules of debit and credit, Journal & ledger, Rules regarding posting and balancing of ledger Account and Trial Balance.

1.3 Rectification of errors :

Types of errors, Rectification entries and suspense Account.

Unit-II 2.1 **Sub- sidiary Book :**

Sub-sidiary Book, Purchases Book, Purchases Return Book, Sales Book, Sales Return Book.

2.2 Cash Book :

Single column/Simple Cash Book, Double column Cash Book, Triple column Cash Book and petty Cash Book.

Unit-III Final Accounts of individual, Manufacturing Account, Trading Account, Profit & Loss Accounts, Balance Sheet with Adjustment.

Unit-IV 4.1 **Depreciation Methods :**

Concepts of depreciation, Different methods of depreciation.

Problem on :

- I) Straight line Method.
- II) Reducing Balance Method.

Unit-V **Bank Reconciliation statement :**

Meaning, Importance and need, Cause of difference between cash book and pass book. Preparation of all types of Bank Reconciliation statement.

BOOKS RECOMMENDED

- Anthony, R. N. and Reece, J. S. : Accounting Principles; Richard Irwin Inc.
 - Gupta, R. L. and Radhaswamy, M : Financial Accounting; Sultanchand and Sons, New Delhi.
 - Monga J. R. Ahuja Girish, and Sehgal Ashok : Financial Accounting; Mayur Paper Back, Noida.
 - Shukla, M. C., Grewal T S., and Gupta, S. C. : Advanced Accounts; S. Chand & Co. New Delhi.
 - Compendium of Statement and Standards of Accounting ; The Institute of Chartered Accountants of India, New Delhi.
 - Agarwala A. N., Agarwala K. N. : Higher Sciences of Accountancy; Kitab Mahal, Allahabad. (Hindi and English)
- Ashok Banerjee : Financial Accounting; Excel Books, New Delhi-110028.

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N. Vinayakam, P.L. Mani, K.L. Nagarajan : Principles of Accountancy; Eurasia Publishing House (Pvt.) Ltd., New Delhi-110 055.

- R.R. Gupta : Advanced Accountancy.
- Jain, Narang (Kalyanipulli) : Advanced Accountancy.
- William Pickles : Accountancy.
- A. Mukherjee, M.Hanif : Modern Accountancy ; Tata McGraw Hill Publishing Co. Ltd.
- P.C. Tulsian : Accountancy; Tata McGraw Hill Publishing Co. Ltd.
- Monga, Gandhi, Kadu : Advanced Accounts; National Publishing House.
- S. Chakravorti : Advanced Accounting.
- Fundamentals of Accounting : R.L. Gupta & V.K. Gupta, Sultanchand & Sons.
- fundamentals of Accounting : T.P Ghosh, Sultanchand & Sons.
- Financial Accounting : Payal Prakashan, Nagpur.
- Financial Accounting : V.R. Mohota, Rashi publication, Arni, Distt. Yavatmal.
- Financial Accounting : Dr. Gajanan Patil, Dr. Shakil Sattar, Dr. Anil Bhawsar, Dr. Dattatraya Gujrathi-Das Ganu Prakashan, Nagpur.
- Financial Accounting : Dr. Kanetkar Medha, Dr. Baheti D.R. – Shri Sainath Prakashan, Nagpur.
- Financial Accounting : L.N. Chopde, D.H. Choudhary, Dr. Raju, L. Rathi, Sheth Publishers Pvt. Ltd, Mumbai-31

हिंदी

रूपराम गुप्त, विद्यासरन गुप्त : एडवांस्ड एकाउन्टेसी; आगरा बुक स्टोअर्स

डॉ. एस.एम.शुक्ला : अडव्हान्स अकौन्टेन्सी.

सक्सेना, वैश्य : उच्च लेखाकर्म

डॉ.एम.पी.खंडेलवाल : उच्चतर लेखाकर्म.

ए.एन.अग्रवाल : उच्चतर लेखाविज्ञान.

जे.के.अग्रवाल : बृहत लेखाकर्म.

गुप्ता, अग्रवाल : एडवान्सड एकाउन्ट्स; एस.चान्द.

मराठी

डॉ.शुक्ल, डोंगरे, मोहता : लेखा तत्व आणि व्यवहार; पिंपळापुरे अँड कं. पब्लिशर्स, नागपुर.

प्रा. अरविंद शेंडे, प्रा. अब्दुल बारी : वित्तीय लेखांकन भाग-१; अनुराधा प्रकाशन, नागपुर.

प्रा. अरविंद शेंडे, प्रा. अब्दुल बारी : आर्थिक लेखांकन भाग-१; अनुराधा प्रकाशन, नागपुर.

गजानन पाटील, भरत मेघे, विकास चोपडे : आर्थिक लेखांकन; दत्त सन्स, सदर, नागपुर.

प्रा.भ.नी. गर्गे, प्रा.वि.द. पेंढारकर, ज.अ. पाध्ये : उच्च लेखाकर्म; मंगेश प्रकाशन.

प्रा. लांजेवार, गुल्हाने, कडु : लेखाकर्म भाग-१; संगम प्रकाशन.

नाथ, लांजेवार, भागवत : उच्च लेखाकर्म भाग-१ : महाराष्ट्र राज्य ग्रंथ निर्मिती मंडळ.

प्रा.ए.एस. उखळकर : उच्च लेखाकर्म भाग-१; विद्या प्रकाशन.

रोडे, स्मार्थ, ढोन्बारे : प्रथम वर्ष जमाखर्च — खंड १; एस.चांद कं. लि.

A- 3742
B.Com. Part - I
Semester – II
FINANCIAL ACCOUNTING

Time : 3 Hours

Marks : 80

Objective : To develop conceptual understanding of fundamentals of financial accounting system and to impart skills in accounting for various kinds of business transaction.

Unit-I Accounts of Non-trading Institutions

Unit-II Special Accounting Areas : Accounts of Co-operative societies.

Unit-III Accounting for Agriculture Farms.

Unit-IV Hire purchases & Instalment purchase Accounts.

Unit-V Insolvency Account of and Individuals : Law's of insolvency- Provisions for preferential creditors, Meaning of insolvency, Procedure of insolvency, Problems on Insolvency Accounts.

BOOKS RECOMMENDED

Anthony, R. N. and Reece, J. S. : Accounting Principles; Richard Irwin Inc.

Gupta, R. L. and Radhaswamy, M : Financial Accounting; Sultanchand and Sons, New Delhi.

Monga J. R. Ahuja Girish, and Sehgal Ashok : Financial Accounting; Mayur Paper Back, Noida.

Shukla, M. C., Grewal T S., and Gupta, S. C. : Advanced Accounts; S. Chand & Co. New Delhi.

Compendium of Statement and Standards of Accounting ; The Institute of Chartered Accountants of India, New Delhi.

Agarwala A. N., Agarwala K. N. : Higher Sciences of Accountancy; Kitab Mahal, Allahabad. (Hindi and English)

Ashok Banerjee : Financial Accounting; Excel Books, New Delhi-110028.

N. Vinayakam, P.L. Mani, K.L. Nagarajan : Principles of Accountancy; Eurasia Publishing House (Pvt.) Ltd., New Delhi-110 055.

R.R. Gupta : Advanced Accountancy.

Jain, Narang (Kalyanipulli) : Advanced Accountancy.

William Pickles : Accountancy.

A. Mukherjee, M.Hanif : Modern Accountancy ; Tata McGraw Hill Publishing Co. Ltd.

P.C. Tulsian : Accountancy; Tata McGraw Hill Publishing Co. Ltd.

Monga, Gandhi, Kadu : Advanced Accounts; National Publishing House.

S. Chakravorti : Advanced Accounting.

Fundamentals of Accounting : R.L. Gupta & V.K. Gupta, Sultanchand & Sons.

fundamentals of Accounting : T.P Ghosh, Sultanchand & Sons.

Financial Accounting : Payal Prakashan, Nagpur.

Financial Accounting : V.R. Mohota, Rashi publication, Arni, Distt. Yavatmal.

Financial Accounting : Dr. Gajanan Patil, Dr. Shakil Sattar, Dr. Anil Bhawsar, Dr.

Dattatraya Gujrathi-Das Ganu Prakashan, Nagpur.

Financial Accounting : Dr. Kanetkar Medha, Dr. Baheti D.R. – Shri Sainath Prakashan, Nagpur.

A- 3743

Financial Accounting : L.N. Chopde, D.H. Choudhary, Dr. Raju, L. Rathi, Sheth
Publishers Pvt. Ltd, Mumbai-31

हिंदी

रूपराम गुप्त, विद्यासरन गुप्त : एडवांस्ड एकाउन्टेसी; आगरा बुक स्टोअर्स

डॉ. एस.एम.शुक्ला : अडव्हान्स अकौन्टन्सी.

सक्सेना, वैश्य : उच्च लेखाकर्म

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ए.एन.अग्रवाल : उच्चतर लेखाविज्ञान.

जे.के.अग्रवाल : बृहत लेखाकर्म.

गुप्ता, अग्रवाल : एडवान्सड एकाउन्ट्स; एस.चान्द.

मराठी

डॉ.शुक्ल, डोंगरे, मोहता : लेखा तत्व आणि व्यवहार; पिंपळापुरे अँड कं. पब्लीशर्स, नागपुर.

प्रा. अरविंद शेंडे, प्रा. अब्दुल बारी : वित्तीय लेखांकन भाग-१; अनुराधा प्रकाशन, नागपुर.

प्रा. अरविंद शेंडे, प्रा. अब्दुल बारी : आर्थिक लेखांकन भाग-१; अनुराधा प्रकाशन, नागपुर.

गजानन पाटील, भरत मेघे, विकास चोपडे : आर्थिक लेखांकन; दत्त सन्स, सदर, नागपुर.

प्रा.भ.नी. गर्गे, प्रा.वि.द. पेंढारकर, ज.अ. पाध्ये : उच्च लेखाकर्म; मंगेश प्रकाशन.

प्रा. लांजेवार, गुल्हाने, कडु : लेखाकर्म भाग-१; संगम प्रकाशन.

नाथ, लांजेवार, भागवत : उच्च लेखाकर्म भाग-१ : महाराष्ट्र राज्य ग्रंथ निर्मिती मंडळ.

प्रा.ए.एस. उखळकर : उच्च लेखाकर्म भाग-१; विद्या प्राकाशन.

रोडे, स्मार्थ, ढोन्बारे : प्रथम वर्ष जमाखर्च — खंड १; एस.चांद कं. लि.

A- 3744
B.Com. Part - I
Semester – I

PRINCIPLES OF BUSINESS ORGANIZATION

Unit – 1 Commerce and Industry

- 1.1 Commerce and Industry - Meaning, Scope and Evolution
- 1.2 Industrial Revolution- Its Effects
- 1.3 Emergence of Indian MNC
- 1.4 Recent Trends in Business World
- 1.5 Indian Business in New Millennium.

Unit – 2 Business

- 2.1 Business Sectors and Its Form
- 2.2 Forms of Business Organization
- 2.3 Unorganised Business-Mom and Pop Stores, Peddlers and Hawkers, Market Traders and Street Traders
- 2.4 E-Commerce and Online Trade
- 2.5 E- Tailers, Cashless Transaction

Unit 3 Merger and Acquisition

- 3.1 Mergers and Acquisition- Meaning and Mergers In India
- 3.2 Networking of Business
- 3.3 Franchising ,Dealership, Business Outlets
- 3.4 BPO's and KPO's
- 3.5 Patents ,Trademarks, Copyrights

Unit – 4 New Enterprises

- 4.1 Decisions in Setting up Enterprises
- 4.2 Opportunity and Idea Generation
- 4.3 Role of Creativity And Innovation
- 4.4 Feasibility Study and Business Plan
- 4.5 Business Size and Location Decision

Unit – 5 Trade In India

- 5.1 Whole Sale and Retail Trade
- 5.2 Malls, Super Markets, Hypermarket
- 5.3 Stores-Speciality, Convenience, Departmental and Discount
- 5.4 Transport, Insurance, Communication and Other Services
- 5.5 Import – Export Trade Procedure

Reference :

1. **Organization: Text, Cases and Readings on the Management of Organizational Design and Change**, J.P.Kotter, L.A. Schlesinger and V. Sathe.
2. **Business Organization & Management**, Mr.Mahesh Chaudhary.
3. **Business Organization & Management**, Kaul V (Pearson Education 2012).
4. **Business Organization & Management**, Tulsian P and Pandey V (Pearson Education 2011).
5. **Business Environment**, Cherunilam F. (Himalaya Publishing House 2010).
6. **Business Sutra**, Pattanaik D. (Aleph Book Company 2013).
7. **Organizational Traps: Leadership, Culture, Organizational Design**, Chris A (Oxford University Press 2010).
8. **World Class in India**, Piramal G and Ghoshal S (Penguin India 2002).
9. **Business Maharajas**, Piramal G (Penguin India 2011).
10. **On Becoming a Leader**, Warren B.,. (Perseus Books Group 2009)

A- 3745
B.Com. Part - I
Semester – II

PRINCIPLES OF BUSINESS MANAGEMENT

Unit – 1 Management Concept

- 1.1 Management-Concept, Meaning, Definition and Importance
- 1.2 Management Thought and Schools
- 1.3 Contribution of Fredrik Taylor
- 1.4 Contribution of Henry Fayol
- 1.5 Contribution of Elton Mayo

Unit – 2 Planning

- 2.1 Planning : Concept, Meaning and Definition.
- 2.2 Nature and Importance of Planning
- 2.3 Objectives of Planning
- 2.4 Forecasting and Planning
- 2.5 Planning Process.

Unit – 3 Organizing

- 3.1 Organization -Concept, Nature, Meaning and Importance
- 3.2 Principles of Organization.
- 3.3 Line Organization
- 3.4 Staff Organization
- 3.5 Departmentalization

Unit – 4 Directing

- 4.1 Directing- Concept, Meaning, Definition and Importance.
- 4.2 Nature of Direction
- 4.3 Advantages and Disadvantages
- 4.4 Motivations – Concept, Meaning and Importance
- 4.5 Coordination: - Meaning and Principle

Unit – 5 Controlling

- 5.1 Controlling-Concept, Meaning, Definition and Importance.
- 5.2 Advantages and Disadvantages
- 5.3 Technique of Controlling
- 5.4 Tool of Controlling
- 5.5 Process of Controlling.

Reference :

1. **MGMT: Principles of Management**, Chuck Williams, Cengage Learning,
2. **Boston** : Cengage Learning Cop. 2016
3. **Principles of Management 1st Edition**, Charles W.L. Hill (Author), Steven McShane.
4. **Principles of Management Paperback-2009**, Mason Carpenter (Author), Talya Bauer, Berrin Endogan

A- 3746

B.B.A. Part – I

Semester – I

102 Business Communication

Unit I : Business Communication

- 1.1 Meaning, Definition, objectives and Importance of Business Communication
- 1.2 Principle of Effective Communication in Business
- 1.3 Types of Communication
- 1.4 Barriers of Business Communication & Its Measures

Unit II : Business Correspondence

- 2.1 Meaning, Importance, Layout of Business Letter
- 2.2 Do's and Don'ts of Business Correspondence Letter
- 2.3 Types of Business Letters. Enquiry Letters, Quotation Letters, Placing Orders, Inviting Tenders, Credit and Status Enquiry letters Complaint Letters and Circular Letters.

Unit III : Employment Related Correspondence

- 3.1 Importance, Structure & Drafting the Application Letter
- 3.2 Preparing the Resume
- 3.3 Letter of Appointment
- 3.4 Resignation & Job Refusal Letter
- 3.5 Job Acceptance/Consent Letter

Unit IV: Soft Skills

- 4.1 Meaning Elements and Importance of Soft Skills.
- 4.2 Grooming Manners and Etiquettes
- 4.3 Effective Speaking
- 4.4 Interview Skills
- 4.5 Group Discussion
- 4.6 Oral Presentation

Unit V : Modern Technology in Business Communication

- 5.1 Role of Information Technology in Business Communication
- 5.2 Advantages and Disadvantages
- 5.3 Word Processor, Internet, E-mail, Fax Video Conferencing, Tele-Conferencing
- 5.4 Overhead Projector, LCD

Reference Book :

- Raman S. & Swami R. Business Communications, Professional Publications Madras
- R.C. Sharma & Krishan Mohan, Business Correspondence & Report Writing. Tata McGraw Hill Delhi.
- Nandanwar K.P. Ninawe A.S. & Nandanwar S.P. Essential of Business Communication, Prashant Publication, Jalgaon.
- Kaul, Business Communication, Prentice Hall, New Delhi.
- Murphy & Peck, Effective Business Communications, Tata McGraw Hill, New Delhi.

A- 3747

**B.B.A. Part – I
Semester – II
204 Business Law**

Unit I :

Law of Contract 1872 : Nature of Contract, Classification, Offer & Acceptance, Capacity of Parties of Contract, Free Consent. Legality of Object, Agreement Void, Performance of Contract Discharge of Contract Remedies of Breach of Contract.

Unit II :

Sales of Good Act 1930 : Formation of Contracts of Sales, Good & their Classification, Price, Conditions & Warranties, Transfer of Property in Goods, Performance of the Contract of Sales, Unpaid Seller & Jis Rights. Sales by Auction. Hire Purchases Agreement.

Unit III :

Negotiable Instruments Act 1981 : Definition of Negotiable Instruments, Gestures, Promissory Note, Bill of Exchange & Cheque- Holder & Holder in the Due Course, Crossing of Cheque, Types of Crossing Negotiation, Dishonour & Discharge of Negotiable Instrument.

Unit IV :

Consumer Protection Act 1986 : Salient Features, Definition of Consumer, Grevance Redressal /Machinery.

Unit V :

Goods And Services Tax (GST) : Introduction, Concept & Meaning of GST, Effects of GST, GST Legislation. Good & Service Tax Network, Migration of the existing Tax payers to GST Regime.

Reference Books

- R.S. Davar, P.M.& I.R. Vikas Publication, Delhi
- P.C. Tripathi, P.M.S. Chand & Sons, Delhi
- N.D. Kapoor, Industrial Law, S. Chand & Sons, Delhi
- Chandra P.R. Business Law, Golgotia, New Delhi
- S.C. Tripathi, Consumer Protection Act, Central Law Publication, Delhi.

A- 3748

B.B.A. Part - I

Semester – I

BUSINESS ENVIRONMENT

Unit I : INTRODUCTION

- 1.1: Concept, Nature and Scope of Business.
- 1.2: Forms of Business Organizations.
- 1.3: Industry: Types of Industries, Industrial Sickness.
- 1.4: Business Environment : Concept, Meaning, Nature, Scope and Importance.
- 1.5: Components of Business Environment.

Unit II: INDIAN BUSINESS ENVIRONMENT

- 2.1: National Income : Meaning, Measurement and Inequality.
- 2.2: Consumption and Propensity to Consume.
- 2.3: Saving and Investment and their propensity.
- 2.4: Parallel Economy : Meaning, Causes, effects.
- 2.5: Concept & Meaning of Balance of Trade & Balance of Payment

Unit III: TRENDS IN INDIAN ECONOMY

- 3.1: LPG: Meaning and its impact on Indian Economy.
- 3.2: FDI : Meaning and its impact on Indian Economy.
- 3.3: Foreign Trade : Concept and Features.
- 3.4: Foreign Trade policy.
- 3.5: Trends in foreign trade of India.

Unit IV : ROLE OF GOVERNMENT

- 4.1: Foreign Trade and Economic Growth.
- 4.2: Problems Related to Business of developing Countries.
- 4.3: Role of finance in Business.
- 4.4: Make in India and Start Ups.
- 4.5: Entrepreneurship and skill development.

Unit V : FOREIGN INSTITUTIONS:

- 5.1: WTO : Introduction, Organisation, Functions, Significance.
- 5.2: IMF : Introduction, Organisation, Functions, Significance.
- 5.3: MNCs : Definition & Meaning, Merits, Demerits, Role of MNCs.
- 5.4: SEZ : Meaning, Role of SEZ in Economic Development.
- 5.5: Foreign collaboration – Meaning, Concept & forms

Book Recommended :-

- 1) The International Business Environment ; Sundaran & Black. Prentice Hall, New Delhi.
- 2) Indian Economy ; Agrawal. A.N.- Vikas Publishing House, New Delhi.
- 3) Environment of Economics; Hedgelan-McMillan, Hampshire.
- 4) International Business ; Bhalla V.K & Shivaramu, New Delhi.
- 5) Indian Economy ; Dulf R, K Sundarama, S Chand, Delhi.
- 6) Global Business Management; Macmillan, New Delhi.
- 7) Environment of Economics; Oxford University Press, New Delhi.
- 8) Indian Economy ; Mishra S.K & Puri V.K, Himalaya Publishing House, New Delhi.
- ९) व्यवसाय पर्यावरण- डॉ. आत्माराम पळवनीरकर
- १०) भारतीय नियोजन आणि आर्थिक विकास – डॉ. श्री. आ. देशपांडे, विद्या प्रकाशन नागपुर.

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B.B.A. Part - I

Semester – II

PRINCIPLES OF ECONOMICS

Unit I : INTRODUCTION

- 1.1: Definition of Economics :Adam Smith,Marshall,Robbins,J.K.Mehta,Amratya Sen.
- 1.2: Economic Laws: Nature,Characteristics,Limitation,and Importance.
- 1.3: Micro Economics : Meaning , Scope , Importance and Limitations.
- 1.4: Macro Economics : Meaning , Scope , Importance and Limitations.
- 1.5: Basic Problems of Indian economy.

Unit II : UTILITY APPROACH

- 2.1: Utility : Meaning , Definition , Deminishing marginal utility Theory.
- 2.2: Demand: Meaning , Law of Demand , Change in Demand.
- 2.3: Indiffernce Curve: Concept and Characteristics.
- 2.4: Elasticity of Demand: Meaning , Concept , Types , Measurements.
- 2.5: Determinants and Importance of Elasticity of Demand.

Unit III : COST AND REVENUE

- 3.1: Cost : Meaning and Types of cost.
- 3.2: Cost Curves : Nature of cost curves in short run.
- 3.3: Nature of cost curves in long run.
- 3.4: Revenue : Total, Average and, Marginal Revenue , Revenue Curves.
- 3.5: Supply : Concept , Nature , Law of Supply.

Unit IV : PRODUCTION

- 4.1: Meaning and characteristics of factors of production.
- 4.2: ISO – Quants : Meaning and characteristics.
- 4.3: Law of variable proportion.
- 4.4: Market structure : Meaning , Types and characterstics.
- 4.5: Internal and External Economics and Diseconomics.

Unit V : DISTRIBUTION

- 5.1: Meaning of distribution and Theory of Marginal distribution.
- 5.2: Rent : Recardian and Modern theory of Rent, Quasi Rent.
- 5.3: Wages : Meaning , Types , Determinants of wages.
- 5.4: Interest : Meaning , Types , Theories of Interest.
- 5.5: Profit : Meaning , Types , Theories of profit.

Reference Books:

- 1) Ahuja H.L : Business Economics : S.Chand & Co. New Delhi.
- 2) Business Economics : Dr.G.N.Zamare Pimplapure & Co.publisher ,Nagpur.
- 3) K.P.M.Sundharam : Micro Economics – S. Chand and Sons. E.N.Sundharam.
- 4) M.L.Jhingam : Micro Economics Theory , Konark Publishers, Delhi.
- 5) Misra Puri : Economics of Growth and Development – Himalaya, Bombay.
Business Economics : Dr.Sudhir Bodhankar , Dr. Medha Kanetkar , Shri.Sainath
Prakashan , Nagpur.

A- 3750

B.B.A. Part - I

Semester – II

FINANCIAL SERVICES

Unit I : INTRODUCTION TO FINANCE

- 1.1 : Meaning , Nature and scope of finance.
- 1.2 : An overview and significance of finance.
- 1.3 : Sources of finance.
- 1.4 : Kinds of finance.
- 1.5 : Role of finance in Indian Economy.

Unit II : INTRODUCTION TO FINANCIAL SYSTEM

- 2.1 : Concept , Meaning and Nature of financial system.
- 2.2 : Structure of financial system.
- 2.3 : Indian money market – concept , features , objectives and components.
- 2.4 : Indian capital market – concept , features , objectives and components.
- 2.5 : Role and current trends of Money Market and Capital market in Indian financial system.

Unit III : INTRODUCTION TO FINANCE SERVICES.

- 3.1 : Concept , Meaning , Nature and scope of financial services.
- 3.2 : Financial services – Features, objectives and significance to corporate sector.
- 3.3 : Financial services - Features , objectives to Industrial sector and significance.
- 3.4 : Financial services - Features , objectives and significance to Agriculture sector.
- 3.5 : Financial services - Features , objectives and significance to Micro sector.

Unit IV : BANKING FINANCIAL SERVICES

- 4.1 : Commercial Banking services – forms & significance.
- 4.2 : Investment services - forms , significance.
- 4.3 : Exchange services - forms , significance.
- 4.4 : Stock Market services operations , significance.
- 4.5 : Operational Instruments – ATM , Debit and credit card , E-Banking , Net Banking Mobile Banking , Cashless Operations.

Unit V : OTHER FINANCIAL SERVICES

- 5.1 : Underwriting and Brokeage of financial services.
- 5.2 : Inter – Mediation and Advisory services.
- 5.3 : Introduction to financial services to EXIM Trade.
- 5.4 : Management of Risk in financial services.
- 5.5 : Regulation of other financial services.

Reference Books :

- 1) Khan.M.Y. – Indian Financial System – Theory and Practice , Tata McGraw Hill New Delhi.
- 2) Bhalla.V.K.- Management of Financial Services, Anmol ,New Delhi 2001.
- 3) Ennew.C.Treror Watkins & Mike Wright – Marketing of Financial Services,Heinemann Professional Pub.1990.
- 4) Garden.E and K.Natrajan – Emerging scenario of financial services, Himalaya Publishing House.1997.
- 5) Report of currency & finance .
- 6) RBI : Bulletins.

A- 3751

B.B.A. Part - I

Semester – II

BASICS OF ACCOUNTING

Unit : I

Introduction of Accounting , Meaning , Nature , Function and Usefulness , Accounting Concept and Conventions , Double Entry Accounting system , Accounting Standards, concept and Objectives, Branch of Accounting .

Unit : II

Journal Entry , Ledger, Trial Balance & Subsidiary Books., Rectification or error.

Unit : III

Final Accounts of sole Traders.

Unit : IV

Accounts of Joint Venture, Bill of Exchange and accommodation bill.

Unit : V

Depreciation: Accounting Straight line Method , Reducing Balance Method , Depreciation Fund Method , Annuity Method.

Reference Books :

- 1) J.R.Botliboi : Advanced Accountancy
- 2) R.R.Gupta : Advanced Accountancy
- 3) Shukla & Grewal : Advanced Accountancy
- 4) A.N.Agarwal : Higher Science of Accounting
- 5) R.L.Gupta, V.K.Gupta : Advanced Accounting

A- 3752

B.B.A. Part - I

Semester – I

BUSINESS MATHEMATICS & STATISTICS

Unit : I

- 1.1 : Natural Numbers , Integers HCF & LCM on two or more Integers.
Liner Equation in one and two Variables Method with application.
- 1.2 : Ratio, Proportion and percentage , Direct and inverse proportion.
- 1.3 : Mathematics of finance : Simple interest , Compound interest.
Concept of present value and amount a sum annuities , Types of annuities , present value and amount of an annuity including the case of continuous compounding.

Unit : II

Integration – Definite & indefinite Integral – Rules of integration substitutional
integration by parts partial fraction complete square properties of definite integral.

Unit : III

- 3.1 : Definitions of Statistics , Subject matter of statistics.
Statistical methods , Nature and limitations of statistics, Collection of
statistical data, classification Tabulation and presentation of data.
- 3.2 : Measure of central Tendency , mean , mode , median.

Unit : IV

Measures of Dispersion and Skewness , Index Number.

Unit : V

Correlation Analysis , Grouping method and simple method.

Reference Book :

- 1) D.N.Elhance : Fundamental of Statistics
- 2) B.M.Asthana : Applied Statistics in India
- 3) S.S.Shrivastav : Introduction to Statistics
- 4) S.P.Gupta : Statistical Methods

A- 3753

B.B.A. Part - I

Semester – II

FUNDAMENTALS OF ACCOUNTING

Unit : I

Accounts of Non-trading concerns.

Unit : II

Accounts of Self Balancing Ledgers and single entry system.

Unit : III

Account of Hire purchases and instalment purchase system.

Unit : IV

Branch Accounting and Departmental Accounting.

Unit : V

Accounts of Insolvent Individuals.

Reference Book :

- 1) J.R.Botliboi : Advanced Accountancy
- 2) R.R.Gupta : Advanced Accountancy
- 3) Shukla & Grewal : Advanced Accountancy
- 4) A.N.Agarwal : Higher Science of Accounting
- 5) R.L.Gupta, V.K.Gupta : Advanced Accounting

A- 3754

B.B.A. Part - I

Semester – I

CREATIVITY AND INNOVATION

Unit -1 Idea

- 1.1 Idea – Concept, Meaning and Nature
- 1.2 Idea – Evaluation, Generalisation and Execution
- 1.3 Idea in Reality
- 1.4 Identification of Critical Issues
- 1.5 Solution of Critical Issues

Unit – 2 Incubation

- 2.1 Incubation – Concept, Meaning ,Nature and Importance
- 2.2 Facilitate Incubation
- 2.3 Incubation Process and Creativity
- 2.4 Facilitate Creativity and Innovation
- 2.5 Creativity in Organization

Unit – 3 Creativity

- 3.1 Climate for Creativity Meaning and Definition of creativity
- 3.2 Creating and Creative Environment
- 3.3 Keeping Creative People Creative
- 3.4 Creativity in Teams
- 3.5 Managing Creative Employee

Unit – 4 Innovation

- 4.1 Meaning, Definition and Importance
- 4.2 Climate for Innovation in Enterprise
- 4.3 Leading for Creativity and Innovation
- 4.4 Maturity Life Cycle
- 4.5 Competitive Advantage of Innovation

Unit – 5 Renovation

- 5.1 Meaning ,Definition, Role and Scope
- 5.2 Creativity to Innovation
- 5.3 Role of Champions in Renovation
- 5.4 Thinking Differently For Innovation
- 5.5 Communicating Innovation

Reference :

1. **The Act of Creation** by Arthur Koestler.
2. **Creativity in Product Innovation** by jacob Goldenberg and David Mazursky.
3. **Creative Cognition : Theory, Research and Applications** by Ronald A. Finke, Thomas B. Ward and Steven M. Smith.
4. **The Creative Mind: Myths and Mechanisms** by Margaret A.Boden.
5. **Mastering the Dynamics of Innovation** by James M.Utterback.
6. **Think: Before It's Too Late** by Edward de Bono.
7. **The Progress Principle: Using Small Wins to Ignite Joy,Engagement and Creativity at Work**, Teresa Amabile and Steven Kramer.
8. **The Progress Principle: Using Small Wins to Ignite Joy,Engagement and Creativity at Work Hardcover- July 19, 2011**, Teresa Amabile, Steven Kramer.
9. **Motivation for Crative People: How to Stay Creative While Gaining Money, Fame, and Reputation** Kindle Editon, Mark McGuinness.

A- 3755

B.B.A. Part - I

Semester – II

PRINCIPLES OF BUSINESS MANAGEMENT

Unit -1 Business Management

- 1.1 Business Meaning Nature and Business Organization
- 1.2 Business Management :- Concept, Meaning, Nature and Management Process
- 1.3 Contribution of F.W. Taylor
- 1.4 Contribution of Henry Fayol
- 1.5 Contribution of Elton Mayo

Unit - 2 Planning

- 2.1 Planning- Meaning, Nature ,and Importance
- 2.2 Types of Planning
- 2.3 Planning Procedure
- 2.4 Planning Policies
- 2.5 Strategic Planning

Unit – 3 Organizing

- 3.1 Organization- Meaning, Nature and Scope
- 3.2 Organization and Structure
- 3.3 Horizontal Organization
- 3.4 Vertical Organization
- 3.5 Line and Staff Organization

Unit – 4 Directing

- 4.1 Direction- Meaning, Nature, Scope and Importance
- 4.2 Principles of Direction
- 4.3 Forms of Direction
- 4.4 Direction Mechanism
- 4.5 Direction- Horizontal and vertical

Unit – 5 Controlling

- 5.1 Control- Concept, Meaning, Nature and Role
- 5.2 Process of Control
- 5.3 Techniques of Control
- 5.4 Effective Control System
- 5.5 Control Mechanism



Delhi

27th Dec 2018

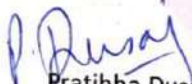
To
The Principal
Vidya Bharati Mahavidyalaya, Amravati
Maharashtra

Subject : Approval of Syllabus B.VoC (Cosmetic Technology) of Semester I & II

Dear Sir

With reference to the subject cited above, your college has submitted the syllabus of B.VoC (Cosmetic Technology) of Semester I & II, the submitted syllabus of said course has been approved and sanctioned for the session 2018-19.

With Best Regards


Pratibha Dusaj

Head- Standards & QA
Beauty & Wellness Sector Skill Council



Encl- Certified copy of Sem I & Sem II syllabus

General Provisions and Summary of Teaching and Examination Scheme

For B. Voc. (Cosmetic Technology) course the following provisions should be made-

1. Credits awards should be as under-

Semester	Credits for-		Total credits	Exit point/ Award	NSQF Level
	General Education Component	Skill Education Component			
Semester – I	12	18	30	Certificate	4
Semester - II	12	18	60	Diploma	5
Semester – III	12	18	90	----	
Semester – IV	12	18	120	Advance Diploma	6
Semester – V	12	18	150	----	
Semester - VI	12	18	180	B.Voc.	7

2. Teaching & Examination Scheme Summary.

Semester	Teaching Scheme (hours per week)		Total	Examination Scheme		
	Theory	Practical/ Field Work		External Marks (Max.)	Internal Marks (Min.)	Total Marks
Semester – I	14	34	48	325	225	550
Semester - II	14	34	48	325	225	550
Semester – III	14	34	48	325	225	550
Semester – IV	14	34	48	325	225	550
Semester – V	12	18	30	335	215	550
Semester - VI	12	18	30	335	215	550
Total	80	172	252	1970	1330	3300

3. Eligibility for admission:

- Should have passed H.Sc. examination of Maharashtra State Board of Secondary Education or any Equivalent examination with Physics, Chemistry, Mathematics or Physics, Chemistry, Biology as main subject.
- Any qualifying NSQF level as decided by Beauty & Wellness Sector Skill Council from time to time.

4. Teaching faculty qualification:

- M.Tech. (Cosmetics) or Ph.D. in Cosmetics.
 - Any other qualification as recommended by the UGC.
5. Other ordinary provisions for B.Voc. under direction no. 14/2016 and 18/2016 shall apply for this course.

P. D. D. D.
Beauty & Wellness Sector Skill Council



H. B.

Principal
Vidyabharati Mahavidyalaya
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- I

EXIT POINT/AWARD: CERTIFICATE (NSQF LEVEL 4)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-A

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	IBVCGEC1	English & Communication Skills-I	3	-	3	3	3	40	10	50	20	-
2	IBVCGEC2	Applied Computer Skills-I	3	-	3	3	3	40	10	50	20	-
3	IBVCSEC3	Skin Care Service-I	3	-	3	3	3	40	10	50	20	-
4	IBVCSEC4	Hair Care Service-I	2	-	2	3	3	40	10	50	20	-
5	IBVCSEC5	Aesthetic Dermatology-I	3	-	3	3	3	40	10	50	20	-
6	IBVCGEC6	English & Communication Skills-I: LAB	-	6	6	3	2	25	25	50	-	20
7	IBVCGEC7	Applied Computer Skills-I: LAB	-	6	6	3	2	25	25	50	-	20
8	IBVCSEC8	Skin Care Service-I - LAB	-	6	6	3	3	25	25	50	-	20
9	IBVCSEC9	Hair Care Service-I - LAB	-	6	6	2	3	25	25	50	-	20
10	IBVCSEC10	Aesthetic Dermatology-I - LAB	-	6	6	2	3	25	25	50	-	20
11	IBVCSEC11	Field work/industrial visit 240 hrs	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 4**.



[Signature]
Principal

Vidyabharati Mahavidyalaya
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- II

EXIT POINT/AWARD: DIPLOMA (NSQF LEVEL 5)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-B

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	2BVCGEC1	English & Communication Skills-II	3	-	3	3	3	40	10	50	20	-
2	2BVCGEC2	Applied Computer Skills-II	3	-	3	3	3	40	10	50	20	-
3	2BVCSEC3	Nail Care Service	3	-	3	3	3	40	10	50	20	-
4	2BVCSEC4	Skin Care Service-II	2	-	2	3	3	40	10	50	20	-
5	2BVCSEC5	Hair Care Service-II	3	-	3	3	3	40	10	50	20	-
6	2BVCGEC6	English & Communication Skills-II:LAB	-	6	6	3	2	25	25	50	-	20
7	2BVCGEC7	Applied Computer Skills-II:LAB	-	6	6	3	2	25	25	50	-	20
8	2BVCSEC8	Nail Care Service - LAB	-	6	6	3	3	25	25	50	-	20
9	2BVCSEC9	Skin Care Service-II - LAB	-	6	6	2	3	25	25	50	-	20
10	2BVCSE10S	Hair Care Service-II - LAB	-	6	6	2	3	25	25	50	-	20
11	2BVCSEC11	Field work/industrial visit 240 hrs	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for LEVEL 5.




Principal
Vidyabharati Mahavidyalaya
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- III

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-B

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	3BVCGEC1	English & Communication Skills-III	3	-	3	3	3	40	10	50	20	-
2	3BVCGEC2	Applied Computer Skills-III	3	-	3	3	3	40	10	50	20	-
3	3BVCSEC3	Skin Care Service-III	3	-	3	3	3	40	10	50	20	-
4	3BVCSEC4	Hair Care Service-III	2	-	2	3	3	40	10	50	20	-
5	3BVCSEC5	Aesthetic Dermatology-II	3	-	3	3	3	40	10	50	20	-
6	3BVCGEC6	English & Communication Skills-III:LAB	-	6	6	3	2	25	25	50	-	20
7	3BVCGEC7	Applied Computer Skills-III:LAB	-	6	6	3	2	25	25	50	-	20
8	3BVCSEC8	Skin Care Service-III – LAB	-	6	6	3	3	25	25	50	-	20
9	3BVCSEC9	Hair Care Service-III – LAB	-	6	6	2	3	25	25	50	-	20
10	3BVCSEC10	Aesthetic Dermatology-II - LAB	-	6	6	2	3	25	25	50	-	20
11	3BVCSEC11	Field work/industrial visit	-	4	4	2	-	-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

- Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
- One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.




Principal
 Vidyabharati Mahavidyalaya
 AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- IV

EXIT POINT/AWARD: ADVANCE DIPLOMA (NSQF LEVEL 6)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-D

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	4BVCGEC1	English & Communication Skills-IV	3	-	3	3	3	40	10	50	20	-
2	4BVCGEC2	Soft Skill Development-I	3	-	3	3	3	40	10	50	20	-
3	4BVCSEC3	Skin Care Service-IV	3	-	3	3	3	40	10	50	20	-
4	4BVCSEC4	Spa Services	2	-	2	3	3	40	10	50	20	-
5	4BVCSEC5	Aesthetic Dermatology-III	3	-	3	3	3	40	10	50	20	-
6	4BVCGEC6	English & Communication Skills-IV:LAB	-	6	6	3	2	25	25	50	-	20
7	4BVCGEC7	Soft Skill Development-I:LAB	-	6	6	3	2	25	25	50	-	20
8	4BVCSEC8	Skin Care Service-IV – LAB	-	6	6	3	3	25	25	50	-	20
9	4BVCSEC9	Spa Services – LAB	-	6	6	2	3	25	25	50	-	20
10	4BVCSEC10	Aesthetic Dermatology-III - LAB	-	6	6	2	3	25	25	50	-	20
11	4BVCSEC11	Field work/industrial visit	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

- Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
- One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
- Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for LEVEL 6.



P. Desai



H. B.
Principal
Vidyabharati Mahavidyalaya
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- V

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-E

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	5BVCGEC1	English & Communication Skills-V	3	-	3	3	3	40	10	50	20	-
2	5BVCGEC2	Soft Skill Development-II	3	-	3	3	3	40	10	50	20	-
3	5BVCSEC3	Category Expert - I	3	-	3	3	3	40	10	50	20	-
4	5BVCSEC4	Institute Head - I	3	-	3	3	3	40	10	50	20	-
5	5BVCGEC5	English & Communication Skills-V:LAB	-	3	3	3	2	25	25	50	-	20
6	5BVCGEC6	Soft Skill Development-II:LAB	-	3	3	3	2	25	25	50	-	20
7	5BVCSEC7	Category Expert - I - LAB	-	4	4	4	3	25	25	50	-	20
8	5BVCSEC8	Institute Head - I - LAB	-	4	4	4	3	25	25	50	-	20
9	5BVCSEC9	Seminar & Project Phase-I	-	4	4	4	3	75	75	150	-	60
Total			12	18	30	30		335	215	550	80	140

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Project shall be evaluated through project document, presentation, case study and viva-voce.



P. Desai



[Signature]
Principal
Vidyabharati Mahavidyalaya
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- VI

EXIT POINT/AWARD: B. Voc. Degree (NSQF LEVEL 7)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-F

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	6BVCGEC1	Industrial Organization & Management	3	-	3	3	3	40	10	50	20	-
2	6BVCGEC2	Soft Skill Development-III	3	-	3	3	3	40	10	50	20	-
3	6BVCSEC3	Category Expert - II	3	-	3	3	3	40	10	50	20	-
4	6BVCSEC4	Institute Head - II	3	-	3	3	3	40	10	50	20	-
5	6BVCGEC5	Industrial Organization & Management-LAB	-	3	3	3	2	25	25	50	-	20
6	6BVCGEC6	Soft Skill Development-III-LAB	-	3	3	3	2	25	25	50	-	20
7	6BVCSEC7	Category Expert - II - LAB	-	4	4	4	3	25	25	50	-	20
8	6BVCSEC8	Institute Head - II - LAB	-	4	4	4	3	25	25	50	-	20
9	6BVCSEC9	Project Phase-II	-	4	4	4	3	75	75	150	-	60
Total			12	18	30	30		335	215	550	80	140

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Project shall be evaluated through project document, presentation, case study and viva-voce.
4. In house /Institute Level Theory and Practical shall be of Eight Week duration, for Semester VI.
5. Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 7**.



P. Desai




 Principal
 Vidyabharati Mahavidyalaya
 AMRAVATI

Syllabus Prescribed for Cosmetic Technology: B.Voc. Part-I (Vocation)

Semester-I

SUBJECT CODE: 1BVCGEC1 & 1BVCGEC6

English and Communication Skill-I

Theory

- 1) Revisiting English Grammar: articles, prepositions, adjectives.
- 2) Written communication : letter writing (customer complaints, general complaints, seeking information, placing orders).
- 3) Reading skills: scanning and skimming, reading comprehension, summarizing.
- 4) Communication skills: language functions (greeting, taking leave, thanking, apologizing, introducing self).

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 1BVCGEC2 & 1BVCGEC7

Applied Computer Skill-I

Theory

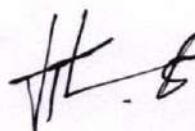
- 1) Word Processing : Introduction, starting word, creating document, structure of MS-word window and its application, mouse and keyboard operations, designing document; formatting-selection, cut, copy, paste, toolbars, operating on text; printing, saving, opening, closing of document; creating a template.
- 2) Tables, borders, textbook operations; spelling and grammar check, mail merge, envelope and label, protection of document, change the view of document.
- 3) PowerPoint Presentation – working with PowerPoint window, standard toolbar, formatting toolbar, drawing toolbar, moving the frame, inserting clip art, picture, slide; text styling, send to back.
- 4) Entering data to graph, organization chart, table, design template, master slide, animation setting, saving and presentation, auto content wizard, package for CD (Pack & Go Feature).

Practical – Practical based on above chapter.

Reference books:

- 1) Information technology concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.]
- 2) Fundamentals of Information Technology by Alexis and Mathews Leon [Leon Press; Chennai & Vikas Publishing House Pvt. Ltd, New Delhi]
- 3) Computer Fundamentals by P.K.Sinha.




 Principal
 Vidyabharati Mahavidyalaya
 AMRAVATI

SUBJECT CODE: 1BVCSEC3 & 1BVCSEC8**Title: Skin Care Service-I**

Qualification Pack- Beauty Therapist- Skin Care Services (BWS/Q0102) ✓ *VER 2*
 National Occupational Standards (BWS/Q0102, BWS/N0104)

No. code

Unit 1 : Anatomy and Physiology of Skin.

Unit 2: Perform skin care services- Provide facial skin care treatment to enhance facial skin condition

Unit 3: Skin types, recognition of skin types. Different types of blemishes. Basic types of face, muscle of facial expression etc.

Unit 4: Study of Skin Care Cosmetic- Skin Creams and Lotions.

Practical's:

1. Facial treatments.
2. Facial skin care
3. Study of skin
4. Study of cosmetic products

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Indu Puri- Beauty and Skin Care
4. Gaynor Winyard- a guide for health & beauty therapist
5. Rama Bams- Health & Beauty
6. Marry Healy.

SUBJECT CODE: 1BVCSEC4 & 1BVCSEC9**Title: Hair Care Service-I**

Qualification Pack- Hair Care Services- Hair Stylist (ver. 2) (BWS/Q0202) ✓
 National Occupational Standards (BWS/Q0202)

Unit 1: Shampoo and conditioner – study of shampoo and conditioner. Treat the hair and scalp using a range of products and massage techniques.

Unit 2: Blow drying techniques – detailed study.

Unit 3: Hair coloring and lightening- a detail study of coloring techniques and precautions.

Unit 4 : Hair relaxing and straightening- a detail of techniques and services.

Practical's:

1. Study of hair
2. Blow drying
3. Hair coloring
4. Hair straightening
5. Head massage- shampooing and conditioning

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Rama Bams- Health & Beauty
4. Harry's cosmetology
5. Anatomy and physiology by Ross and Wilson.



P. Desai



[Signature]
 Principal
 Vidyabharati Mahavidyalaya
 AMRAVATI

SUBJECT CODE: 1BVCSEC5 & 1BVCSEC10**Title: Aesthetic Dermatology-I**

Qualification Pack- Aesthetic Dermatology- Cosmetic Dermatology (BWS/Q0501)
National Occupational Standards (BWS/Q0501)

Unit 1: Understanding the chemistry of products used in the hair and beauty sector. To understand the chemistry, effects and safe use of active ingredients.

Unit 2: Knowledge of Dermatology and Physiology of ageing.

Unit 3: Maintain health and safety at the workplace.

Unit 4: Create a positive impression at the workplace- Personal grooming and behavior to execute tasks as per the organization's standards and create a positive impression at the workplace.

Practical's:

1. Professional beauty ethics.
2. Practical regarding module 3 and 4.
3. Dermatology of skin.
4. Dermatology of hair.

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Rama Bams- Health & Beauty
4. Harry's cosmetology
5. Anatomy and physiology by Ross and Wilson.

SUBJECT CODE: 1BVCSEC11**Field Work/Industrial Visit**

Visit to any cosmetic manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.



Principal
vidyabharati Mahavidyalaya
AMRAYATI

Syllabus Prescribed for Cosmetic Technology: B.Voc. Part-I (Vocation)

Semester-II

SUBJECT CODE: 2BVCGEC1 & 2BVCGEC6

English and Communication Skill-II

Theory

- 1) Revisiting English Grammar: modal auxiliaries, adverbs and adverbial phrases.
- 2) Written communication: job applications, resumes, responding to advertisements.
- 3) Reading skills: note making, distinguishing facts from beliefs, opinions.
- 4) Communication skills: language functions (asking for information, requesting, agreeing and disagreeing, complimenting and responding to compliments)

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 2BVCGEC2 & 2BVCGEC7

Applied Computer Skill-II

Theory

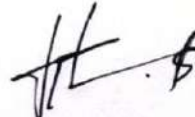
- 1) Introduction to MS-Excel: Navigating, excel toolbars and operations, formatting features-copying data between Worksheets; entering and editing cell entries, creation of charts, editing and formatting charts.
- 2) Goal seek, auditing, linking, Workbook, Database in Excel (Auto Filter, Advanced filter, sort form), Mathematical, statistical and financial functions in MS-Excel.
- 3) MS-Access: Introduction to database management system, DBMS vs RDBMS
- 4) Database Administrator (DBA) and its role.

Practical – Practical based on above chapter.

Reference books:

1. Database system concepts by A. Silbers Chatz by Henry Korth and S. Sudarshan [Mcgraw-hill Ltd. New Delhi] 3rd edition.
2. Introduction to data base management by Naveen Prakash [Tata McGraw-Hil]
3. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.
4. Raghu Ramkrishnan & Johannes Gerhrke, "Data Base Management Systems", Mc Graw Hill International Edition 2000.




 Principal
 Vidyabharati Mahavidyalaya,
 AMRAVATI

SUBJECT CODE: 2BVCSEC3 & 2BVCSEC8**Title: Nail Care Service**

Qualification Pack- Senior Nail Technician – Nail Care Services (BWS/Q0404)
National Occupational Standards (BWS/Q0404, BWS/N9001)

Unit 1

Prepare and maintain work area. Prepare the equipment, products and work area ahead of service delivery to ensure the efficiency and effectiveness of conducting nail care services considering the standards of operation of the organization.

Unit 2 Anatomy and Physiology of Nails.

Unit 3 Manicure and Pedicure techniques and services and products required.

Unit 4 Nail art application. Planning and creating individual nail art designs.

Nail Extension.

Practical's:

1. Study of Nails.
2. Manicure
3. Pedicure
4. Nail art application.

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Rama Bams- Health & Beauty
4. Harry's cosmetology
5. Anatomy and physiology by Ross and Wilson.



[Signature]
Principal
Vidyabharati Mahavidyalaya
AMRAVATI

SUBJECT CODE: 2BVCSEC4& 2BVCSEC9**Title: Skin Care Service-II**

Qualification Pack- Beauty Advisor – Skin Care Services (BWS/Q0103)
 National Occupational Standards (BWS/Q0103, BWS/N9004)

Unit 1: Make-up Services – introduction, parameters and types of make-up.

Unit 2: Make-up: pre-makeup skin care, cosmetics used for makeup.

Unit 3: Eye makeup, Day makeup, party makeup, bridal makeup and precaution during and after makeup.

Unit 4: Manage and lead a team. Manage the team on day to day basis, ensuring their deployment, motivating them by involving them in various engagement initiatives at the work area, helping them improve the skills levels and managing their grievances in the best possible manner in order to maximize the people productivity.

Practical's:

1. Pre-make-up Skin Care
2. Study of cosmetics used for make-up
3. Daily make-up
4. Functional Make-up
5. Eye Make-up
6. Bridal Make-up

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Indu Puri- Beauty and Skin Care
4. Gaynor Winyard- a guide for health & beauty therapist
5. Rama Bams- Health & Beauty
6. Marry Healy

H. B.

Principal
 Vidya Bharati Mahavidyalaya
 AMRAVATI



SUBJECT CODE: 2BVCSEC5 & 2BVCSEC10**Title: Hair Care Service-II**

Qualification Pack- Hair Advisor- Hair Care Services (BWS/Q0203)
National Occupational Standards (BWS/Q0203, BWS/N9004)

- Unit 1** ✓ Scalp massage and hair spa services. Massage techniques and product range.
Unit 2 ✓ Hair Styling and Hair Dressings. Techniques and products used.
Unit 3 ✓ Perm and neutralize hair. Techniques and products used.
Unit 4 ✓ Promote and sell services and products. Promote products and services to address client needs through consultation and advice on the range of beauty treatments and products.

Practical's:

1. Hair spa.
2. Hair styling techniques
3. Perming of hairs
4. Hair dressing methods.

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Indu Puri- Beauty and Skin Care
4. Gaynor Winyard- a guide for health & beauty therapist
5. Ramia Bams- Health & Beauty
6. Marry Healy


SUBJECT CODE: 2BVCSEC11**Field Work/Industrial Visit**

Visit to any cosmetic manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.




Principal
Vidyabharati Mahavidyalaya
AMRAVATI

To,
The Principal
Vidya Bharati Mahavidyalaya, Amravati
Maharashtra

Subject: Approval of Syllabus B.VoC (Cosmetic Technology) of Semester I & II

Dear Sir,

With reference to the subject cited above, your college has submitted the syllabus of B.VoC (Cosmetic Technology) of Semester I & II. The submitted syllabus of said course has been approved and sanctioned for the session 2019-20, with suggested changes.

With Best Regards


Gouri Chugh

Manager - Standards & QA
Beauty & Wellness Sector Skill Council



Enclosed – Certified copy of Sem I & II syllabus

Vidya Bharati Shaikshanik Mandal, Amravati

VIDYABHARATI MAHAVIDYALAYA, AMRAVATI.

Accredited "A" Grade by NAAC* CPE status by UGC

C.K. Naidu Road, Camp , Amravati- 444602. (M.S.) India

Phone No. 0721-2662740, Fax No. 0721-2552012, 2662740, E-mail: vbmamt@dataone.in, Website:
<http://www.vbirsm.org>

Founder President

President

Principal

Dr. D.R. Shekhawat

Mr. R.D. Shekhawat

Dr. P. S. Yenkar

Phone: 2662866,2662783®

Phone: 2662866,2662783®

Phone: 2662740(0),2664532®

Ref.No.

Ref.No.VBM/SRI 456 12019

29 NOV 2019

To,

The Head

Standards and QA

Beauty and Wellness Sector Skill Council

Subject: Approval of Syllabus B.Voc (Cosmetic Technology) of Semester III & IV

Dear Madam,

With reference to the subject cited above, our college has submitted the syllabus of B.Voc (Cosmetic Technology) of Semester III & IV, the submitted syllabus of said course has been approved and sanctioned for the session 2019-2020.



With Best Regards,
PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
Amravati.

Vidyabharati Mahavidyalaya

Amravati.



Vidya Bharati Shaikshanik Mandal, Amravati
VIDYABHARATI MAHAVIDYALAYA, AMRAVATI.

Accredited "A" Grade by NAAC* CPE status by UGC

C.K. Naidu Road, Camp , Amravati- 444602. (M.S.) India

Phone No. 0721-2662740, Fax No. 0721-2552012, 2662740, E-mail: vbmamt@dataone.in, Website:
<http://www.vbirsm.org>

Founder President	President	Principal
Dr. D.R. Shekhawat	Mr. R.D. Shekhawat	Dr. P. S. Yenkar
Phone: 2662866,2662783®	Phone: 2662866,2662783®	Phone: 2662740(0),2664532®

Ref.No. **Ref. No. VBM/SRI/456/12019**

29 Date: **NOV 2019**

To,

The Head

Standards and QA

Beauty and Wellness Sector Skill Council

Subject: Approval of Syllabus B.Voc (Cosmetic Technology) of Semester I to VI

Dear Madam,

With reference to the subject cited above, our college has submitted the syllabus of B.Voc (Cosmetic Technology) of Semester I to VI, the submitted syllabus of said course has been approved and sanctioned for the session 2019-2020



With Best Regards,

PRINCIPAL
VIDYABHARATI MAHAVIDYALAYA
AMRAVATI.

Vidyabharati Mahavidyalaya

Amravati.



SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- I

EXIT POINT/AWARD: CERTIFICATE (NSQF LEVEL 4)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-A

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	1BVCGEC1	English & Communication Skills-I	3	-	3	3	40	10	50	20	-	
2	1BVCGEC2	Applied Computer Skills-I	3	-	3	3	40	10	50	20	-	
3	1BVCSEC3	Skin Care Service-I	3	-	3	3	40	10	50	20	-	
4	1BVCSEC4	Hair Care Service-I	2	-	2	3	40	10	50	20	-	
5	1BVCSEC5	Aesthetic Dermatology-I	3	-	3	3	40	10	50	20	-	
6	1BVCGEC6	English & Communication Skills-I: LAB	-	3	3	3	2	25	25	50	-	20
7	1BVCGEC7	Applied Computer Skills-I: LAB	-	3	3	3	2	25	25	50	-	20
8	1BVCSEC8	Skin Care Service-I - LAB	-	3	3	3	2	25	25	50	-	20
9	1BVCSEC9	Hair Care Service-I - LAB	-	3	3	3	2	25	25	50	-	20
10	1BVCSEC10	Aesthetic Dermatology-I - LAB	-	3	3	3	2	25	25	50	-	20
11	1BVCSEC11	Field work/industrial visit 240 hrs	-	16	16	1	-	50	50	-	20	
Total			14	31	45	30	325	225	550	100	120	

Notes:

- Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
- One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
- Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 4**.

* In Hair care Service - Blow drying, shampooing, conditioning
Hair cut - Straight cut / Vcut / Ucut

* Added Make-up services module - Day & Evening, eye make-up

* Nailcare - Basis of hands & feet,

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PRINCIPAL
VIDYA BHARATI MAHAVIDYALAY
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- II

EXIT POINT/AWARD: DIPLOMA (NSQF LEVEL 5)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-B

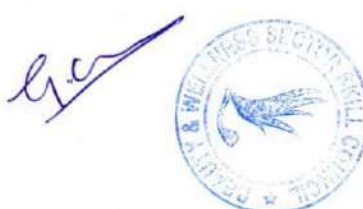
Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	2BVCGEC1	English & Communication Skills-II	3	-	3	3	3	40	10	50	20	-
2	2BVCGEC2	Applied Computer Skills-II	3	-	3	3	3	40	10	50	20	-
3	2BVCSEC3	Nail Care Service	3	-	3	3	3	40	10	50	20	-
4	2BVCSEC4	Skin Care Service-II	2	-	2	2	3	40	10	50	20	-
5	2BVCSEC5	Hair Care Service-II	3	-	3	3	3	40	10	50	20	-
6	2BVCGEC6	English & Communication Skills-II:LAB	-	3	3	3	2	25	25	50	-	20
7	2BVCGEC7	Applied Computer Skills-II:LAB	-	3	3	3	2	25	25	50	-	20
8	2BVCSEC8	Nail Care Service - LAB	-	3	3	3	2	25	25	50	-	20
9	2BVCSEC9	Skin Care Service-II - LAB	-	3	3	3	2	25	25	50	-	20
10	2BVCSE10S	Hair Care Service-II - LAB	-	3	3	3	2	25	25	50	-	20
11	2BVCSEC11	Field work/industrial visit 240 hrs	-	16	16	1	-	-	50	50	-	20
Total			14	31	45	30		325	225	550	100	120

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 5**.

* Depilation - Theory & Practical (waxing & threading) - Types of waxing - Preparation of wax

* Introduction to Facial Electrotherapy to be added



Principal
PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- III

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-B

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	3BVCGEC1	English & Communication Skills-III	3	-	3	3	3	40	10	50	20	-
2	3BVCGEC2	Applied Computer Skills-III	3	-	3	3	3	40	10	50	20	-
3	3BVCSEC3	Skin Care Service-III <i>Nail</i>	3	-	3	3	3	40	10	50	20	-
4	3BVCSEC4	Hair Care Service-III	2	-	2	2	3	40	10	50	20	-
5	3BVCSEC5	Aesthetic Skin Dermatology-III <i>Care Services</i>	3	-	3	3	3	40	10	50	20	-
6	3BVCGEC6	English & Communication Skills-III:LAB	-	3	3	3	2	25	25	50	-	20
7	3BVCGEC7	Applied Computer Skills-III:LAB	-	3	3	3	2	25	25	50	-	20
8	3BVCSEC8	Skin Care Service-III - LAB	-	3	3	3	2	25	25	50	-	20
9	3BVCSEC9	Hair Care Service-III - LAB	-	3	3	3	2	25	25	50	-	20
10	3BVCSEC10	Aesthetic Dermatology-II - LAB	-	3	3	3	2	25	25	50	-	20
11	3BVCSEC11	Field work/industrial visit	-	16	16	1	-	-	50	50	-	20
Total			14	31	45	30		325	225	550	100	120

Notes:

- Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
- One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.

* *Nailcare Services*



N. B. Law

PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- IV

EXIT POINT/AWARD: ADVANCE DIPLOMA (NSQF LEVEL 6)

General Education Component Credits: 12

Skill Development Component
Credits: 18 Appendix-D

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	4BVCGEC1	English & Communication Skills-IV	3	-	3	3	3	40	10	50	20	-
2	4BVCGEC2	Soft Skill Development-I	3	-	3	3	3	40	10	50	20	-
3	4BVCSEC3	Skin Care Service-IV	3	-	3	3	3	40	10	50	20	-
4	4BVCSEC4	Spa Services	2	-	2	2	3	40	10	50	20	-
5	4BVCSEC5	Aesthetic Dermatology-III	3	-	3	3	3	40	10	50	20	-
6	4BVCGEC6	English & Communication Skills-IV:LAB	-	3	3	3	2	25	25	50	-	20
7	4BVCGEC7	Soft Skill Development-I:LAB	-	3	3	3	2	25	25	50	-	20
8	4BVCSEC8	Skin Care Service-IV – LAB	-	3	3	3	2	25	25	50	-	20
9	4BVCSEC9	Spa Services – LAB	-	3	3	3	2	25	25	50	-	20
10	4BVCSEC10	Aesthetic Dermatology-III - LAB	-	3	3	3	2	25	25	50	-	20
11	4BVCSEC11	Field work/industrial visit	-	16	16	1		-	50	50	-	20
Total			14	31	45	30		325	225	550	100	120

Notes:

- Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
- One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
- Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for LEVEL 6.

* Haircare Services



AB Saw

PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- V

General Education Component Credits: 12

Skill Development Component
Credits:18 Appendix-E

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	5BVCGEC1	English & Communication Skills-V	3	-	3	3	3	40	10	50	20	-
2	5BVCGEC2	Soft Skill Development-II	3	-	3	3	3	40	10	50	20	-
3	5BVCSEC3	Category Expert - I	3	-	3	3	3	40	10	50	20	-
4	5BVCSEC4	Institute Head - I	3	-	3	3	3	40	10	50	20	-
5	5BVCGEC5	English & Communication Skills-V:LAB	-	3	3	3	2	25	25	50	-	20
6	5BVCGEC6	Soft Skill Development-II:LAB	-	3	3	3	2	25	25	50	-	20
7	5BVCSEC7	Category Expert - I - LAB	-	4	4	4	3	25	25	50	-	20
8	5BVCSEC8	Institute Head - I - LAB	-	4	4	4	3	25	25	50	-	20
9	5BVCSEC9	Seminar & Project Phase-I	-	4	4	4	3	75	75	150	-	60
Total			12	18	30	30		335	215	550	80	140

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Project shall be evaluated through project document, presentation, case study and viva-voce.



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PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

Cosmetic Technology

SEMESTER- VI

EXIT POINT/AWARD: B. Voc. Degree (NSQF LEVEL 7)

General Education Component Credits: 12
Credits: 18

Skill Development Component

Appendix-F

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	6BVCGEC1	Industrial Organization & Management	3	-	3	3	3	40	10	50	20	-
2	6BVCGEC2	Soft Skill Development-III	3	-	3	3	3	40	10	50	20	-
3	6BVCSEC3	Category Expert - II	3	-	3	3	3	40	10	50	20	-
4	6BVCSEC4	Institute Head - II	3	-	3	3	3	40	10	50	20	-
5	6BVCGEC5	Industrial Organization & Management-LAB	-	3	3	3	2	25	25	50	-	20
6	6BVCGEC6	Soft Skill Development-III-LAB	-	3	3	3	2	25	25	50	-	20
7	6BVCSEC7	Category Expert - II - LAB	-	4	4	4	3	25	25	50	-	20
8	6BVCSEC8	Institute Head - II - LAB	-	4	4	4	3	25	25	50	-	20
9	6BVCSEC9	Project Phase-II	-	4	4	4	3	75	75	150	-	60
Total			12	18	30	30		335	215	550	80	140

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Project shall be evaluated through project document, presentation, case study and viva-voce.
4. In house /Institute Level Theory and Practical shall be of Eight Week duration, for Semester VI.
5. Model curriculum prepared by Beauty & Wellness Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 7**.



(Handwritten Signature)

PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

Syllabus Prescribed for Cosmetic Technology: B.Voc. Part-I (Vocation)

Semester-I

SUBJECT CODE: 1BVCGEC1 & 1BVCGEC6

English and Communication Skill-I

Theory

- 1) Revisiting English Grammar: articles, prepositions, adjectives.
- 2) Written communication: letter writing (customer complaints, general complaints, seeking information, placing orders).
- 3) Reading skills: scanning and skimming, reading comprehension, summarizing.
- 4) Communication skills: language functions (greeting, taking leave, thanking, apologizing, introducing self).

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 1BVCGEC2 & 1BVCGEC7

Applied Computer Skill-I

Theory


- 1) Word Processing : Introduction, starting word, creating document, structure of MS-word window and its application, mouse and keyboard operations, designing document; formatting-selection, cut, copy, paste, toolbars, operating on text; printing, saving, opening, closing of document; creating a template.
- 2) Tables, borders, textbook operations; spelling and grammar check, mail merge, envelope and label, protection of document, change the view of document.
- 3) PowerPoint Presentation – working with PowerPoint window, standard toolbar, formatting toolbar, drawing toolbar, moving the frame, inserting clip art, picture, slide; text styling, send to back.
- 4) Entering data to graph, organization chart, table, design template, master slide, animation setting, saving and presentation, auto content wizard, package for CD (Pack & Go Feature).

Practical – Practical based on above chapter.

Reference books:

- 1) Information technology concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.]
- 2) Fundamentals of Information Technology by Alexis and Mathews Leon [Leon Press; Chennai & Vikas Publishing House Pvt. Ltd, New Delhi]
- 3) Computer Fundamentals by P.K.Sinha.




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SUBJECT CODE: 1BVCSEC3 & 1BVCSEC8

Title: Skin Care Service-I

Qualification Pack- Beauty Therapist- Skin Care Services (BWS/Q0102)
National Occupational Standards (BWS/Q0102, BWS/N0104)

Unit 1: Anatomy and Physiology of Skin.

Unit 2: Perform skin care services- Provide facial skin care treatment to enhance facial skin condition

Unit 3: Skin types, recognition of skin types. Different types of blemishes. Basic types of face, muscle of facial expression etc.

Unit 4: Study of Skin Care Cosmetic- Skin Creams and Lotions.

Practicals:

1. Facial treatments.
2. Facial skin care
3. Study of skin
4. Study of cosmetic products

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Indu Puri- Beauty and Skin Care
4. Gaynor Winyard- a guide for health & beauty therapist
5. Rama Bams- Health & Beauty
6. Marry Healy.

SUBJECT CODE: 1BVCSEC4 & 1BVCSEC9

Title: Hair Care Service-I

Qualification Pack- Hair Care Services- Hair Stylist (ver. 2) (BWS/Q0202)
National Occupational Standards (BWS/Q0202)

Unit 1: Shampoo and conditioner – study of shampoo and conditioner. Treat the hair and scalp using a range of products and massage techniques. ✓

Unit 2: Blow drying techniques – detailed study. ✓

Unit 3: Hair coloring and lightening- a detail study of coloring techniques and precautions. ✕

Unit 4: Hair relaxing and straightening- a detail of techniques and services.

Basics of hair cut - straight cut - U cut - V cut

Practicals:

1. Study of hair ✓
2. Blow drying ✓
3. Hair coloring
4. Hair straightening
5. Head massage- shampooing and conditioning ✓

Reference books:

Consider the ticked ones for 1st year

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1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Rama Bams- Health & Beauty
4. Harry's cosmetology
5. Anatomy and physiology by Ross and Wilson.

SUBJECT CODE: 1BVCSEC5 & 1BVCSEC10

Title: Aesthetic Dermatology-I

Qualification Pack- Aesthetic Dermatology- Cosmetic Dermatology (BWS/Q0501)
National Occupational Standards (BWS/Q0501)

Theory:

Unit 1: Understanding the chemistry of products used in the hair and beauty sector. To understand the chemistry, effects and safe use of active ingredients.

Unit 2: Knowledge of Dermatology and Physiology of ageing.

Unit 3: Maintain health and safety at the workplace.

Unit 4: Create a positive impression at the workplace- Personal grooming and behavior to execute tasks as per the organization's standards and create a positive impression at the workplace.

Practical:

1. Professional beauty ethics.
2. Practical regarding module 3 and 4.
3. Dermatology of skin.
4. Dermatology of hair.

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Rama Bams- Health & Beauty
4. Harry's cosmetology
5. Anatomy and physiology by Ross and Wilson.

SUBJECT CODE: 1BVCSEC11

Field Work/Industrial Visit

Visit to any cosmetic manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.



**PRINCIPAL
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Syllabus Prescribed for Cosmetic Technology: B.Voc. Part-I (Vocation)

Semester-II

SUBJECT CODE: 2BVCGEC1 & 2BVCGEC6

English and Communication Skill-II

Theory

- 1) Revisiting English Grammar: modal auxiliaries, adverbs and adverbial phrases.
- 2) Written communication: job applications, resumes, responding to advertisements.
- 3) Reading skills: note making, distinguishing facts from beliefs, opinions.
- 4) Communication skills: language functions (asking for information, requesting, agreeing and disagreeing, complimenting and responding to compliments)

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 2BVCGEC2 & 2BVCGEC7

Applied Computer Skill-II

Theory

- 1) Introduction to MS-Excel: Navigating, excel toolbars and operations, formatting features-copying data between Worksheets; entering and editing cell entries, creation of charts, editing and formatting charts.
- 2) Goal seek, auditing, linking, Workbook, Database in Excel (Auto Filter, Advanced filter, sort form), Mathematical, statistical and financial functions in MS-Excel.
- 3) MS-Access: Introduction to database management system, DBMS vs RDBMS
- 4) Database Administrator (DBA) and its role.

Practical – Practical based on above chapter.

Reference books:

1. Database system concepts by A. Silbers Chatz by Henry Korth and S. Sudarshan [Mcgraw-hill ltd. New Delhi] 3rd edition.
2. Introduction to data base management by Naveen Prakash [Tata McGraw-Hil]
3. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.
4. Raghu Ramkrishnan & Johannes Gerhrke, "Data Base Management Systems", Mc Graw Hill International Edition 2000.



**PRINCIPAL
VIDYA BHARATI MAHAVIDYALAY
AMRAVATI**

SUBJECT CODE: 2BVCSEC3 & 2BVCSEC8

Title: Nail Care Service - I

Qualification Pack- Senior Nail Technician – Nail Care Services (BWS/Q0404)
National Occupational Standards (BWS/Q0404, BWS/N9001)

Theory:

Unit 1: Prepare and maintain work area. Prepare the equipment, products and work area ahead of service delivery to ensure the efficiency and effectiveness of conducting nail care services considering the standards of operation of the organization.

Unit 2: Anatomy and Physiology of Nails.

Unit 3: Manicure and Pedicure techniques and services and products required.

Unit 4: Nail art application. Planning and creating individual nail art designs.

Practicals:

1. Study of Nails.
2. Manicure
3. Pedicure
4. Nail art application.

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Rama Bams- Health & Beauty
4. Harry's cosmetology
5. Anatomy and physiology by Ross and Wilson.

SUBJECT CODE: 2BVCSEC4 & 2BVCSEC9

Title: Skin Care Service-II

Qualification Pack- Beauty Advisor – Skin Care Services (BWS/Q0103)
National Occupational Standards (BWS/Q0103, BWS/N9004)

Theory:

Unit 1: Make-up Services – introduction, parameters and types of make-up.

Unit 2: Make-up: pre-make-up skin care, cosmetics used for make-up.

Unit 3: Eye make-up, Day make-up, party make-up, ~~bridal make-up~~ and precaution during and after make-up.

Unit 4: Manage and lead a team. Manage the team on day to day basis, ensuring their deployment, motivating them by involving them in various engagement initiatives at the work area, helping them improve the skills levels and managing their grievances in the best possible manner in order to maximize the people productivity.

Practicals:

1. Pre-make-up Skin Care
2. Study of cosmetics used for make-up
3. Daily make-up
4. Functional Make-up
5. ~~Bridal Make-up~~



Handwritten signature of the Principal

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Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Indu Puri- Beauty and Skin Care
4. Gaynor Winyard- a guide for health & beauty therapist
5. Rama Bams- Health & Beauty
6. Marry Healy

SUBJECT CODE: 2BVCSEC5 & 2BVCSEC10

Title: Hair Care Service-II

Qualification Pack- Hair Advisor- Hair Care Services (BWS/Q0203)
National Occupational Standards (BWS/Q0203, BWS/N9004)

Theory:

Unit 1: Scalp massage and hair spa services. Massage techniques and product range.

Unit 2: Hair Styling and Hair Dressings. Techniques and products used.

Unit 3: Perm and neutralize hair. Techniques and products used. ✕

Unit 4: Promote and sell services and products. Promote products and services to address client needs through consultation and advice on the range of beauty treatments and products.

Practicals:

1. Hair spa.
2. Hair styling techniques
3. Perming of hairs ✕
4. Hair dressing methods.

Reference books:

1. A complete book on beauty, body, makeup and hair styles by Parvesh Handa
2. Meladay's cosmetics
3. Indu Puri- Beauty and Skin Care
4. Gaynor Winyard- a guide for health & beauty therapist
5. Rama Bams- Health & Beauty
6. Marry Healy

SUBJECT CODE: 2BVCSEC11

Field Work/Industrial Visit

Visit to any cosmetic manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.




PRINCIPAL
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Syllabus Prescribed for Cosmetic Technology

B.Voc. Part-II (Vocation)

Semester-III

SUBJECT CODE: 3BVCGEC1 & 3BVCGEC6

English and Communication Skill-III

Theory:

- 1) Revisiting English Grammar: forming questions, using conditionals, question tags.
- 2) Writing skills: paragraph writing, writing newspaper reports.
- 3) Comprehensions skills: converting verbal information into non-verbal and vice-versa, interpreting graphs, charts, diagrams.
- 4) Communication skills: short situational conversations, self introduction, short talks.

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 3BVCGEC2 & 3BVCGEC7

Applied Computer Skill-III

Theory

- 1) MIS- Systems approach, characteristics, types of systems; Elements-input, output, environment, Boundary Interface, Feedback, and control.
- 2) System Life Cycle; MIS, TPS, OAS, DSS, KWS, Value of information, information life cycle, data vs information, Components of MIS, characteristics of MIS.
- 3) System Analysis & Design: System development life cycle, modeling the required system.
- 4) E-R diagrams, ELHs, ECDs, user view of processing, modeling input output data.

Practical – Practical based on above chapter.

Reference books:

- 1) Microsoft Office – 2008- Gini Courter, Annette Marquis BPB
- 2) IT Today (Encyclopedia) –S. Jaiswal
- 3) A First Course In Computers – Sanjay Saxena
- 4) First Text book on Information Technology – Shrikant Patnaik.



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SUBJECT CODE: 3BVCSEC3 & 3BVCSEC8

Title: ^{Nail} Skin Care Service-III ^{II}

Qualification Pack- BWS/Q0105; BWS/N401

National Occupational Standards- ¹⁰⁴ BWS/N9002

Theory

Unit 1: Pedicure & Manicure: requirement, procedure, massage, varnishing, and application of false nails, electric manicure.

Unit 2: Product Study of Manicure- Formulations and Evaluation

Unit 3: Product Study of Pedicure- Formulations and Evaluation

Unit 4: Safety of Cosmetics: Basic concept of cosmetics safety, safety test items & evaluation method: Skin irritation, Sensitization, Testing on Human (Patch test, usage test).

Nail Enhancement and overlay using liquid and powder (acrylic), and UV gels, Refilling, Gel polish application, Electric filling, Nail art, (Theory + Practical)

Practical

- 1) Perform nail care treatment
- 2) Perform foot care treatment.
- 3) Preparation of manicure products like nail lacquer, cuticle cream, nail paint remover etc.
- 4) Preparation of foot care products.
- 5) Evaluation of cosmetic products.

Different kinds of eye makeup, Bridal makeup, Camouflaging, Corrective makeup, Draping (Dupatta, saree, etc.)

Reference books:

- 1) Formulation manufacturing & quality control by P. P. Sharma
- 2) Harry's cosmetology
- 3) Modern cosmetics by E.J. Thomson
- 4) Cosmetic science and Technology by Sagarin.
- 5) Remington's Pharmaceutical Practices.
- 6) The pharmacopoeia of India

SUBJECT CODE: 3BVCSEC4 & 3BVCSEC9

Title: Hair Care Service-III

Qualification Pack-BWS/~~N0210~~ 203

National Occupational Standards- BWS/N0201, BWS/N0202, BWS/N0206

Theory

Unit 1: Detail study of products used in hair spa- formulation and evaluation ✓

Unit 2: Different types of shampoo and manufacturing process of shampoo. ✓

Unit 3: Principle of conditioner, different types of conditioner and evaluation of conditioner.

Unit 4: Detail study of tools and equipments used for blow drying, hair styling and dressing, hair straightening and perming.

Head Massage, Semi-permanent waving

Practical:

- 1) Preparation of hair spa products
- 2) Preparation of different types of shampoo.
- 3) Preparation of conditioner.
- 4) Study of tools and equipments (Regarding unit 4).

Sem 3 & 4, and it is subjected to change as we are in the process of finalization.
Smiley



Principal

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VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

Reference books:

- 1) Formulation manufacturing & quality control by P. P. Sharma
- 2) Harry's cosmetology
- 3) Modern cosmetics by E.J. Thomson
- 4) Cosmetic science and Technology by Sagarin.
- 5) Remington's Pharmaceutical Practices.
- 6) The pharmacopoeia of India

SUBJECT CODE: 3BVCSEC5 & 3BVCSEC10**Title: Aesthetic Dermatology-H** *Skin Care Services - III*Qualification Pack-BWS/0503 *20104*

National Occupational Standards- BWS/N0110, BWS/N0108

Theory**Unit 1:** Micro-dermabrasion: principal, objective, methodology, and advantages.**Unit 2:** Epilation and depilation: definition of epilation and depilation, difference between epilation and depilation, and concepts of both.**Unit 3:** Epilation techniques and equipments and products used, and advantages of epilation**Unit 4:** Study of causes of hair growth and growth patterns, study of depilatory products.**Practical:**

- 1) Study of micro-dermabrasion.
- 2) Perform micro-dermabrasion on skin.
- 3) Perform epilation methods.
- 4) Preparation of depilatories.
- 5) Application of depilatories.

Reference books:

- 1) A complete book on beauty, body, makeup and hair styles by Parvesh Handa
- 2) Meladay's cosmetics
- 3) Indu Puri- Beauty and Skin Care
- 4) Gaynor Winyard- a guide for health & beauty therapist
- 5) Rama Bams- Health & Beauty
- 6) Marry Healy

SUBJECT CODE: 3BVCSEC11**Field Work/Industrial Visit**

Visit to any cosmetic manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.



A handwritten signature in black ink, appearing to read "M. B. Sawant".

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AMRAVATI

Syllabus Prescribed for Cosmetic Technology

B.Voc. Part-II (Vocation)

Semester-IV

SUBJECT CODE: 4BVCGEC1 & 4BVCGEC6

English and Communication Skill-IV

Theory

- 1) Grammar: use of modal auxiliaries, use of passive voice.
- 2) Writing: summarizing articles and passages, writing short reviews.
- 3) Vocabulary: synonyms, antonyms, idioms and phrases, converting idiomatic into plain English and vice versa.
- 4) Communication Skills: group discussion, short presentations.

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 4BVCGEC2 & 4BVCGEC7

Soft Skill Development-I

Theory

- 1) Introduction to business communication, introduction to sound system of English, introduction to effective writing, non verbal communication.
- 2) The self concept, self management techniques. Self image and self esteem, building self confidence, personal planning and success attitude, creating the master plan, active positive visualization and positive attitude, spot analysis.
- 3) Self motivation & communication: levels of motivation, power of irresistible enthusiasm, etiquettes and manners in a group, public speaking oral and written communication, body language, importance of listening and responding, types for technical writing.
- 4) Etiquettes: office etiquettes, email etiquettes, telephone etiquettes, goal setting and time managements

Team dynamics: introduction to team work, working in teams, personal attitude, conflicts and its resolutions, assertiveness, diversities, role of career planning in personality development, how to face personal interviews and group discussion.

Note:

Self paced learning

Industry awareness

Assignments and discussions.

Practical – Practical based on above chapter.

Recommended books:

- 1) Personality development by Rajiv K. Mishra



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SUBJECT CODE: 4BVCSEC3 & 4BVCSEC8

Title: Skin Care Service-IV

Qualification Pack- BWS/Q0105

National Occupational Standards- BWS/N0107, BWS/N106

Theory

Unit 1: Facial Electrotherapy – principle, objectives, techniques and methods, and advantages.

Unit 2: Study of face packs and masks – objectives, types and applications.

Unit 3: Study of skin toners and astringents.

Unit 4: Color Cosmetics- lip care cosmetics, foundation (types and formulation study).

Practical

- 1) Study of electrotherapy
- 2) Perform Electrotherapy
- 3) Preparation of different types of face packs and masks
- 4) Preparation of skin toners and astringent.
- 5) Preparation of lip care products.
- 6) Preparation of foundations.

Reference books:

- 1) Formulation manufacturing & quality control by P. P. Sharma
- 2) Harry's cosmetology
- 3) Modern cosmetics by E.J. Thomson
- 4) Cosmetic science and Technology by Sagarin.
- 5) Remington's Pharmaceutical Practices.
- 6) The pharmacopoeia of India

SUBJECT CODE: 4BVCSEC4 & 4BVCSEC9

Title: Spa Services → Sem 5.

Qualification Pack- BWS/Q1004

National Occupational Standards- BWS/N1004

Theory

Unit 1: History, objectives, advantages and types of Spa.

Unit 2: Study of basic ailments, contraindications, contra actions, treatment plans.

Unit 3: Study of different spa techniques (range of body massages, wraps etc.)

Unit 4: Range of spa products, procedure for product selection, different skin types and application of products based on skin types.

Practical:

- 1) Preparations of different range of spa products.
- 2) Perform different spa techniques.
- 3) Study of spa equipments.

Reference books:

- 1) Formulation manufacturing & quality control by P. P. Sharma
- 2) Harry's cosmetology
- 3) Modern cosmetics by E.J. Thomson
- 4) Cosmetic science and Technology by Sagarin.
- 5) Remington's Pharmaceutical Practices.
- 6) The pharmacopoeia of India

Haircare Services

chemical composition of hair, Hair analysis, Hair growth, Hair loss, Hair & scalp disorders, Principles of hair dressing, Hair designing as per facial structure, cutting curly, steps, fringes, layering and different cutting techniques, wet hair styling, curls - roller curls, chemical texture services for hair structure, structure, Semi-permanent waving, Permanent waving, Hair colouring - Colour theory, Types, Application procedure, Root touch up, Male hair colour, Global hair colour, Pre and Post treatment.



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SUBJECT CODE: 4BVCSEC5 & 4BVCSEC10

Title: Aesthetic Dermatology-III II

Qualification Pack-BWS/0503

National Occupational Standards- BWS/N0111, BWS/N0113, BWS/N0119

Theory

Unit 1: Cosmetic Skin Peel treatments- Principle, objectives, techniques and advantages.

Unit 2: Study of concept of Pigmentation and Depigmentation.

Unit 3: Study of various methods used for Depigmentation.

Unit 4: Laser and Light Treatments for hair removal and skin rejuvenation.

Practical:

- 1) Perform skin peel treatment
- 2) Perform micro pigmentation
- 3) Perform depigmenting methods.
- 4) Perform laser and light treatments for skin rejuvenation.

Reference books:

- 1) Formulation manufacturing & quality control by P. P. Sharma
- 2) Harry's cosmetology
- 3) Modern cosmetics by E.J. Thomson
- 4) Cosmetic science and Technology by Sagarin.
- 5) Remington's Pharmaceutical Practices.
- 6) The pharmacopoeia of India

SUBJECT CODE: 4BVCSEC11

Field Work/Industrial Visit

Visit to any cosmetic manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.



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VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI

To: vm126@srbau.ac.in



विश्वविद्यालय अनुदान आयोग
UNIVERSITY GRANTS COMMISSION
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बहादुर शाह ज़फर मार्ग, नई दिल्ली: - ११० ००२
BAHADUR SHAH ZAFAR MARG, NEW DELHI - 110 002
Email: ccsection012@gmail.com Phone: 011-23604284



F. No. 1-25/2018 (NSQF)/589

Date: 30/07/2019

Dr P S Yenkar

Vidya Bharati Mahavidyalaya, Amravati

Sir/Madam,

I am directed to convey the approval of the University Grants Commission (UGC) for offering the following programmes/courses for the academic session 2019-2020:

S.No.	Name of the Programme	Specialization
1	BVoc_Degree_Programme	Software Development

The Institution must adhere to the following guidelines:

1. The Institutions must adhere to relevant UGC guidelines as amended from time to time.
2. The Skill Component should be aligned to National Skill Qualification Framework in terms of Qualification Packs (QPs) and National Occupational Standards (NOSs) of Sector Skill Council.
3. The Institution may admit upto a maximum of 50 students per course in Certificate, Diploma, Advanced Diploma and B.Voc programmes; and upto a maximum of 20 students per course in M.Voc and PG Diploma programmes.
4. The Institutions will not run the courses on online/distance education mode and through franchise arrangements.
5. On commencement of the course/programme, details of the students admitted must be uploaded on the www.ugc.aicte-india.org portal at the earliest.

NOTE: Kindly login to the portal & download the approval letter.

With regards,


PRINCIPAL
VIDYA BHARATI MAHAVIDYALAYA
AMRAVATI




Dr. Mriganka Sekhar Sarma
(Education Officer)

General Provisions and Summary of Teaching and Examination Scheme

For B. Voc. (Software Development) course the following provisions should be made-

1. Credits awards should be as under-

Semester	Credits for-		Total credits	Exit point/ Award	NSQF Level
	General Education Component	Skill Education Component			
Semester – I	12	18	30	Certificate	4
Semester - II	12	18	60	Diploma	5
Semester – III	12	18	90	----	
Semester – IV	12	18	120	Advance Diploma	6
Semester – V	12	18	150	----	
Semester - VI	12	18	180	B.Voc.	7

2. Teaching & Examination Scheme Summary.

Semester	Teaching Scheme (hours per week)		Total	Examination Scheme		
	Theory	Practical/ Field Work		External Marks (Max.)	Internal Marks (Min.)	Total Marks
Semester – I	14	34	48	325	225	550
Semester - II	14	34	48	325	225	550
Semester – III	14	34	48	325	225	550
Semester – IV	14	34	48	325	225	550
Semester – V	12	18	30	335	215	550
Semester - VI	12	18	30	335	215	550
Total	80	172	252	1970	1330	3300

3. Eligibility for admission:

- a. Should have passed H. Sc. examination of Maharashtra State Board of Secondary Education or any Equivalent examination .
- b. Any qualifying NSQF level as decided by Information Technology IT-ITeS Sector Skill Council from time to time.

4. Teaching faculty qualification:

- a. M.Sc. (Computer Science) or MCA or Ph.D. in Computer Science.
- b. Any other qualification as recommended by the UGC.

5. Other ordinary provisions for B. Voc. under direction no. 14/2016 and 18/2016 shall apply for this course.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

B. Voc. (Software Development) SEMESTER- I

EXIT POINT/AWARD: CERTIFICATE (NSQF LEVEL 4)

General Education Component Credits: 12

Skill Development Component Credits:

18

Appendix-A

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	IBVCGEC1	English & Communication Skills-I	3	-	3	3	3	40	10	50	20	-
2	IBVCGEC2	Applied Computer Skills-I	3	-	3	3	3	40	10	50	20	-
3	IBVCSEC3	Computer Fundamentals	3	-	3	3	3	40	10	50	20	-
4	IBVCSEC4	Programming in 'C'	2	-	2	3	3	40	10	50	20	-
5	IBVCSEC5	DBMS & SQL	3	-	3	3	3	40	10	50	20	-
6	IBVCGEC6	English & Communication Skills-I: LAB	-	6	6	3	2	25	25	50	-	20
7	IBVCGEC7	Applied Computer Skills-I: LAB	-	6	6	3	2	25	25	50	-	20
8	IBVCSEC8	Computer Fundamentals-LAB	-	6	6	3	3	25	25	50	-	20
9	IBVCSEC9	Programming in 'C'-LAB	-	6	6	2	3	25	25	50	-	20
10	IBVCSEC10	DBMS & SQL-LAB	-	6	6	2	3	25	25	50	-	20
11	IBVCSEC11	Field work/industrial visit 240 hrs	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

1. Th: Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by IT-ITeS Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 4**.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

B. Voc. (Software Development) SEMESTER- II

EXIT POINT/AWARD: DIPLOMA (NSQF LEVEL 5)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-B

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	2BVCGEC1	English & Communication Skills-II	3	-	3	3	3	40	10	50	20	-
2	2BVCGEC2	Applied Computer Skills-II	3	-	3	3	3	40	10	50	20	-
3	2BVCSEC3	Operating System Concept & LINUX	3	-	3	3	3	40	10	50	20	-
4	2BVCSEC4	Object Oriented Programming Using C++	2	-	2	3	3	40	10	50	20	-
5	2BVCSEC5	Core Java	3	-	3	3	3	40	10	50	20	-
6	2BVCGEC6	English & Communication Skills-II:LAB	-	6	6	3	2	25	25	50	-	20
7	2BVCGEC7	Applied Computer Skills-LAB	-	6	6	3	2	25	25	50	-	20
8	2BVCSEC8	Operating System Concept & LINUX-LAB	-	6	6	3	3	25	25	50	-	20
9	2BVCSEC9	Object Oriented Programming Using C++ - LAB	-	6	6	2	3	25	25	50	-	20
10	2BVCSEC10	Core Java -LAB	-	6	6	2	3	25	25	50	-	20
11	2BVCSEC11	Field work/industrial visit 240 hrs	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by IT-ITeS Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 5**

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

B. Voc. (Software Development) SEMESTER- III

EXIT POINT/AWARD: ADVANCE DIPLOMA (NSQF LEVEL 6)

General Education Component Credits: 12

Skill Development Component Credits: 18

Appendix-B

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	3BVCGEC1	English & Communication Skills-III	3	-	3	3	3	40	10	50	20	-
2	3BVCGEC2	Applied Computer Skills-III	3	-	3	3	3	40	10	50	20	-
3	3BVCSEC3	Software Engineering	3	-	3	3	3	40	10	50	20	-
4	3BVCSEC4	Data Structure	2	-	2	3	3	40	10	50	20	-
5	3BVCSEC5	Php, JQuery & Bootstrap	3	-	3	3	3	40	10	50	20	-
6	3BVCGEC6	English & Communication Skills-III:LAB	-	6	6	3	2	25	25	50	-	20
7	3BVCGEC7	Applied Computer Skills-III:LAB	-	6	6	3	2	25	25	50	-	20
8	3BVCSEC8	Software Engineering-LAB	-	6	6	3	3	25	25	50	-	20
9	3BVCSEC9	Data Structure-LAB	-	6	6	2	3	25	25	50	-	20
10	3BVCSEC10	Php, JQuery & Bootstrap-LAB	-	6	6	2	3	25	25	50	-	20
11	3BVCSEC11	Field work/industrial visit	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by IT-ITeS Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 6**.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

B. Voc. (Software Development) SEMESTER- IV

EXIT POINT/AWARD: ADVANCE DIPLOMA (NSQF LEVEL 6)

General Education Component Credits: 12

Skill Development Component

Credits: 18 Appendix-D

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	4BVCGEC1	English & Communication Skills-IV	3	-	3	3	3	40	10	50	20	-
2	4BVCGEC2	Soft Skill Development-I	3	-	3	3	3	40	10	50	20	-
3	4BVCSEC3	System Analysis & Design	3	-	3	3	3	40	10	50	20	-
4	4BVCSEC4	Web Designing Using HTML	2	-	2	3	3	40	10	50	20	-
5	4BVCSEC5	Computer Graphics	3	-	3	3	3	40	10	50	20	-
6	4BVCGEC6	English & Communication Skills-IV:LAB	-	6	6	3	2	25	25	50	-	20
7	4BVCGEC7	Soft Skill Development-I:LAB	-	6	6	3	2	25	25	50	-	20
8	4BVCSEC8	System Analysis & Design-LAB	-	6	6	3	3	25	25	50	-	20
9	4BVCSEC9	Web Designing Using HTML-LAB	-	6	6	2	3	25	25	50	-	20
10	4BVCSEC10	Computer Graphics-LAB	-	6	6	2	3	25	25	50	-	20
11	4BVCSEC11	Field work/industrial visit	-	4	4	2		-	50	50	-	20
Total			14	34	48	30		325	225	550	100	120

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by IT-ITeS Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 6**.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),
Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

B. Voc. (Software Development) SEMESTER- V

EXIT POINT/AWARD: B. Voc. Degree (NSQF LEVEL 7)

General Education Component Credits: 12

**Skill Development Component
Credits:18 Appendix-E**

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	5BVCGEC1	English & Communication Skills-V	3	-	3	3	3	40	10	50	20	-
2	5BVCGEC2	Soft Skill Development-II	3	-	3	3	3	40	10	50	20	-
3	5BVCSEC3	Programming in Visual Basic	3	-	3	3	3	40	10	50	20	-
4	5BVCSEC4	Software Testing	3	-	3	3	3	40	10	50	20	-
5	5BVCGEC5	English & Communication Skills-V:LAB	-	3	3	3	2	25	25	50	-	20
6	5BVCGEC6	Soft Skill Development-II:LAB	-	3	3	3	2	25	25	50	-	20
7	5BVCSEC7	Programming in Visual Basic-LAB	-	4	4	4	3	25	25	50	-	20
8	5BVCSEC8	Software Testing-LAB	-	4	4	4	3	25	25	50	-	20
9	5BVCSEC9	Seminar & Project Phase-I	-	4	4	4	3	75	75	150	-	60
		Total	12	18	30	30		335	215	550	80	140

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Model curriculum prepared by IT-ITeS Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 7**.
4. Project shall be evaluated through project document, presentation, case study and viva-voce.

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI.

Teaching & Examination Scheme

Certificate (One Semester), Diploma (Two Semesters), Advanced Diploma (Four Semesters),

Bachelor of Vocation (Six Semesters) (Three Years Degree Course: Semester Pattern)

B. Voc. (Software Development) SEMESTER- VI

EXIT POINT/AWARD: B. Voc. Degree (NSQF LEVEL 7)

General Education Component Credits: 12

Skill Development Component

Credits: 18

Appendix-F

Sr. No	Subject code	Subject Title	Teaching Scheme (Hrs/Week)			Credits	Examination Scheme					
			Th.	Pr/ FW	Total		Duration (Hrs)	Max. Marks		Total Marks	Minimum Passing Marks	
								External Marks	Internal Marks (IA)		Th.	Pr.
1	6BVCGEC1	Industrial Organization & Management	3	-	3	3	3	40	10	50	20	-
2	6BVCGEC2	Soft Skill Development-III	3	-	3	3	3	40	10	50	20	-
3	6BVCSEC3	Asp. Net with C#	3	-	3	3	3	40	10	50	20	-
4	6BVCSEC4	Python Programming and Data Structures	3	-	3	3	3	40	10	50	20	-
5	6BVCGEC5	Industrial Organization & Management-LAB	-	3	3	3	2	25	25	50	-	20
6	6BVCGEC6	Soft Skill Development-III-LAB	-	3	3	3	2	25	25	50	-	20
7	6BVCSEC7	Asp. Net with C#-LAB	-	4	4	4	3	25	25	50	-	20
8	6BVCSEC8	Python Programming and Data Structures - LAB	-	4	4	4	3	25	25	50	-	20
9	6BVCSEC9	Project Phase-II	-	4	4	4	3	75	75	150	-	60
Total			12	18	30	30		335	215	550	80	140

Notes:

1. Th : Theory; Pr: Practical; WS: Workshop, LAB: Laboratory, FW: Field Work, IA: Internal Assessment, BVC: B.Voc., GEC: General Education Component, SEC: Skill Education Component.
2. One credit would mean equivalent of 1 periods of 1 hour duration/week/semester for theory & 2 periods of 1 hour duration each /week/semester for Practical/Lab Work/ Field Work.
3. Project shall be evaluated through project document, presentation, case study and viva-voce.
4. In house /Institute Level Theory and Practical shall be of Eight Week duration, for Semester VI.
5. Model curriculum prepared by IT-ITeS Sector Skill Council with relevant National Occupation Standards is adopted for **LEVEL 7**.

Syllabus Prescribed for B.Voc. Software Development:

Semester-I

SUBJECT CODE: 1BVCGEC1 & 1BVCGEC6

English and Communication Skill-I

Theory

- 1) Revisiting English Grammar: articles, prepositions, adjectives.
- 2) Written communication : letter writing (customer complaints, general complaints, seeking information, placing orders).
- 3) Reading skills: scanning and skimming, reading comprehension, summarizing.
- 4) Communication skills: language functions (greeting, taking leave, thanking, apologizing, introducing self).

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 1BVCGEC2 & 1BVCGEC7

Applied Computer Skill-I

Theory

- 1) Word Processing : Introduction, starting word, creating document, structure of MS-word window and its application, mouse and keyboard operations, designing document; formatting-selection, cut, copy, paste, toolbars, operating on text; printing, saving, opening, closing of document; creating a template.
- 2) Tables, borders, textbook operations; spelling and grammar check, mail merge, envelope and label, protection of document, change the view of document.
- 3) PowerPoint Presentation – working with PowerPoint window, standard toolbar, formatting toolbar, drawing toolbar, moving the frame, inserting clip art, picture, slide; text styling, send to back.
- 4) Entering data to graph, organization chart, table, design template, master slide, animation setting, saving and presentation, auto content wizard, package for CD (Pack & Go Feature).

Practical – Practical based on above chapter.

Reference books:

- 1) Information technology concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.]
- 2) Fundamentals of Information Technology by Alexis and Mathews Leon [Leon Press; Chennai & Vikas Publishing House Pvt. Ltd, New Delhi]
- 3) Computer Fundamentals by P.K.Sinha.

SUBJECT CODE: 1BVCSEC3 & 1BVCSEC8

Title: Computer Fundamentals

Junior Software Developer

Qualification Pack- Ref. QP: SSC/Q0508

UNIT - I: Basic Components of Digital Computers: Block Diagram, Types: Digital, Analog, Hybrid Bus: Data, Control and Address Bus.

Number Systems: Binary, Octal, Decimal, Hexa Decimal, Their Conversions, Binary Arithmetic, ASCII, BCD, EBCDIC.

Generation of Languages: Machine, Assembly, High Level Languages.

Translators: Compiler, Interpreter and Assembler, Source and Object Program.

UNIT - II: Memory: Static & dynamic, RAM, ROM, PROM, EPROM, EEPROM, flash and Cache.

Storage Devices: Hard Disk, Zip Disk and Optical Disk, Pen Drive, Blu Ray.

Input Devices: Light Pen, Touch Screen, Voice Input, MICR, OCR, OMR, Barcode Reader and Flatbed Scanner.

Output Devices: VDU, Printers: Dot Matrix, Laser and Inkjet. Plotters: Drum, Flat-Bed and Inkjet.

UNIT - III: Network: Network terminology, Topologies: Linear, Circular, Tree and Mesh.

Types of Networks: LAN, WAN, MAN. Repeaters, Bridge, Routers, B routers and Gateway. Modem for Communication between pc's, wi-fi network, Introduction of Bluetooth and Infrared devices. Network Protocols. Architecture : Peer-to-Peer, Client/Server.

UNIT - IV: DOS AND WINDOWS OPERATING SYSTEMS:

Introduction to OS, functions and classification Dos: warm booting & cold booting, types of commands, command format, directory, file management, disk management and general commands, file naming conventions, dos editor, batch file.

WINDOWS OS: Introduction, features

MODULES : Program, File and Print Managers, Control Panel, Icons, switching between applications, running MSDos application , Help and Recycle bin.

Windows accessories : Note pad, Paint and Calculator.

Practical:-

1. Case Study on Block Diagram of Computers.
2. Case Study on Different Types of Number System.
3. Case Study on Various Conversion Techniques in Number System.
4. Case Study on ASCII, BCD, & EBCDIC Code.
5. Case Study On Types of Memory.
6. Case Study on Operating System and its objectives.
7. Case Study on Difference between DOS and Windows Operating System.
8. Case Study on Internet Protocol.
9. Case Study on types on Network.

Reference Books:

1. Information technology concepts by Dr. Madhulika Jain, Shashank & Satish Jain, [BPB Publication, New Delhi.]
2. Fundamentals of Information Technology By Alexis And Mathews Leon [Leon Press, Chennai & Vikas Publishing House Pvt Ltd, New Delhi]
3. Computer Fundamentals by P. K. Sinha

SUBJECT CODE: 1BVCSEC4 & 1BVCSEC9

Title: Programming in 'C'

Junior Software Developer

Qualification Pack- Ref. QP: SSC/Q0508

UNIT- I:

Programming Structure: Sequence, Selection, Iteration and Modular.

Problem Solving techniques: Development Tools: Algorithm, Flowcharts and Pseudo code (Definition and its characteristics) Developing Algorithm and Drawing flowcharts.

UNIT- II :

C Character set, Tokens, Identifier, Keywords, Variables, Data types, Operators and Expressions, Constants, Character Strings, Enumerated Data Types, Operator Precedence and Associativity. Library functions, Control Structure.

UNIT- III:

Arrays: Single and Two Dimensional Array.

Strings: Strings Manipulation, Arrays of Strings.

Functions: Function Components, Parameter Passing, Default Arguments, Recursive Functions, Arrays with Functions, Storage Classes.

UNIT- IV:

Structure: Declaration, Accessing structure members, Initialization, Nesting of Structures.

Union: Unions, Differences between Structure and Union

Pointer: Introduction, Address Operator (&), Pointer variables, Void Pointers, Pointer Arithmetic, Pointers to Pointers.

File handling: Hierarchy of FileStream Classes, Opening & closing a file, File Modes, File pointers and their manipulations, Sequential Access, Random Access, Command Line arguments.

Practical:-

1. Write a program in 'C' in C to print hello world.
2. Write a program in 'C' to print your name.
3. Write a program in 'C' to add and subtract two numbers.
4. Write a program to perform multiplication and division.
5. Write a program in 'C' to check person eligible for vote or not.
6. Write a program in 'C' Print 1 to 10 numbers using while loop.
7. Write a program in 'C' factorial of no using for loop.
8. Write a program to display two dimensional array.

Reference Books:

1. The Art of programming through flowcharts & algorithm by Anil B. Chaudhari Firewall Media, Laxmi publication, New Publication.
2. Programming in C by E. Balagurusamy TMH Publications.
3. C Programming - Kernighen and Ritchie
4. Let us C – Y. Kanetkar.

SUBJECT CODE: 1BVCSEC5 & 1BVCSEC10

Title: DBMS & ORACLE

Junior Software Developer

Qualification Pack- Ref. QP: SSC/Q0508

Unit – I: Database environment, data processing, Database system, types of database: centralize, distributed, Database management system, components of DBMS, DBMS elements, Database approach – objectives, benefits, characteristics, advantages of DBMS, Three level architecture, database administration – Roles, functions and responsibilities of DBA.

UNIT – II: Data models- E-R model, Logical and physical database development life cycle, Integrity constrains, Transforming ERR diagram into relations, tree structure and hierarchical. Normalization, codd's 12 rules, hierarchical database structure, network database structure, Relational database structure, RDBMS.

UNIT – III: Introduction to ORACLE as RDBMS, History & standardization of SQL elements

SQL: Database objects, reserved words, keywords, variables, Data types, operators.

Types of SQL: DDL, DML, DCL.

Functions: Arithmetic & characters comparison, logical set like function, Group function, Data Functions.

UNIT – IV: PL/SQL : Introduction to PL/SQL, Variables, Initialization of variables, Dynamic data types, Control loop statements.

PL/SQL Cursor: Declare Cursor, Fetch, Open Cursor, Close Cursor.

Triggers: Trigger definition, trigger type, enabling, disabling & dropping triggers.

Practical:-

1. Perform a query to create a table with three column named as id, name and city and describe the structure.
2. Perform in SQL to create a table with two columns ID, NAME . Add a column mobile_no in the table and describe its structure
3. Perform in SQL to create a table with the columns ID, NAME and CITY and modify the size of the column CITY to 50 characters. Describe its structure after the modification.

4. Perform in SQL to create a table with at least three columns , add minimum five records in a table .
5. Perform in SQL to create a table with four columns named as ORACLE . And rename the table as WORKPLACE.
6. Perform in SQL to create a table with four column named as id,name,city and salary and delete the entire table using DROP command.
7. Perform in SQL to create a table with the following column roll no,name, marks,city. Add three records into the table. And update the marks column entries with 85 marks.
8. Perform in SQL to create a table with two columns named as id, name. Add three records and delete third record from the table.
9. Perform in SQL to select only the job column (entries) from the emp table. And then display all the records using SELECT command.
10. Perform in SQL to select sum of all employees salary from emp table.
11. Perform in SQL to select average of all employees salary from emp table.
12. Perform in PL/SQL to add two numbers.
13. Perform in PL//SQL to find factorial of a number.

Reference Books:

- a. Data Base System Concepts By A SilbersChatz By Henry Korth And S.Sudarshan [Mcgraw-Hill ltd. New Delhi] 3rd Edition.
- b. Introduction to Data Base Management by NAVEEN PRAKASH [Tata McGrawHill ltd.]
- c. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.
- d. Raghu Ramakrishnan & Johannes Gerhrke, "Data Base Management Systems", Mc Graw Hill International Edition, 2000
- e. Muzumdar, Introduction to Database Management Systems. TMH
- f. Understanding ORACLE By Ivan Bayross [BPB Publication]
- g. Database System Using Oracle: A Simplified Guide to SQL & PL-SQL: Nilesh Shah, PHI Publication.
- h. Database Management Systems (Complete practical approach) by Sharad Maheshwari & Ruchin Jain, Firewall media
- i. Dr. P.S.Deshpande SQL & PL/SQL for Oracle 10g Black Book
- j. Scott Urman Programming PL/SQL TMH

SUBJECT CODE: 1BVCSEC11
Field Work/Industrial Visit

Visit to any IT industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.

Syllabus Prescribed for B.Voc. Software Development:

Semester-II

SUBJECT CODE: 2BVCGEC1 & 2BVCGEC6

English and Communication Skill-II

Theory

- 1) Revisiting English Grammar: modal auxiliaries, adverbs and adverbial phrases.
- 2) Written communication: job applications, resumes, responding to advertisements.
- 3) Reading skills: note making, distinguishing facts from beliefs, opinions.
- 4) Communication skills: language functions (asking for information, requesting, agreeing and disagreeing, complimenting and responding to compliments)

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 2BVCGEC2 & 2BVCGEC7

Applied Computer Skill-II

Theory

- 1) Introduction to MS-Excel: Navigating, excel toolbars and operations, formatting features-copying data between Worksheets; entering and editing cell entries, creation of charts, editing and formatting charts.
- 2) Goal seek, auditing, linking, Workbook, Database in Excel (Auto Filter, Advanced filter, sort form), Mathematical, statistical and financial functions in MS-Excel.
- 3) MS-Access: Introduction to database management system, DBMS vs RDBMS
- 4) Database Administrator (DBA) and its role.

Practical – Practical based on above chapter.

Reference books:

1. Database system concepts by A. Silbers Chatz by Henry Korth and S. Sudarshan [Mcgraw-hill ltd. New Delhi] 3rd edition.
2. Introduction to data base management by Naveen Prakash [Tata McGraw-Hill]
3. Bipin C. Desai, An Introduction to Database Systems, Galgotia Publications.
4. Raghu Ramkrishnan & Johannes Gerhrke, "Data Base Management Systems", Mc Graw Hill International Edition 2000.

SUBJECT CODE: 2BVCSEC3 & 2BVCSEC8

Title: OPERATING SYSTEM CONCEPTS & LINUX

Web Developer

Qualification Pack- Ref. QP: SSC/Q0503

UNIT- I: Structure of Operating System, Operating System functions,

Process Management: Process states, Creation, Termination, Operations on Process, Concurrent process, Processes Threads, Multithreading, Micro Kernels

Memory Management: Logical Vs. Physical Address Space, Memory Management Requirement

Memory Allocation Method: Single Partition allocation, Multiple Partitions, Compaction, paging, segmentation, Segmentation with paging

UNIT- II: I/O Management: I/O hardware, I/O Buffering, Disk I/O, Raid, Disk Cache.

File Management: File Management system, File Accessing Methods, File Directories, File Allocation Methods, File Space Management, Disk Space Management.

UNIT- III : Introduction: Logging In and Logging Out, Anatomy of Linux OS, Directory Structure, Directory, File Types.

Commands: Basic Syntax for a command, Home Directory, ls, mkdir, rmdir, stat, cat, rm, mv, cp.

Editor: Vi editor.

System: Simple Backup, gzip, gunzip, tar.

UNIT- IV: Working with Processes: Types of processes, Command, Creating process, killing process, free command and top utility.

Managing Disk Space: df, du commands, Creating Additional Free Disk Space, Locating Unused Files, Setting System Clock.

Communication Utilities: who, who am i, finger, mesg, write, wall, talk.

Practical:

1. Case Study Structure of Operating System.
2. Case Study various Functions of Operating System.
3. Case Study various Process States of Operating System.
4. Case Study File Management of Operating System.
5. Case Study various Types of Process in Operating System.
6. Case Study Communication Utilities of Operating System.
7. Case Study on Memory Management Techniques.
8. Case Study on LINUX Operating System.
9. Case Study on any Disk Scheduling Algorithms.

Reference Books:

1. Operating Systems by P. Balakrishna Prasad [Scitech Publication]
2. Operating System Concept : Silbershaz (Addision Education)
3. Operating Systems - H.M. Deitel - Addision Wesley.
4. Operating Systems- John J. Donoven.
5. Operating System : A.S.Godbole (TMH)
6. Modern Operating Systems : Tenenenbaum (Pearson Education)
7. Operating System : Peterson.
8. SAMS Teach Yourself Linux by Craig and Coletta Witherspoon [Techmedia]
9. LINUX complete reference by Richard Peterson

SUBJECT CODE: 2BVCSEC4 & 2BVCSEC9

Title: OBJECT ORIENTED PROGRAMMING USING 'C++'

Web Developer

Qualification Pack- Ref. QP: SSC/Q0503

UNIT - I: Object Oriented Methodology: Elements of Object Oriented programming, Objects, Classes, OOPs features.

Classes & Objects: Specifying a Class, Creating Objects, Accessing Class members, Defining member function, Outside Member Functions as inline, Accessing Member Functions within the class, Static data member, Access Specifiers: Private, Protected and Public Members.

UNIT - II: CONSTRUCTORS & DESTRUCTORS: Introduction, Parameterized Constructors, Constructor Overloading, Constructors with Default Arguments, Copy Constructor, Destructor, Order of Construction and Destruction, Static data members with Constructor and Destructors.

OPERATOR OVERLOADING: Definition, Overloadable Operators, Unary Operator Overloading, Unary & Binary overloading, Rules for Operators Overloading.

UNIT - III: DYNAMIC OBJECTS: Pointers to Objects, Creating and Deleting Dynamic Objects: New and Delete operators, Array of Objects, Array of Pointers to Objects, Pointers to Object Members, this Pointer.

INHERITANCE: Defining, Abstract classes, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Constructor and Destructor in Derived Classes.

UNIT - IV: VIRTUAL FUNCTIONS: Need for Virtual Functions, definition, Pure Virtual Functions, Abstract Classes, Rules for Virtual Functions.

EXCEPTION HANDLING: Exception Handling Model, List of Exceptions, Handling Uncaught Exceptions, Fault Tolerant Design Techniques, Memory Allocation Failure Exception, Rules for Handling Exception Successfully.

Practical's :-

1. Write a program in C++ to sort array in ascending order.
2. Write a program in C++ for interchange of two numbers.
3. Write a friend function for adding the two complex numbers, using a single class.
4. Write a program in C++ to Overload the operator unary (-) for demonstrating operator overloading.
5. Design a class for multiple inheritances
6. Write a program in C++ Show the use of virtual function
7. Show the implementation of exception handling.
8. Design the template class library for concatenating two strings.
9. Read the two arrays from the user and merge them and display the elements in sorted order.
10. Write a program to perform the Matrix addition, Multiplication and Transpose Operation.

Reference Books:

1. Mastering C++ by K R Venugopal Tata McGraw-Hill , New Delhi.
2. The C++ Programming Language –Bjarne Stroustrup
3. Programming with C++ - Ravichandran
4. Programming with C++ - Robert Lafore
5. Object Oriented Programming with C++ by E. Balagurusamy, McGraw Hill

SUBJECT CODE: 2BVCSEC5 & 2BVCSEC10

Title: Core Java

Web Developer
Qualification Pack- Ref. QP: SSC/Q0503

Unit I:-

Introduction :History of Java, Java features, different types of Java programs, Differentiate Java with C and C++, JVM, JIT and JRE.

Java Basics :Variables and data types, declaring variables, literals:-numeric, Boolean, character and string literals, keywords, type conversion and casting. Standard default values.

Unit II:-

Java Operators :Arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise, precedence and order of evaluation, statement and expressions, string arithmetic.

Loops and Controls :Control statements for decision making :- select statements (if statement, if ... else ... statement, if Else ... if ...statement, switch statement), goto statement, looping (while loop, do ... while loop and for loop), nested loops, breaking out of loops (break and continue statements), labeled loops.

Unit III:-

Arrays and Strings :One and two dimensional array, creating array,strings, string buffer.

Introduction of Classes :Defining a class, creating instance and class members : creating object of a class, accessing instance variables of a class, creating methods, naming methods of a class, accessing methods of a class.

Unit IV:-

Constructor: Parameterized constructor, 'this' keyword, garbage collection, finalize() method, methods overloading, constructor, overloading, nested and inner classes, static member.

Visibility control : public access, friendly access, protected access, private access, private protected access.

Inheritance :Various types of inheritance, super and subclasses, keywords - 'extends', 'super', constructor chaining, method overriding, final variables and methods, final classes, abstract method and classes, dynamic method dispatch.

1. Write a Java program to create a Java class : (a) without instance variables and methods, (b) with instance variables and without methods, (c) without instance variables and with methods. (d) with instance variables and methods.
2. Write a Java program that illustrates the concepts of selection statement, looping, nested loops, breaking out of loop.
3. Write a Java Program that illustrates the concepts of one, two dimension arrays and strings.
4. Write a Java program that illustrates the concepts of Java class that includes (a) constructor with and without parameters, (b) Overloading methods, (c) Overriding methods.
5. Write a Java program to demonstrate inheritance by creating suitable classes.
6. Create a Java package, interface and implement in Java program.
7. Practical's on Collection Framework
8. Practical on thread Programming
9. Write a program that illustrates the error handling using exception handling.
10. Write a program that illustrates the concepts of stream classes.
11. Write a Java applet to demonstrate graphics, font and Color classes.
12. Write a Java program to illustrate AWT package, Event classes and listeners.
13. Practical on JDBC

Reference Book:-

1. The Complete Reference - Tata McGraw Hill, Fifth edition.
2. Programming with Java A primer, by E. Balagurusamy 3rd Edition

SUBJECT CODE: 2BVCSEC11

Field Work/Industrial Visit

Visit to any IT industry/workshop/college/university/technical expo/international and national exhibitions.
Report writing based on the above work.
Assessment done on the basis of viva-voc and report by the teaching faculty.

Syllabus Prescribed for Software Development

B.Voc. Part-II (Vocation)

Semester-III

SUBJECT CODE: 3BVCGEC1 & 3BVCGEC6

English and Communication Skill-III

Theory:

- 1) Revisiting English Grammar: forming questions, using conditionals, question tags.
- 2) Writing skills: paragraph writing, writing newspaper reports.
- 3) Comprehensions skills: converting verbal information into non-verbal and vice-versa, interpreting graphs, charts, diagrams.
- 4) Communication skills: short situational conversations, self introduction, short talks.

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 3BVCGEC2 & 3BVCGEC7
Applied Computer Skill-III

Theory

- 1) MIS- Systems approach, characteristics, types of systems; Elements-input, output, environment, Boundary Interface, Feedback, and control.
- 2) System Life Cycle; MIS, TPS, OAS, DSS, KWS, Value of information, information life cycle, data vs information, Components of MIS, characteristics of MIS.
- 3) System Analysis & Design: System development life cycle, modeling the required system.
- 4) E-R diagrams, ELHs, ECDs, user view of processing, modeling input output data.

Practical – Practical based on above chapter.

Reference books:

- 1) Microsoft Office – 2008- Gini Courter, Annette Marquis BPB
- 2) IT Today (Encyclopedia) –S. Jaiswal
- 3) A First Course In Computers – Sanjay Saxena
- 4) First Text book on Information Technology – Shrikant Patnaik.

SUBJECT CODE: 3BVCSEC3 & 3BVCSEC8
Software Engineering
Master Trainer for Junior Software Developer
Qualification Pack- Ref. QP: (SSC/Q0509)

Unit-I : System Concept: Definition, Characteristics of System, Elements of System; Types of System: Physical or Abstract Systems, Open or Closed Systems, Man-made Information Systems; Subsystem.

System Analyst: Role; Skills: Interpersonal, Technical; Information Gathering Tools (Fact Finding Techniques); Feasibility Study.

Introduction to Software Engineering: Definition and Characteristics of Software; Software Application Domains; Software Engineering: Definition, Layered Model.

Unit-II : Software Process Framework; Umbrella Activities. Process Models: SDLC (Waterfall); Incremental; Evolutionary Models: RAD, Prototyping, Spiral; Concurrent Development Model; Components based Development Model. **Agility:** Agile Process: Assumptions, Agility Principles, Human Factors.

Software Engineering Practice: Essence of Practice, Core Principles, Communication Principles, Planning Principles, Modeling Principles, Construction Principles, Deployment Principles.

Unit-III: Requirements Engineering: Requirements Engineering Tasks: Inception, Elicitation, Elaboration,

Negotiation, Specification, Validation. Requirements Management; Steps in Requirements Engineering. Requirements Analysis: Objectives;

Requirements Modeling Approaches: Scenario-Based Modeling: Use-Case; Class Models: E-R Diagram, Class Diagrams; Flow Oriented Modeling: DFD, CFD; Behavioral Models: State Diagram, Sequence Diagrams.

Unit-IV : Software Design: Design Process and Quality; Design Concepts: Abstraction, Architecture, Modularity, Information Hiding, Functional Independence, Refinement. Component Level Design: Component-Definition; Object-oriented View, Traditional View, Cohesion, Coupling. **Designing**

Traditional Components: Graphical Design – Notations (Flow Chart), Tabular Design – Notations (Decision Table), Program Design Language (Structured English or Pseudo-code). User Interface Design: Rules; Interface Design Models; Interface Analysis.

Practical:-

1. Problem Definition, Identifying & Understanding the system, its functions, desired inputs, outputs etc.
2. Conducting Feasibility Study – Deciding S/W, H/W requirements, Type of system (Single-User/Multi-user etc), Limitations of current system, Benefits of the proposed
3. Requirement Analysis, Interviews, Questionnaire, Creating SRS
4. Drawing ERD & converting to tables
5. Drawing Context Diagram, DFDs for understanding process flow
6. Drawing Use Case Diagram
7. Drawing Class, Object Diagrams,
8. Drawing Sequence & Collaboration Diagrams,
9. Drawing State Transition, State chart diagrams
10. Drawing Activity Diagram
11. Drawing Component Diagram
12. Drawing Package Diagram

Reference books:

1. System Analysis and Design: Elias M. Awad (Galgotia)
2. Software Engineering–A Practitioner's Approach (7th Ed): Roger S. Pressman (Mc-Graw Hill)
3. Analysis and Design of Information Systems: James A. Senn (Mc- Graw Hill)
4. Software Engineering Concepts: Richard Fairley

SUBJECT CODE: 3BVCSEC4 & 3BVCSEC9

DATA STRUCTURES

Master Trainer for Junior Software Developer

Qualification Pack- Ref. QP: (SSC/Q0509)

UNIT- I:LINKED LIST : Linked List, Representation of Single, Double, Header, Circular Single and Double Linked list, All possible operations on Single and Double linked List using Dynamic representation, Polynomial Representation and its Manipulation

UNIT- II :STACKS : Stacks terminology, Representation of Stacks in Memory, Operation on Stacks, Polish Notations, Translation of infix to postfix & prefix expression, Infix to Postfix Conversion, Evaluation of Postfix Expression, Recursion, Problems on Recursion, Quick Sort and Tower of Hanoi Problem.

UNIT- III :QUEUE : Representation of Queues in Memory, Circular Queue. Dequeue and Priority Queue. Operations of above Structure using Array and Linked Representation.

SORTING AND SEARCHING: Selection Sort, Insertion Sort, Merge Sort, Efficiency of Sorting Methods, Big-O Notations. Hash Tables, Hashing Technique, Collision Resolution Technique.

UNIT- IV : TREES : Basic Terminologies, Representation of Binary Trees in Memory, Traversing of Binary tree, Binary Search Tree, Operation on Binary Search Tree, Heap Tree, Operation on Heap Tree, Heap Sort Method

GRAPHS : Basic Terminologies, Definition and Representation of Graphs in Memory: Linked List and Matrix Representation. Traversing graphs : BSF, DFS Method.

Practical's:-

1. Write a program to insert an element into array.
2. Write a program to sort array in Ascending order using Bubble sort method.
3. Write a program to search given element using Binary search method.
4. Write a program for traversing array element.
5. Write a program to sort array in Descending order using Bubble sort method.
6. Write a program to implement insertion sort using link list.
7. Write a program to implement order link list.
8. Write a program to implement Stack.
9. Write a program to implement queue.

Reference Books:

1. Classical Data Structures : D. Samanta. PHI, New Delhi.
2. DATA STRUCTURE : LIPSCTUZ SCHUM OUTLINE SERIES
3. Data structure Using C++ : Y. Kanetkar
4. Data Structures Using C++: Tennenbaum
5. Data structures by Tremblay Sorenson
6. Data structures by Bhagat singh Naps

SUBJECT CODE: 3BVCSEC5 & 3BVCSEC10

Title: Php, JQuery & Bootstrap **Master Trainer for Junior Software Developer** Qualification Pack- Ref. QP: (SSC/Q0509)

Unit I:- Php:- Introduction, Syntax, Variables, Print/Echo, Data types, Strings, Constants, Operators If.....Else.....Else if, Switch, While Loops, For Loops, Function, Arrays.

Unit II:- Bootstrap, Grid Basic, Typography, Tables, Images, Wells, Alerts, Buttons, Button Groups, Badges/Labels, Progress Bars, Pagination, Pager, List Groups, Panels, Dropdowns Collapse, Tabs/Pills Navbar.

Unit III:- Introduction:- Syntax, Selectors, Events, jQuery Effects, Hide/Show, Fade, Slide, Animate, Stop() Callback, Chaining, JQuery HTML, JQuery Get, JQuery Set, JQuery Add, JQuery Remove, JQueryCss Classes JQuerycss(), JQuery Dimensions.

Unit IV:- Introduction on Angular JS, AngularJS Expressions, AngularJS Modules, AngularJS Directives AngularJSng-model Directive, AngularJS Data Binding, AngularJS Controllers, AngularJS Scope, AngularJS Filters, AngularJS Services, AngularJS AJAX - \$http.

Practical's:-

1. Write a Php program using Different types of data types.
2. Write a Php program using String Functions.
3. Write a Php program which displays the working of control statements.
4. Write a Php program which displays the working of Operators.
5. Write a Php program which displays the working of Arrays().
6. Write a program for tables using Bootstrap.
7. Write a program for different styles of buttons using Bootstrap.
8. Write a program for different progress bars using Bootstrap.
9. Write a program for dropdowns using Bootstrap.
10. Write a program for navbar using Bootstrap.
11. Write a program for JQuery Selectors.
12. Write a program for JQuery Event Methods.
13. Write a program for JQuery Effects
14. Write a program for JQuery HTML Elements & attributes.
15. Write a program for Angular JS

Reference book:

1. PHP: The Complete Reference-Steven Holzner.
2. JQuery Pocket Reference –David Flanagan.
3. Step by Step Bootstrap 3:Riwanto Megosinarso

SUBJECT CODE: 3BVCSEC11
Field Work/Industrial Visit

Visit to any IT manufacturing industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.

Syllabus Prescribed for Software Development

B.Voc. Part-II (Vocation)

Semester-IV

SUBJECT CODE: 4BVCGEC1 & 4BVCGEC6 English and Communication Skill-IV

Theory

- 1) Grammar: use of modal auxiliaries, use of passive voice.
- 2) Writing: summarizing articles and passages, writing short reviews.
- 3) Vocabulary: synonyms, antonyms, idioms and phrases, converting idiomatic into plain English and vice versa.
- 4) Communication Skills: group discussion, short presentations.

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 4BVCGEC2 & 4BVCGEC7 Soft Skill Development-I

Theory

- 1) Introduction to business communication, introduction to sound system of English, introduction to effective writing, non verbal communication.
- 2) The self concept, self management techniques. Self image and self esteem, building self confidence, personal planning and success attitude, creating the master plan, active positive visualization and positive attitude, spot analysis.
- 3) Self motivation & communication: levels of motivation, power of irresistible enthusiasm, etiquettes and manners in a group, public speaking oral and written communication, body language, importance of listening and responding, types for technical writing.
- 4) Etiquettes: office etiquettes, email etiquettes, telephone etiquettes, goal setting and time managements

Team dynamics: introduction to team work, working in teams, personal attitude, conflicts and its resolutions, assertiveness, diversities, role of career planning in personality development, how to face personal interviews and group discussion.

Note:

Self paced learning

Industry awareness

Assignments and discussions.

Practical – Practical based on above chapter.

Recommended books:

- 1) Personality development by Rajiv K. Mishra

SUBJECT CODE: 4BVCSEC3 & 4BVCSEC8

SYSTEM ANALYSIS & DESIGN

Master Trainer for Junior Software Developer

Qualification Pack- Ref. QP: (SSC/Q0509)

UNIT - I: Introduction: System, Types, Components of Computerized Information System, Systems Analysts: Duties, Role. SDLC.

Feasibility Study and Analysis: Identifying Problems, Organizing Feasibility Analysis: Economic, Financial, Organizational and Technological. Feasibility Decision, Choice of a solution.

Data Collection: Interviews, Brain Storming, Questionnaires, Document Search, Observation.

UNIT - II: Structured tools and techniques of Data analysis Structured English, Decision Tables and Decision Trees, Data Flow Diagram, Data Dictionary

System Design: Input and Output design, Design Principles, Forms: Principles of Form Design, Ways to ensure Quality Forms.

Codes: Types, Physical Representation of Codes, Principle of Code Design.

UNIT - III: Implementation: Training, Operational Training and Related Activities, Change Strategies.

Testing: Preparation for Testing, Levels of Testing, Test Evaluation, Acceptance.

Conversion: Cold Turkey, Parallel, Pilot, Modular and Sequential Methods. Conversion Period Length.

System Evaluation.

UNIT - IV: Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Project Monitoring and Control. Risk Management.

Software Configuration Management: Necessity, Configuring Management Activities

Software Reliability and Quality Management: Software Reliability, Software Quality, ISO 9000. Software Maintenance, Maintenance Process Models, Estimation of Maintenance Cost.

Software Reuse: What can be reused, Why no reuse so far, Basic Issues.

Practical:-

1. Case Study on Focuses of System Analysis and Design.
2. Case Study on Steps of System Analysis and Design.
3. Case Study on Components of Computerized Information System.
4. Case Study on Various Phases of SAD.
5. Case Study on System Design.
6. Case Study on tools and techniques of Data analysis.
7. Case Study on Role of SAD in Business Management.
8. Case Study on Methodology of SAD.

Reference Books:

1. Information Systems Analysis, Design and Implementation By K. M. Hussain
Donna Hussain [Tata McGraw-Hill Publishing Company Ltd, New Delhi]
2. Fundamentals of Software Engineering by Rajib Mall [PHI Publication]
3. Workbook on Systems Analysis & Design by V. Garg [PHI Publication]
4. System Analysis and Design- Don Yeates, shiebls, Helmy (M).
5. System Analysis & Design - Edward –TMH
6. System Analysis and Design – Satzinger, Robert Jackson and Stephen Burd, Thomson Learning
7. Introduction to Systems Analysis Design, Igor Hawryszkiewicz, PHI

SUBJECT CODE: 4BVCSEC4 & 4BVCSEC9

Web Designing Using HTML

Master Trainer for Junior Software Developer Qualification Pack- Ref. QP: (SSC/Q0509)

UNIT - I :

Introduction to Internet, History of Internet, Internet users, Internet working, Information on Internet, Requirements for connecting to Internet, Basic Internet Terms, Introduction to world wide web, Evaluation of world wide web, basic features, web browsers, popular web browsers, web servers, HTTP URL, Search Engines, Search Engines categories, how to use Search Engines, Searching criterion.

UNIT - II :

HTML: Introduction, Objective, HTML Browsers, Windows Switching, HTML Command Tags, URLs, links, new web page creation, main body of the text, putting headers, adding paragraph , formatting text in HTML and font mechanism, Color settings, superscripts and subscripts and other manipulations on text and paragraphs, using directory and menu lists, creation of links, inserting graphics, using images, all manipulations on tables and its display, Detailed working with forms, allowing visitors to upload files, active images ,working with frames & framesets, Frames handling, scroll bars, alternatives to frames,

UNIT - III :

Introduction to browsers, Working with e-mail, Parts of e-mail text, working with messages.

DHTML: using DHTML in internet explorer, heading and horizontal line, hidden message, the message at the center of the page, moving boxes ,changeable box.

UNIT - IV :

Cascading style sheets: Introduction to css, creating style sheets, common tasks with CSS, Colors, the font -family, font metrics ,length units ,absolute units ,relative units ,the pixel unit ,percentages as values, keywords as values, various properties such as the font -size property, font -size property etc, Assigning classes ,tags and attributes for applying classes, applying classes to an HTML tag, applying classes to other document parts ,the layer tag, CSS Tags.

Practical:-

1. Write a Case Study on History of Internet.
2. Write a case Study on Search Engine.
3. Write an HTML code to display family Information.
4. Write an HTML code to display student Information using table tag.
5. Write an HTML code to display hyperlink.
6. Write an HTML code to display Mark sheet.
7. Write an HTML code to display College data.
8. Write an HTML code to display Data types in C++ using ordered and unordered list.

9. 7. Write an HTML code to display Faculties in College using unordered and unordered list.
10. Write an HTML code to display an image.
11. Write an HTML code using CSS for display two Heading line in different font.

Reference Books:

1. Internet and web design by R Bangia, Second edition , firewall media
2. Multimedia and Web technology by R Bangia
3. Internet and web designing by ITELs (Macmillan)
4. Web Enabled Commercial Application Development Using HTML, DHTML, JS, Perl by Ivan Bayross
5. Deitel, Deitel & Nieto, Internet and Worldwide Web how to Program, Pearson Education, PHI.
6. Internet Programming with VBScript and Java Script. Kathleen Kalata, (Thomson Publication)
7. Programming the World Wide Web By. Robert W. Sebesta. (Pearson)

SUBJECT CODE: 4BVCSEC5 & 4BVCSEC10

Computer Graphics

Master Trainer for Junior Software Developer

Qualification Pack- Ref. QP: (SSC/Q0509)

Unit I:- Introduction to Computer Graphics, Overview of Computer Graphics, Image and Objects, Image Representation, Basic Graphics Pipeline, Bitmap and Vector-Based Graphics, Computer Graphics Application and Software, Display Device, Cathode Ray Tubes, Flat Panel Displays, Input Technology. Coordinate System Overview, Introduction to Graphics Libraries, Scan conversion, Digital Analyzer (DDA) algorithm. Bresenham's Line drawing algorithm, Bresenham's method of Circle drawing Midpoint Circle Algorithm Drawing Ellipses and other Conics.

Unit II:- a) Two-Dimensional Transformation:- Transformations and Matrices, 2D Transformations, 2D Scaling 2D Reflection, 2D Shear Transformation, 2D Rotation, 2D Translation, Combined Transformation: Homogeneous Coordinates. Translations in Homogeneous Coordinates, Rotation in Homogeneous Coordinates Reflection in Homogeneous Coordinates, Scaling in Homogeneous Coordinates, Shear Transformation in Homogeneous Coordinates, Composition of 2D transformations, Rotation About an Arbitrary Point, Reflection through an Arbitrary Line, Viewing Transformation and Clipping:-Normalization Transformation, Workstation Transformation, Line Clipping, Polygon Clipping.

b) Three Dimension Transformation:- Three-Dimensional Scaling, Three-Dimensional Shearing, Three-Dimensional Rotation, Three-Dimensional Reflection, Three-Dimensional Translation, Rotation about an Arbitrary Axis in Space, Reflection through an Arbitrary Plane, 3D Viewing, Viewing Parameters Transformations from world coordinate to Viewing, Coordinates.

Unit III:- a) Projections:- Parallel Projection, Perspective Projection, Types of Parallel Projections Orthographic Projections, Oblique Projections, Types of Perspective Projections, Transformation Matrices for general Parallel Projection, Transformation Matrix for oblique onto xy Plane Projection, Transformation Matrix for Perspective Projection.

b) Area Filling and Curves:- Types of Polygon, Representation of Polygons, Filling Polygons, An Inside Test, Polygon Filling, Seed Fill, Boundary Fill Algorithm, Flood Fill Algorithm, Curve Design, Bezier Curves b. B-Spline Curves.

Unit IV:- Introduction to animation, Key-Frame Animation, Construction of an Animation Sequence Motion Control Methods, Procedural Animation, Key-Frame Animation vs. Procedural Animation Introduction to Morphing, Three-Dimensional Morphing, Image Manipulation and Storage:-What is an Image? Digital image file formats, Image compression standard – JPEG, Image Processing - Digital image enhancement contrast stretching, Histogram Equalization smoothing and median Filtering.

Practical's:-

- 1.a. Study and enlist the basic functions used for graphics . Give an example for each of them.
- b. Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message.
- c. Draw the following at the center of the screen : - i. Circle ii. Rectangle iii. Square iv. Concentric Circles v. Ellipse vi. Line
- 2.a. Develop the program for DDA Line drawing algorithm.
- b. Develop the program for Bresenham's Line drawing algorithm.
- 3.a. Develop the program for the mid-point circle drawing algorithm.
- b. Develop the program for the mid-point ellipse drawing algorithm.
- 4.a. Write a program to implement 2D scaling.
- b. Write a program to perform 2D translation
- c. Write a program to demonstrate shear transformation in different directions on a unit square situated at the origin.
- 5.a. Perform 2D Rotation on a given object.
- b. Program to create a house like figure and perform the following operations.
 - i. Scaling about the origin followed by translation.
 - ii. Scaling with reference to an arbitrary point.
 - iii. Reflect about the line $y = mx + c$.
6. Write program to perform the following 3D transformations on the given input figure, Rotate through θ . Reflection, Scaling, Translation.
- 7.a. Write a program to implement Cohen-Sutherland clipping.
- b. Write a program to implement Liang - Barsky Line Clipping Algorithm
8. Write a program to implement polygon filling
9. Write a program to implement Sutherland-Hodgeman polygon Clipping Algorithm
 - a. Write a program to demonstrate 2D animation such as clock simulation
 - b. Write a program to implement the bouncing ball inside a defined rectangular window.
 - c. Write a program to demonstrate 2D animation rising sun.

Reference book:

1. Computer Graphics, R. K. Maurya(2011).Wiley
2. Computer Graphics, A.P. Godse
3. Computer Graphics, Donald Hearn and M. Pauline Bake.

SUBJECT CODE: 4BVCSEC11

Field Work/Industrial Visit

Visit to any IT industry/workshop/college/university/technical expo/international and national exhibitions.

Report writing based on the above work.

Assessment done on the basis of viva-voc and report by the teaching faculty.

Syllabus Prescribed for Software Development

B.Voc. Part-III (Vocation)

Semester-V

SUBJECT CODE: 5BVCGEC1 & 5BVCGEC5

English and Communication Skill-V

Theory

- 1) Grammar: sentence expansion, use of clauses, sentence linkers.
- 2) Writing: notices, minutes of meetings or programs.
- 3) Reading: comprehension of short literary passages, interpretation skills.
- 4) Communication Skills: interview techniques, preparing and making presentations.

Practical – Practical based on above chapter.

Recommended books:

1. Bhaskaran & Horsburg. Strengthen Your English, OUP (unit 1)
2. Patil, Valke, Thorat & Merchant. English for Practical Purpose. Macmillan (unit 2,3 & 4)
3. Dwivedi & Kumar. Macmillan Foundation English. Macmillan.

SUBJECT CODE: 5BVCGEC2 & 5BVCGEC6

Soft Skill Development-II

Theory

- 1) Objectives, Introduction, Concept, Nature and Dimension of Stress.
- 2) Stress: its effects, causes and ways of coping, what is pressure and what is stress. The three stages of burnout, recognizing your own stressors, personality types and reactions to stress. How your beliefs and perception cause stress.
- 3) Managing yourself: Does your job cause stress? Five ways to battle job stress, developing a strategy for stress management, managing change, relaxation techniques, assertiveness skills, stress and faith healing.
- 4) Common Meditation Techniques:
 - i) Positive Force of Nature
 - ii) Relaxation by Music
 - iii) Exercise, Yoga and Meditation.Planning your next steps.

Practical – Practical based on above chapter.

Reference books:

- 1) Stress management by Dr. Satish Pai, Dr. S. Ravishankar, Dr. H.Kaila, Shri S. V. Kamat; Himalaya; Students Edition.

SUBJECT CODE: 5BVCSEC3 & 5BVCSEC7

PROGRAMMING IN VISUAL BASIC

Software Developer

Qualification Pack- Ref. QP: (SSC/Q0501)

UNIT-I : Programming Fundamentals: Variables, Data types, Constant, Conversion Function. **Scope of Variable:** Public, Private Static. Operators, Control Statement, Working with Visual Basic Window Components, Working with Forms.

UNIT-II : Arrays: Dynamic Array, Preserve and Control arrays.

Procedure: General procedure, General Methods for Passing Arguments to a Procedure Functions:

String, Math, Date and Conversion Functions.

Modules: Form, Standard

UNIT-III :Menus: Working with Menu, Adding Separators Bars, Code for Menus.

Creating Popup Menu: System, Custom.

Database Handling: Database Concepts, Creating and Accessing Database, Using Data Control.

Using DAO: Creating Search Programs, Numeric Search and Complex Search Programs.

UNIT-IV : Using ADO Data Control, Data Link, ODBC Data Source name, Using

Connection String, Creating Navigating buttons.

Working with Advanced Data Controls:DataList Control, DataCombo Control, DataGrid Control and Msflexgrid Control.

Handling Errors : Run Time, Trapping and Handling Error, ERR Object. Data Environment and Data Reports.

Practical:-

1. Write a program in VB to dynamically set properties.
2. Write a program in VB to set properties of controls using property window.
3. Write a program in VB to perform addition of two numbers.
4. Write a program in VB to perform addition, subtraction, multiplication and division.
5. Write a program in VB to find largest no among two no.
6. Write a program in VB to find whether entered no is even or odd.
7. Write a program in VB to find out whether an entered no is positive or negative.
8. Write a program in VB to find the largest among three no.
9. Write a application in VB to generate marksheet.
10. Write a program in VB to print no from 1 to 10 using GoTo.
11. Write a program in VB to calculate factorial of given no using do while loop.

Reference Books:

1. VISUAL BASIC – to Advance by Soma Dasgupta [BPB Publication]
2. Evangelos Petroustos, Mastering Visual Basic 6.0 BPB Publication.
3. VISUAL BASIC 6 COMPLETE REFERENCE (TMH PUB)
4. Visual Basic 6 Deitel & Deitel (Pearson Education) Mastering VB 6.0 Black Book -Peter - Norton-Techm

SUBJECT CODE: 5BVCSEC4 & 5BVCSEC8

SOFTWARE TESTING

Software Developer

Qualification Pack- Ref. QP: (SSC/Q0501)

Unit I:- a) Fundamentals of testing:- Necessity of testing, what is testing, Testing principles, Fundamental test process, The psychology of testing.

b) Testing throughout the software life cycle:-Software development models, Test levels, Test types: the targets of testing, Maintenance testing.

Unit II:- a) Static techniques:- Reviews and the test process, Review process, Static analysis by tools

b) Test design techniques:- Identifying test conditions and designing test cases, Categories of test design techniques, Specification-based or black box techniques, Structure-based or white-box techniques, Experience based techniques.

Unit III:- Test management:- Test organization, Test plans, Estimates and strategies, Test progress monitoring and control, Configuration management, Risk and testing Incident.

Unit IV:- Tool support for testing:- Types of test tool, Effective use of tools, Potential benefits and risks Introducing a tool into an organization.

Practical:-

1. Case Study on Fundamentals of Testing.
2. Case Study on Software life Cycle.
3. Case Study on Test Design Techniques.
4. Case Study on Test Management.
5. Case Study on Types of Tool of Testing.
6. Case Study on benefits and Risks of Testing.
7. Case Study on Water Fall Model.
8. Case Study on Spiral Model.

Reference book:

1. Software Testing Foundations, 2nd Edition By Hans Schaefer, Andreas Spillner, Tilo Linz, Shroff Publishers and Distributors.
2. FOUNDATIONS OF SOFTWARE TESTING by Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black.

SUBJECT CODE: 5BVCSEC9

Seminar & Project Phase - I

Seminar & Completion of 25% of project based on Software Development Design project / Model/ collaboration with any Software Developing. industry/workshop/college/university.
Report writing based on the above work.

Syllabus Prescribed for Software Development

B.Voc. Part-III (Vocation)

Semester-VI

SUBJECT CODE: 6BVCGEC1 & 6BVCGEC5

Industrial Organization & Management

Theory

- 1) Ownership and entrepreneurship development: individual, partnership, joint stock companies, co-operative, public sectors and government undertaking, difference, comparison, merits. Project and feasibility reports, licensing, scale of industry- small, medium and large registration and other formalities. Excise and relevant taxation. Procurement of power, water and other facilities.
- 2) Finance: sources, raising of finances, bank, financial institutions, leasing institutions, shares debentures, loans, credit convertible bonds, cost account and control, prime cost, elements of cost, break even chart, budget and budgetary control, profit and loss account, balance sheet.
- 3) Site selection and plant layout: factors affecting selection economic survey of site selection. Functional layout, product layout, mix layout, advantages and disadvantages.
- 4) General functions in industries: procuring of buying, inspections, storing production material handling, packing and forwarding, marketing, supervision, different systems of the above functions. Their advantages and disadvantages, equipments necessary to carry out these functions.

Practical – practical report should be submitted on above subject.

Reference books:

1. Financial management – Dr. Rastogi / Prasanna Chandra , publications: TATA Mc Grow-hill, New Delhi
2. Financial management theory and practice Prasanna Chandra
3. Entrepreneurship development – Dr. K. Natrajan
4. Entrepreneurship development- B. Badnai, B.K. Publications
- 5.

SUBJECT CODE: 6BVCGEC2 & 6BVCGEC6

Soft skill Development- III

Theory

- 1) Introduction, corporate culture: definition and meaning professionalism at the work place, youthfulness and its role in professional growth. Dynamism and its contribution towards success. The concept of being goal oriented how to be team player.
- 2) How to be an effective leader: the role of emotional intelligence, managing your state of mind. Being proactive emphatic listening. Developing a win-win attitude, using the right style situational leadership. Adaptability to change.
- 3) The importance of employees in an organization: the importance of employee evaluation. How to prepare evaluation. How to motivate employees, physical health and pleasure time.
- 4) The management model: introduction, the CRM management model, introduction and overview of the model, the management model. Reasons for failure of CRM.

Practical – Practical Reports based on above chapter.

Reference books:

- 1) Effective human resources training and development by Dr. Rathana Reddy, Himalaya.
- 2) Communication skills by Sanjay Kumar, Datta.

SUBJECT CODE: 6BVCSEC3 & 6BVCSEC7

Title: Asp. Net with C#

Software Developer

Qualification Pack- SSC/QO501

Unit I:- Overview of .NET Framework, Objectives, Main components of .NET Framework and their overview, Types of Applications. .NET Framework Architecture– CLR(Goal of CLR, Services/Features, Benefits, Managed Execution Process, Automatic memory Management), CTS(CTS Overview, Type Definitions, Type members, Different types of data such as class, delegates, pointers, arrays, interfaces), Meta Data, Structure of Metadata & Self Describing Components, Cross Language Interoperability & CLS, Assemblies(Assembly overview, Benefits, Contents, Types)
Creating Web Sites :- Working with Web Forms, Working with CSS in Visual Web Developer, ASP.NET Server Controls, Standard Controls, HTML Controls, Understanding ASP.NET State Engine.

Unit II:- Introduction to Programming:- Data Types and Variables, Statements, Methods: Functions and Subroutines. Consistent Page Layout with Master Pages, Using a Centralized Base Page. Structured Exception Handling : try, catch, finally blocks, throwing exceptions, Err object, Using masked Textboxes Navigation Controls- Architecture of the Navigation Controls, Menu Control, Tree View Control Validation Controls – Validations & Validator controls.

Unit III:- ADO.NET: Data Provider Model, Direct Data Access - Creating a Connection, Select Command, DataReader, Disconnected Data Access.Data Binding: Introduction, Single-Value Data Binding, Repeated Value Data Binding, Data Source Controls – SqlDataSource, Other Data Controls, Working Together with Data Source and Data-bound Controls User Controls-Creating User Controls, Adding User Controls to a Content Page or Master Page.

Unit IV:- LINQ: Operators, implementations, LINQ to objects,XML,ADO.NET, Query Syntax. ASP.NET Ajax: Introducing AJAX, Working of AJAX, Using ASP.NET AJAX server controls. Web Service: What is web service, ASP.NET Web services, Creating a simple web service, Consuming Web service.

Practical's:-

1. Simple Programs with C#:
2. Object oriented programs with C#
3. Programs using different controls.
4. Programs using CSS.
5. Programs using ASP.NET Server controls.
6. Database programs with ASP.NET and ADO.NET
7. Programs using Language Integrated query.
8. Implement the exercise on AJAX.
9. Implement the exercise on JQuery.
10. Programs securing web pages.

Reference book:

1. The Complete Reference ASP .NET, MacDonald, Tata McGraw Hill
2. Beginning ASP.NET 4 in C# and VB ImaSpanjaars, WROX

SUBJECT CODE: 5BVCSEC4 & 5BVCSEC8
Title: Python Programming and Data Structures
Software Developer
Qualification Pack- SSC/QO501

Unit I:- a) Introduction:- i. The Python Programming Language, History, features, Installing Python, Running Python program. ii. Interactive and script modes of IDLE
b) Data Types :- i. Values and Types ii. Type conversion
c) expressions and operators: i) Of types int, float, boolean. Built-in function type. Operator precedence.
ii) Variables, Variable Names and Keywords.
d) Statements:- i. The conditional statements if, if-else, ii. if-elif-else
iii. The iterative statements while, while-else, for-else. iv. Nested compound statements.
v. The continue statement to skip over one iteration of a loop, the break statement to exit the loop, pass statement.
e) Functions:- i) The import statement for already-defined functions and constants.
ii) Modules.
iii) The compound statement def to define functions; the role of indentation for delimiting the body of a compound statement; calling a previously defined function.
iv) Advantages of functions, function parameters
v) Built-in functions
vi) Recursive functions

Unit II:- a) Strings : i.) Strings and tuples are immutable, lists are mutable.
ii. String Methods, operators and comparison
b) Tuples: i) Built-in methods ii) Operations
c) Lists:- i) Accessing elements ii) Built-in List functions iii) List Operations
d) Sets and Dictionaries:- i) Difference between sets and dictionaries, ii) Sets and frozen sets.
iii) Creating a Dictionary, Accessing Values in a Dictionary, iv) Built-in methods, v) Operations on dictionary.
e) Gentle introduction to object-oriented programming
f) Python File Input-Output: i) Opening and closing files, ii) Various types of file modes,
iii) Reading and writing to files iv) Manipulating directories.

Unit III:- a) Exception handling:- i) What is an exception ii) Various keywords to handle exceptions such try, catch, except, else, finally, raise.
b) GUI Programming in Python:- i. What is GUI ii. Introduction to GUI library. iii. Layout management, events and bindings, fonts, colors, drawing on canvas (line, oval, rectangle, etc.) iv. Widgets
c) Database connectivity in Python:- i. Mysql connector, accessing connector module. ii. Using connect, cursor, execute & close functions. iii. Reading single & multiple results of query execution
iv. Executing different types of statements, executing transactions

Unit IV:- a) Stacks:- i. Operations push(), pop(), is_empty(); stacktop(), len() implementation using lists.
b) Queues: i. Operations enqueue() and dequeue(), i.e., enter() and exit(), is_empty(), first(), last()); implementation using Python lists:- ii. Application
c) Linked List: i. Singly, doubly and circularly linked lists, with head and optional tail.
ii. Implementation of list nodes as Python objects.
iii. Operations: insertion and deletion at the front and the rear of the list.
iv. Search for a value in a list, Delete a value in a list.
v) Applications

d) Trees:

- i. Trees and binary trees, definitions and properties
- ii. Insertion and deletion of a tree node.
- iii. Binary tree traversal

Practical's:-

- 1.a. Programs based on lists, conditional constructs, the for statement and the range function; interactively using the built-in functions len, sum, max, min.
- b. Programs using break and continue statements.
- 2.a. Programs related to string manipulation.
- b. Programs using list comprehensions and anonymous functions.
- 3.a. Programs related to dictionaries.
- b. Programs using the built-in methods of the string, list and dictionary classes
- 4.a. Design a class that store the information of Employee and display the same.
- b. Implement the concept of inheritance using python.
- 5.a. Programs to read and write files.
- b. Program to demonstrate exception handling
6. Program to show draw shapes & GUI controls.
- 7.a. Design a simple database application that stores the records and retrieve the same.
- b. Design a database application to search the specified record from the database.
- c. Design a database application to that allows the user to add, delete and modify the records.
- 8.a. Write a program to implement stack and its applications.
- b. Write a program to implement queue and its applications.
9. Write a program to implement linked list and its applications.(singly,doubly)
- 10.a. Write a program to perform insertion and deletion of a node from a tree.
- b. Write a program to print pre-order, post-order and in-order traversal of a tree

Reference book:

1. Allen Downey. (2012). Think Python. Needham, Massachusetts: O'Reilly.
2. Allen Downey. (2012). Think Python. Retrieved from <http://www.greenteapress.com/thinkpython/thinkpython.pdf>
3. Jason Montojo, Jennifer Campbell, Paul Gries. (2014). An Introduction to Computer Science using Python 3. North Carolina Dallas, Texas: SPD.
4. Goodrich, Tamassia, Goldwasser. (2016). Data Structures and Algorithms in Python: J. Wiley.
5. Rance D. Necaise, College of William and
6. Mary. (2016). Data Structures and Algorithms Using Python: J. Wiley.
7. Burkhard A. Meier. (2015). Python GUI Programming Cookbook. Birmingham, UK: Packt.
8. E. Balagurusamy. (2016). Introduction to Problem Solving with Python: TMH.
9. Joel Murach, Michael Urban. (2017). Murach's Python programming: SPD.
10. Michael H. Goldwasser, David Letscher. (2008). Object-oriented Programming in Python. Upper Saddle River, N.J: Pearson Prentice Hall.
11. Budd. (2016). Exploring Python: TMH.
12. <https://docs.python.org>

SUBJECT CODE: 6BVCSEC9

Project Phase-II

Completion of remaining 75% of project based on Software Development.
Design project / Model/ collaboration with any Software Developing
industry/workshop/college/university.
Report writing based on the above

M.Sc.
Sem-I to IV(Chemistry)

Prospectus No. 2015125

संत गाडगे बाबा अमरावती विद्यापीठ

SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका
विज्ञान पारंगत परिक्षा (रसायनशास्त्र)
सत्र-१ ते सत्र -४

PROSPECTUS
OF
MASTER OF SCIENCE EXAMINATION
IN
CHEMISTRY
Semester -I & III, Winter 2014,
Semester -II & IV, Summer 2015,



2014

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Syllabus Prescribed for M.Sc.Part-I, Semester-I (Chemistry)

Paper-I

Inorganic Chemistry

60hrs (4hrs/week). 12hrs/unit

50 Marks

Unit-I A) Stereochemistry and Bonding in Main Group Compound.

6L

VSEPR-Shape of simple inorganic molecules and ions containing lone pairs, Various stereochemical rules and resultant geometry of the compounds of non-transitional elements, Short coming of VSEPR model. Bent rule and energetic of hybridization, some simple reaction of covalently bonded molecules, d-orbital participation by non-metal.

B) Molecular Orbital Theory: 6L

Molecular orbital representation of polyatomic molecules with special reference to C_2H_4 , C_2H_6 and CO and delocalised molecular orbital of ozone, Carbon dioxide, Nitrite, Nitrate and Benzene.

Unit-II 6L

A) Metal ligand Bonding: Splitting of d-orbital in low symmetry environments, Structural effects of orbital splitting. Jahn-Teller effects, tetragonally distorted octahedral complexes. Jahn-Teller distortion in chelate complexes. Thermodynamic effects, crystal field stabilization energies (CFSE's) for octahedral and tetrahedral complexes, correlation of crystal field stabilization energy with the related thermodynamic properties such as lattice energies, enthalpies of hydration, formation constants, stabilization of unusual oxidation states and ionization energies, structure of mineral spinels. Limitations of crystal field theory.

B) Magnetochemistry 6L

Concept of magnetic susceptibility, types of magnetic bodies, Magnetic properties of free ions and transition metal complexes of different geometries, factors affecting the magnetic properties, orbital splitting and magnetic properties, quenching of orbital angular momentum, and effect of ligand field on spin-orbit coupling. Temperature dependence of paramagnetism, High spin-low spin crossover, spin crossover in coordination compounds, spin equilibria, magnetic interactions, ferromagnetism and antiferromagnetism. Anomalous magnetic moments and magnetic exchange coupling. Magnetic properties of polynuclear complexes.

Unit-III Metallic Cluster: 12L

Boron hydrides: Classification, nomenclature, structure, bonding and topology of boranes, 4-digit coding (s, t, y, x) numbers for B_2H_6 , B_4H_{10} , B_5H_9 , B_5H_{11} and B_6H_{10} and their utilities. Chemistry of diboranes. Acquaintance with metalloboranes, Carboranes and Metallocarboranes. Metal clusters: Occurrence of metal-metal bonds, binuclear, trinuclear, tetranuclear, and octahedral clusters. Synthesis, properties and bonding, of carbides, sulphur-nitrogen compounds, peroxo compound of boron, carbon and sulphur, oxy acids of nitrogen, Isopoly and Heteropoly acids.

Unit-IV A) Non-aqueous solvent behavior 6L

Inorganic solutes in organic solvents. Solvent system concept. The role of solvents in chemical reactions, effect of physical and chemical properties. Inorganic reactions in the following non-aqueous solvents: Dinitrogen tetroxide, anhydrous sulphuric acid, bromine trifluoride and reaction in molten salts.

B) Metal-Ligand equilibria in solution: 6L

Stability of complex ions in solution. Basic principles, Mathematical function and their interrelationship, trends in stepwise constant, factors affecting the stability of metal complexes with reference to the nature of metal ion and ligand, statistical, electrostatics, chelate effect and its Thermodynamic origin ($\Delta G, \Delta S, \Delta H$). Uses of stability constants in analytical chemistry, resolving of enantiomorphs. Determination of stability constants by spectrophotometric methods (Job's and Mole ratio), Bjerrum's p_H metric method, polarographic method and Conductometric method.

Unit-V Symmetry and Group theory 12L

Symmetry elements and symmetry operations, symmetry groups or point groups. Schoenflies symbols, point group classification, matrix representation of symmetry operations, identification of point groups ($C_n/C_n v/C_n h/D_n h/T_d, Oh$ etc), necessary conditions for any set of elements to form a group, subgroups, classes in a group, and representation of groups. The great orthogonality theorem (without proof) and its importance. Derivation of character tables for C_2v , C_3v points groups (construction not required), representation reducible and irreducible, and analysis of reducible representation.

List of Books

- 1) S. F. A. Kettle, J. N. Murrell & S. T. Teddler: Valency Theory
- 2) C. A. Coulson: Valency
- 3) J. E. Huheey :Inorganic Chemistry
- 4) F. A. Cotton & G. Wilkinson: Advanced Inorganic Chemistry 3rd, 5th & 6th Editions.
- 5) A. F. Williams: Theoretical Approach in inorganic chemistry.
- 6) A. Mannas Chanda: Atomic Structure and chemical Bonding
- 7) L. E. Orgel: An Introduction To transition metal chemistry, Ligand field theory, 2nd Edition.
- 8) J. J. Logowski: Modern Inorganic Chemistry
- 9) B. Durrant and P.J. Durrant: Advanced Inorganic Chemistry
- 10) J. C. Bailar: Chemistry of co-ordination compounds.
- 11) W. L. Jolly: Modern Inorganic Chemistry
- 12) R. S. Drago: Physical methods in inorganic chemistry.
- 13) Waddington: Nonaqueous solvents.
- 14) Sisler: Chemistry of nonaqueous solvents.
- 15) A. K. Barnard: Therotical Inorganic Chemistry
- 16) Emeleus and Sharpe: Modern Aspect of Inorganic Chemistry.
- 17) F. A. Cotton: Chemical Applications of Group theory.
- 18) Jones: Elementary Co-ordination chemistry.
- 19) B. N. Figgis: Introduction to Ligand field.
- 20) S. F. A. Kettle: Co-ordination chemistry.
- 21) M.C. Day and J. Selbin: Theoretical Inorganic Chemistry.
- 22) J. Lewin and Wilkins: Modern Co-ordination chemistry.
- 23) Gowariker, Vishwanathan and Sheedar: Polymer science.
- 24) H. H. Jattey and M. Orchin: Symmetry in chemistry.
- 25) D. Schonland: Molecular Symmetry in chemistry.
- 26) L. H. Hall: Group theory and Symmetry in chemistry
- 27) H. H. Jattey and M. Orchin: Symmetry in chemistry
- 28) R.L. Dutta and A. Simal: Elements of magneto chemistry
- 29) Inorganic Chemistry 4th Edition, P. Atkins, Oxford University Press.
- 30) Essential Trends in Inorganic Chemistry, D.M.P. Mingos, Oxford University Press

Semester –I**Paper-II****Organic Chemistry**

60hrs (4hrs/week). 12hrs/unit

50 Marks

- Unit-I: Nature and Bonding in Organic Molecule** 12L
 Delocalized chemical bonding, conjugation, cross-conjugation, resonance, hyper-conjugation, bonding in fullerenes.

Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternat hydrocarbons Huckel's rule, energy level of pi-molecules orbitals, annulenes, anti-aromaticity, homo-aromaticity. Aromatic character and chemistry of cyclopentadiene anion, tropyllium cation, tropene and tropelene.

- Unit-II : Stereochemistry** 12L
 Conformational analysis of cycloalkanes (5 6 8 membered rings), decalines, effect of conformation on reactivity, steric strain due to unavoidable crowding.
 Elements of symmetry, chirality, molecules with more than one chiral center, threo and erythro isomers, method of resolution, optical purity, enantiotopic and distereotopic atoms, groups and faces, stereospecific and stereoselective synthesis.
 Asymmetrical synthesis, optical activity in absence of chiral carbon (biphenyl, allenes and spiranes). Stereochemistry of the compounds containing N, P and Sulphur.
- Unit-III : Reaction mechanism: Structure and Reactivity** 12L
 Types of mechanism, Types of reaction, thermodynamics and kinetics requirements, kinetic and thermodynamic control, Hammond's postulate, Curtin-Hammett principle. Potential energy diagrams, transition states and intermediates, methods of determining mechanisms, isotope effects.
 Effect of Structure on reactivity:-
 Resonance and field effects, Steric effect, quantitative treatment. The Hammett equation and linear free energy relationship, substituent and reaction constants. Taft equation.
- Unit-IV : A) reactive Intermediates:** 12L
 Classical and non-classical carbocations, Carbanions, radical anions and radical cations, Carbenes, nitrenes and arynes. General methods of generation , detection and reactivity of these intermediates. Singlet oxygen, its generation and reactions with organic substrates.
- B) Aliphatic nucleophilic substitution:**
 The SN¹, SN², mixed SN¹, SN² and SET and SNⁱ mechanisms. Nucleophilicity, effect of leaving group, ambient nucleophiles and ambient substrates regioselectivity. The neighbouring group. Participation mechanism, substitution at allylic and vinylic carbon atoms.

Dehydration using DCC, Meyllers synthesis of aldehydes, ketones and acids.

Unit-V: A) Aromatic Nucleophilic Substitution 12L

A general introduction to different mechanisms of aromatic nucleophilic substitution S_NAr , S_N1 , Benzyne and $SRN1$ mechanisms.

Reactivity effect of substrate structure leaving group and attacking nucleophile. The Von Richter, Sommet-Hauser and Smiles rearrangements.

B) Elimination Reactions:

The E_1 , E_2 and E_1CB mechanisms orientation of the double bond. Saytzeff and Hoffman's rule. Effect of substrate structure, attacking base, leaving group and medium. Pyrolytic elimination mechanism and orientation. Cleavage of quaternary ammonium salts. Conversion of vicinal dihalides and nitro compounds to alkenes.

BOOKS SUGGESTED-

- Advanced organic chemistry Reaction mechanism and structure. Jerry March, John Wiley.
- Advanced organic chemistry- F.A. Carey and R.J. Sunberg, Plenum.
- A Guidebook to mechanism in organic chemistry-Peterskyes, Longman.
- Structure and mechanism in organic chemistry-C.K. Gold, Cornell University Press.
- Organic chemistry, R.T. Morrison Boyd. Prentice Hall
- Modern organic chemistry-H.O. House, Benjamin.
- Principal of organic chemistry-R.O.C. Norman and J.M. Coxon, Blackie Academic and Professional.
- Reaction mechanism in organic chemistry-S.M. Mukharji and S.P. Singh, Macmillan.
- Stereochemistry of organic compounds- D. Nasipuri, New age international.
- Stereochemistry of organic compounds- P.s.kalsi, New age international.
- Frontier orbitals and organic chemical reactions-I. Fleming.
- Orbital Symmetry R.E. Lehr & A.P. Marchand.
- Reactive intermediate in organic chemistry-N. S. Isaacs.
- Stereochemistry of carbon compounds- E.L. Eliel.
- Physical organic chemistry-J. Hine.
- Name reaction in organic chemistry Surrey.
- Advanced organic chemistry L.F. Fieser and M. Fieser.
- Vol.I & II organic chemistry - I. L. Finar.

- Modern organic chemistry- J.D. Roberts and M. C. Caserio.
- The search for organic reaction pathways (Longmann), Peter Skyes.
- Organic chemistry 5th Edition (McGraw Hill), Pine.
- Organic chemistry (Willard Grant Press Botcon), John McMurry.
- A Textbook of organic chemistry- R.K. Bansal.
- New trends in green chemistry V.K. Ahluwalia & M. Kidwai, Anamaya publishers New Delhi.
- Organic Chemistry, J. Clayden, Oxford University Press.
- Organic Chemistry, 4th Edition, G Marc Loudon, Oxford University Press.

**Semester I
Paper-III
Physical Chemistry-I**

60 Hours (4-Hours/week) 50 Marks 12 hours/Unit

Unit-I Quantum Chemistry:

- Discussion of solutions of Schrodinger equation to some model systems viz., Particle in a three dimensional box, Harmonic oscillator, Rigid rotor. The variation theorem, linear variation principle. Perturbation theory (first order & non degenerate). Application of variation method & perturbation theory to the Helium atom. 6L.
- Ordinary angular momentum, generalized angular momentum, eigen functions for angular momentum, eigen value of angular momentum. Pauli exclusion principle. Russell-Saunders terms and coupling schemes, Slater-Condon parameters, spin-orbit coupling and Zeeman splitting. Numericals. 6L.

Unit-II Surface Chemistry :

- Adsorption: Freundlich adsorption isotherm, Langmuir adsorption isotherm, Gibbs adsorption isotherm, estimation of surface area (BET equation), surface films on liquids, and catalytic activity at surfaces. 6L
- Micelles: micellization, hydrophobic interaction, critical micellar concentration (CMC), factors affecting the CMC of surfactants, counter ion binding to micelles, thermodynamics of micellization-phase separation & mass models, solubilization, micro emulsion, reverse micelles. Numericals. 6L.

Unit-III Thermodynamics

- Classical Thermodynamics: Partial molar properties. Partial molar free energy, Chemical Potential, Partial molar volume

and Partial molar heat content and their significances. Determination of these quantities. Concept of fugacity and determination of fugacity.

Non-ideal systems: Activity, Activity coefficients, Debye-Huckel theory for Activity coefficient of electrolytic solutions; Determination of Activity & Activity coefficients; ionic strength.. 6L.

- B) Non equilibrium Thermodynamics: Thermodynamic criteria for non-equilibrium states, entropy production and entropy flow for different irreversible processes (e.g. heat flow, chemical reaction, coupled reactions and electrochemical reactions.) Transformations of the generalized fluxes and forces, phenomenological equations. Microscopic reversibility and Onsager's reciprocity relation. Numericals. 6L.

Unit-IV Nuclear chemistry:

- A) Properties of Nucleons & Nuclei: Nuclear size and shape, mechanical effects due to orbiting and spinning of Nucleons, magnetic quantum numbers, Principal and radial quantum numbers, Total angular momentum of the nucleus, Magnetic properties of the nucleus. Net magnetic moments of the nuclei. Numericals. 6L.
- B) Nuclear models: Liquid drop model, shell model, Fermi gas model, collective model and optical model. 6L.

Unit-V Chemical Dynamics:

- A) Theories of reaction rates: Collision theory, collision rates in gases, energy requirement and steric requirement. Dynamics of molecular collisions. Transition state theory: assumptions, Statistical Mechanics and chemical equilibrium, derivations of Eyring equation, Application of transition state theory to reaction between atoms and molecules (e.g. The reaction $H + HBr \rightarrow H_2 + Br$) 6L.
- B) Unimolecular reactions: Lindemann-Christiansen hypothesis and Hinshelwood treatment, Marcus's extension of the RRK treatment. 3L.
- C) Reactions in solution: Solvent effect on reaction rate, Factors determining reaction rate. Numericals. 3L.

List of Books :

- 1) Physical chemistry by P.W. Atkins & dePaula 7th Edition
- 2) Introduction to Quantum chemistry by A.K. Chandra, Tata Mc
- 3) Quantum chemistry by Ira N. Levine.
- 4) Molecular quantum mechanics, Vol. I & II, P.W. Atkins, Oxford university press, 1970.

- 5) Statistical thermodynamics, by T.L.Hill, Addison Wesley, 1060
- 6) Chemical thermodynamics, by F.T.Wall, W.H.Freeman & Co. 1965
- 7) Irreversible thermodynamics, Theory and applications, by K.S.Forland, T. Forland, S.K.Ratje, Jonny Wiley, 1988.
- 8) Chemical Kinetics, by K.J.Laidler, 3rd Edition, Harper and row, 1987.
- 9) Chemical Kinetics-A study of reaction rate in solution, K.Conors, V.C.H.Publication 1990.
- 10) Chemical Kinetics and Dynamics, By J.I.Streinfeld, J.S. Francisco & W.I.Hase, Pritice Hall, 1989.
- 11) Kinetics and Mechanism of Chemical transformation, J.Rajraman, J. Kucriacose, Mc-Million
- 12) Molecular reaction Dynamics and chemical reactivity, R.D.Levine and R.B. Benstin, Oxford University press. 1987.
- 13) Physical Chemistry by Alberty and Silby, Jolly Wiley
- 14) Essential of Quantum Chemistry by Anant Raman.
- 15) Introduction to Relativistic Quantum Chemistry, K.G.Dyall, Oxford University Press.
- 16) Molecular Quantum Mechanics, 4th Edition, P.W. Atkins, Oxford University Press

Semester I

PAPER-IV

Modern Methods of Separation

60hrs(4hrs/week),

12hrs/Unit

50 Marks

Unit-I

12L

Role of Analytical Chemistry: Classification of analytical methods-classical & instrumental. Types of instrumental analysis. Selecting an analytical method. Laboratory Operations and practices. Analytical balances (Semi micro and Micro balances) and their use in analytical chemistry. Techniques of weighing and errors. Volumetric glassware cleaning and calibration of glassware. Principal and Methods of sampling, theory of sampling, pit falls and problems associated with sampling. Techniques of sampling of gases, liquids, solids and particulates. Stoichiometric calculations based on gravimetry and titrimetry analysis of commercial samples. Transmission and storage of samples. Effect of sampling uncertainties samplers's responsibility, sampling hazards.

Unit-II

12L

Statistical Analysis: (Emphasis should be placed on numerical problems) Collection, Treatment and presentation of analytical data. True, standard and observed value. Definition of terms in mean and median. Errors in chemical analysis, classification of errors, nature and origin of errors. Accuracy and precision. Average deviation and standard deviation and its physical significance. Normal distribution curve and its properties. Coefficient of variation. Confidence limit and probability. Probability theorem, probability curves, comparison of analytical results. Tests for rejection of data. T-test, F-test and Q-test. Significant figures and computation rules. Least squares method for deriving calibration graph. Curve fitting, Correlation co-efficient. Limit of detection. Regression analysis and Statistical analysis of Chemical analysis.

Unit-III**Modern method of separation:**

12L

Chromatography: General principles and Classification of various techniques. Study of following chromatographic techniques: Partition Chromatography, Liquid-Liquid Chromatography, Reverse Phase chromatography. Adsorption chromatography. Principles, Techniques and applications of paper, Thin-layer, column, HPLC, Gas Chromatography, size exclusion chromatography and Electro chromatography.

Unit-IV**Ion exchange**

12L

Ion-Exchange Separation: Fundamental properties of ion exchangers. Theory of ion exchange, exchange capacity, screening effect, penetration of electrolytes into ion exchange resins, sorption of complex ions Cation and Anion exchangers, Action of ion exchange resins. Ion-exchange equilibria and ion exchange capacity. Strongly and weakly acidic cation exchangers. Strongly and weakly basic anion exchangers. Liquid ion exchangers, chelation ion exchangers, techniques of ion exchange, use of non aqueous solvents in ion exchange separation, application of ion exchange separation in determination of total salt concentration, removal of interfering ions, separation of anions and metals and application in analytical chemistry. Separation using solvent mixture.

Unit-V**Solvent Extraction**

12L

Solvent Extraction: Basic principles, Classification, Mechanism of extraction. Multiple extraction. Significance of various terms factors favouring solvent extraction,

Extraction equilibria. Quantitative treatment of solvent extraction. Synergetic effects, ion-pair extraction, salting out effect and stripping. Techniques in extraction, application of diketone, hydroxyquinoline, oximes, dithiocarbamates, xanthates, thiols, high molecular weight amines i.e. crown ethers, cryptands and calixarenes. Advantages, applications of synergistic extraction. Separation of nonmetals and metals.

List of Books.

1. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age International Publication.
2. Day & Underwood: Quantitative Analysis.
3. Findley: Practical Physical Chemistry:
4. A. I. Vogel A Text book of Quantitative Inorganic Chemistry, ELBS, London.
5. Strouts Galfillal: Analytical chemistry
6. Y. Lyalikov: Physicochemical Analysis
7. S. Wilson & P. Jones: Chemical Analysis Vol I
8. Meites and Thomas: Advance Analytical Chemistry. (Mc Graw Hill)
9. H.H. Willard, L.L. Merritt and J.A. Dean: Instrumental Methods of Analysis (Van Nostrand).
10. B. L. Krayner, H. H. Willard. L. Merritt, J. A. Dean & F. A. Settle: Instrumental Methods of Analysis (CBS Publishers, Delhi, 1986)
11. R. D. Brown Instrumental Methods of Chemical Analysis (Mc Graw Hill)
12. L. R. Snyder & C. H. Harvath: An Introduction to Separation Science (Wiley Interscience)
13. F. J. Wicher Robert: Standard Methods Chemical Analysis.
14. G. L. Davis Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar, Analytical Chemistry.
15. S. M. Khopkar Analytical Chemistry of Macrocyclic and supramolecular and compounds, Narosa publication.
16. R. D. Budhiraja Separation Chemistry, New Age.
17. Kaushik & Kaushik Perspectives in Environmental Studies, New Age
18. R.L. Peesok and L.D. Shield: Modern Methods of Chemical Analysis.
19. Data Analysis for Chemistry, D.B. Hibbert, Oxford University Press.
20. Analytical Chemistry, S.P.J. Higson, , Oxford University Press

Semester I**Organic Chemistry Practical-I**

Total Hours: 90 hrs. (9 Hours per week)

Marks: 100

Unit-I Organic Synthesis

Student is expected to carry out minimum of 8-10 organic preparation (involving two steps) from the following lists.

1. Preparation of Benzanilide from Benzophenone.
2. Preparation of p- nitroaniline from Acetanilide.
3. Preparation of p-Bromoaniline from Acetanilide.
4. Preparation of m-nitroaniline from Nitrobenzene.
5. Preparation of p-Chlorotoulene from p-Toluidine.
6. Preparation of p- nitrobenzoic acid from p-Nitrotoulene.
7. Cannizzaro's reaction with 4-Cholobenzaldehyde as a substrate.
8. Preparation of 2-Phenylindole (Fischer-Indole synthesis).
9. Claisen ó Schmidt: Dibenzal acetone from benzaldehyde.
10. Preparation of Anthranilic acid. (Hoffman's bromamide reaction).
11. Diels ó Alder reaction: Anthracene + Maleic anhydride.
12. Methyl ó orange from Sulphanilic acid.
13. Hydroquinone to 2,5-Dihydroxyacetophenone.
14. Chlorobenzene to 2,4- Dinitrophenylhydrazine.
15. Nitrobenzene to p- Aminophenol.

UNIT-II Quantitative Analysis

Student is expected to carry out following estimations (minimum 6 estimations.)

1. Estimation of Vitamin ó C ó Iodometry.
2. Estimation of Phenol by KBrO₃-KBr.
3. Estimation of Amine by Bromate/ Bromide solution.
4. Estimation of Formaldehyde by Iodometry.
5. Estimation of Glucose by Benedict's solution.
6. Estimation of given carbonyl compound by hydrazone formation.
7. Estimation of Aldehyde by Oxidation method.
8. Determination of percentage of number of hydroxyl group in an organic compound by acetylation method.

Practical-I**Organic Chemistry**

Time : 6-8 Hrs.

(One day Examination)

Marks : 100

- (1) Exercise-1 (Organic Synthesis) - 40 Marks
- (2) Exercise-2 (Qualitative Analysis) - 40 Marks

(3) Record

-10 Marks

(4) Viva-Voce

-10 Marks

Semester I**Practical II****Physical Chemistry****Total Hours: 90 hrs.****9 Hours per week****Time: 6 – 8 hrs.****Marks: 50****Use of Computer Programs 5 terms of practicals :**

Treatment of experimental data, X-Y plots, programs with data preferably from physical chemistry practicals. Students will operate two packages I) MS-Word and II) MS-Excel.

Part –A

- 1) To study the surface tension-concentration relationship for solution and determination of surface excess concentration by using Gibbs's adsorption equation.
- 2) To find out the molecular surface energy and the association factor of ethyl alcohol.
- 4) To compare the cleansing power of two samples of detergent by surface tension method.
- 5) To study the effect of concentration of an electrolyte (KCl, NaCl) on solubility of an organic acid.
- 6) To study the kinetics of iodine clock reaction.
- 7) To study the reaction between acetone & iodine in presence of acids.
- 8) To study the decomposition of hydrogen peroxide catalyzed by iodine ion.

Part- B

- 1) To measure refractometrically average polarisability of some common solvents.
- 2) To find out the order of reaction and velocity constant of inversion of cane sugar by acid polarimetrically.
- 3) Polarimetric determination of the specific rotation of camphor in benzene and carbon tetrachloride.
- 4) Determine the rate constant, order of reaction and energy of activation of saponification of ethyl acetate by sodium hydroxide conductometrically.
- 5) To find out degree of dissociation constant of acetic acid and monochloroacetic acid by conductometrically.
- 6) Determination of strength of strong and weak acid in given mixture conductometrically.

- 7) To determine equivalence conductance of strong electrolytes at several concentrations and verification of Debye-Huckel Onsagar principle conductometrically.
- 8) Determination of solubility and solubility product of sparingly soluble salts (PbSO_4 , BaSO_4) conductometrically.
- 9) To find out composition of ferric ion thiocyanate/Nickel and o-phenanthroline complex by Job's method by colorimetrically
- 10) To study the complex formation between ferric and salicylic acid and find the formula and stability constant of the complex colorimetrically.
- 11) To determine the dissociation constant of phenolphthalein colorimetrically
- 12) To determine the dissociation constant of Cu (II) and Fe (III) solution photometrically by titrating it with EDTA

Practical-II

Physical Chemistry

Time : 6-8 Hrs. (One day Examination)	Marks : 100
(1) Exercise-1 (Instrumental)	- 40 Marks
(2) Exercise-2 (Non-Instrumental)	- 40 Marks
(3) Record	- 10 Marks
(4) Viva-Voce	- 10 Marks

List of Books:-

1. Findley's Practical Physical Chemistry, B.P. Levitt Longman.
2. Practical Physical Chemistry, A.M. James and F.F. Prichard Longman.
3. Experimental Physical Chemistry, R.C. Das and B.Behra, Tata McGraw Hill.
4. Advanced Physical Chemistry Experimentals Gurtu-Gurtu Pragati Prakashan
5. Experimental Physical Chemistry, V.D. Athanale and Parul Mathur New age International
6. Advance Practical Physical Chemistry J.B. Yadao Goel Pubs. House.
7. Experimentals in Physical Chemistry by Dr. D.V.Jahagirdhar.
8. Experiments in Physical Chemistry by D.P.Shoemaker.
9. Systematic experimental Physical Chemistry by Dr. T.K. Chandhekar & S.W. Rajbhoj.

Syllabus for Semester II

Paper V

Co-ordination Chemistry

60hrs (4hrs/week). 12hrs/unit

50 Marks

Unit-I

12L

Ligand field theory (LFT), Failure of ionic model of CFT. Experimental evidences in support of metal ligand orbital overlaps, Adjusted crystal field theory (ACFT), Molecular Orbital Theory: Ligand symmetry orbitals, Sigma and pi-molecular orbitals, Qualitative treatment of MOT of Octahedral complexes with sigma bonding and also with sigma and pi bonding. Qualitative MO diagrams and their interpretation of octahedral, tetrahedral and square planer complexes with example. Explanations of charge transfer spectra. Comparison of theories of bonding-VBT, CFT, LFT and MOT.

Unit-II

12L

Electronic spectra:

Spin-orbit (L-S) coupling scheme, calculation of spectral term symbols for ground state and excited states, selection rules, vibronic coupling, electronic spectra of transition metal complexes, charge transfer spectra, band intensities, band energies, band width & shapes, construction and application of Orgel diagrams, Tanabe-Sugano diagrams, spectra of octahedral, tetrahedral and square planar complexes with examples, Jahn-Teller effect, calculation of crystal field parameters ($10Dq$, B , and C) for octahedral Ni (II) and Co(II) complexes from electronic spectra. Spectrochemical series, Nephelauxetic effect and Nephelauxetic series of ligands. Magnetic moment, electronic spectra and structure of complexes.

Unit-III

Reaction Mechanism of Transition Metal complexes -I

12L

Reactivity of metal complexes, ligand replacement reaction: classification of mechanism and energy profile of reaction. Inert and labile complexes, interpretation of lability and inertness of transition metal complexes on the basis of VBT and CFT. Factors affecting the lability of a complex, transition state or activated complex, substrate, attacking reagents electrophilic and nucleophilic, Nature of central atom. Kinetic application of CFT. Kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism,

direct & indirect evidences in favour of conjugate mechanism, anation reaction, reaction without metal ligand bond cleavage, reactions of coordinated ligands. Molecular rearrangement complexes. Geometrical, linkage and optical isomerization reactions. Ligand stereospecificity.

Unit-IV Reaction Mechanism of Transition Metal complexes -II 12L

Substitution reaction in square planer complexes: the trans effect, cis effect, steric effect, solvent effect, effect of leaving group, effect of charge, effect of nucleophile, effect of temperature. Trans effect theories, uses of trans-effect, mechanism of substitution reactions in Pt(II) complexes. Electron transfer reactions. Types of electron transfer reactions, conditions of electron transfer, and mechanism of one-electron transfer reactions, outer sphere and inner sphere mechanisms, two electron transfer reactions-complimentary and non-complimentary reactions. Tunneling effect, cross-reaction, Marcus-Hush theory, bridged activated mechanism. Synthesis of coordination compounds using electron transfer reactions. Photochemical reaction of Chromium and Ruthenium complexes.

Unit-V Metal pi-Complexes: 12L

Metal carbonyls: Structure and bonding, vibrational spectra of metal carbonyls for bonding and structure elucidation, important reaction of metal carbonyls, Metal nitrosyls: Nitrosylating agents for synthesis of metal nitrosyls, vibrational spectra and X-ray diffraction studies of transition metal nitrosyls for bonding and structure elucidation, important reactions of transition metal nitrosyls, structure and bonding. Dinitrogen and dioxygen complexes; Wilkinson's catalyst and Vaska's compound. Fluxional Organometallic compounds (h^2 -olefin, h^3 -allyl and diene complexes)

List of Books

1. J.E.Huheey :Inorganic Chemistry
2. F.A.Cotton & G. Wilkinson: Advanced Inorganic Chemistry 3rd, 5th & 6th Editions.
3. A.F. Williams: Theoretical Approach in inorganic chemistry.
4. Mannas Chanda: Atomic Structure and chemical Bonding
5. L. E. Orgel: An Introduction To transition metal chemistry, Ligand field theory, 2nd Edition.
6. J. J. Logowski: Modern Inorganic Chemistry

7. B.Durrant and P.J.Durrant: Advanced Inorganic Chemistry
8. J.C. Bailar: Chemistry of co-ordination compounds.
9. W. L. Jolly: Modern Inorganic Chemistry Jones: Elementry Co-ordination chemistry.
10. B. N. Figgis: Introduction to Ligand field.
11. M.C.Day and J.Selbin: Therotical Inorganic Chemistry.
12. J. Lewin and Wilkins: Modern Co-ordination chemistry.
13. Purcell and Kotz: Inorganic Chemistry.
14. D. Banerjea: Co-ordination chemistry, Tata Mc. Graw. Pub.
15. A.F. Wells: Structural inorganic chemistry, 5th Edition, Oxford.
16. S. G. Davies: Organotransition metal chemistry applications to organic synthesis.
17. R. C. Mehrotra: Organometallic chemistry Tata McGraw Hill. Pub.
18. G. S. Manku: Thereotical priciples of inorganic chemistry
19. A. B. P. Lever: Inorganic electronic spectroscopy.
20. R.C.Maurya:Synthesis and charecterisation of novel nitrosyls compounds, Pioneer Pub. Jabalpur 2000.
21. R.H.Crabtree:The Organometallic chemistry of Transition metals, John Wiley.
22. D.N.Styanaryan:Electronic Absorption Spectroscopy and related techniques, University Press.
23. R. S. Drago: Physical methods in inorganic chemistry
24. F.Basolo &G.Pearson: Inorganic Reaction Mechanism
25. Organometallics II & I complexes with transition metal- carbon bonds: Manfred Bochmann- Oxford Press.
26. Advanced Inorganic Chemistry Vol I & II ó Satyaprakash, Tuli, Bassu and Madan- S Chand.
27. M.Tsusui,M.Nlevy,M.Ichikwa and K.Mori:Introduction to metal pi-complexe chemistry,Plenum press,NY
28. A.E.Martel;Coordination Chemistry-VolI&II,VNR.

PAPER VI

ORGANIC CHEMISTRY-II

60hrs (4hrs/week). 12hrs/unit

50 Marks

Unit-I : AROMATIC ELECTROPHILLIC SUBSTITUTION 12L
The arenium ion mechanism,orientation and reactivity,energy profile diagrams.The o/p ratio, ipso attack,orientation in benzene ring with more than one substituents, orientation in other ring system. Diazonium coupling, Gatterman-koch reaction, Pechman reaction,Houben óhoesch reaction.

Unit-II: A) ADDITION TO CARBON – CARBON MULTIPLE BOND 12L

Mechanistic and stereochemical aspects of addition reaction involving electrophiles, nucleophiles and free radicals, regio and chemoselectivity, Orientation and stereochemistry, Addition to cyclopropanes, Hydrogenation of double bond and triple bonds. Hydrogenation of aromatic rings, hydroboration, Michael reaction.

B) Addition to Carbon-Heteroatom multiple bonds.

Mannich reaction, Lithium-Aluminium Hydride, reduction of carbonyl compounds, nitriles, Reformatsky reaction, Aldol Condensation, Knoevenagel reaction, Perkin Witting, Stobbe reaction, Hydrolysis of esters and amide, ammonolysis of esters.

Unit-III : FREERADICAL REACTION 12L

Type of free radical reactions, free radical substitution mechanism at an aromatic substrate, aliphatic substrate, reactivity at a bridgehead position. Neighbouring group assistance, reactivity for aliphatic and aromatic substrates, reactivity in attacking radicals, effect of solvent on reactivity.

Halogenation at an alkyl carbon, allylic carbon, hydroxylation at an aromatic carbon by means of Fenton's reagent. Oxidation of aldehydes to carboxylic acids. Chlorosulphuration (Reed Reaction) Coupling of alkynes and arylation of aromatic compounds by Diazonium salts. Sand Meyer reaction. Free radical rearrangement, Hunsdiecker reaction.

Unit-IV : MECHANISM OF MOLECULAR REARRANGEMENT 12L

Classification and General mechanistic treatment of electrophilic, nucleophilic and free radical molecule rearrangement. Mechanism of the following rearrangement: Wagner-Meerwin, Pinacol-Pinacolone, Tiffeneau, Demjanov ring expansion, Favorski, Wolff, Fritsch-Butenber-Wiel, Curtius Lossen, Beckman, Hoffman, Schmidt rearrangement.

Unit-V : GREEN CHEMISTRY 12L

Designing a green synthesis: Choice of starting material, choice of solvents. Basic principle of green chemistry: Prevention of waste by products, Maximum incorporation of the reactants (starting material and reagents) into the final products. Rearrangements reaction, Addition reaction, substitution, elimination reaction. Prevention or

minimization of hazardous products. Designing of safer chemical. Synthesis involving basic principles of green chemistry, some examples. Synthesis of styrene, Synthesis of urethane, Free radical bromination, Synthesis of paracetamol, Synthesis of Ibuprofen.

BOOKS SUGGESTED-

- Advanced organic chemistry: Reaction mechanism and structure. Jerry March, John Wiley.
- Advanced organic chemistry- F.A. Carey and R.J. Sunberg, Plenum.
- A Guidebook to mechanism in organic chemistry- Peterskies, Longman.
- Structure and mechanism in organic chemistry- C.K. Gold, Cornell University Press.
- Organic chemistry, R.T. Morrison Boyd. Prentice Hall
- Modern organic chemistry- H.O. House, Benjamin.
- Principles of organic chemistry- R.O.C. Norman and J.M. Coxon, Blackie Academic and Professional.
- Reaction mechanism in organic chemistry- S.M. Mukharji and S.P. Singh, Macmillan.
- Stereochemistry of organic compounds- D. Nasipuri, New age international.
- Stereochemistry of organic compounds- P.S. Kalsi, New age international.
- Frontier orbitals and organic chemical reactions- I. Fleming.
- Orbital Symmetry: R.E. Lehr & A.P. Marchand.
- Reactive intermediate in organic chemistry- N. S. Isaacs.
- Stereochemistry of carbon compounds- E.L. Eliel.
- Physical organic chemistry- J. Hine.
- Name reaction in organic chemistry: Surrey.
- Advanced organic chemistry: L.F. Fieser and M. Fieser.
- Vol. I & II organic chemistry - I. L. Finar.
- Modern organic chemistry- J.D. Roberts and M. C. Caserio.
- The search for organic reaction pathways (Longman), Peter Skyes.
- Organic chemistry 5th Edition (McGraw Hill), Pine.
- Organic chemistry (Willard Grant Press Botcon), John McMurry.
- A Textbook of organic chemistry- R.K. Bansal.
- New trends in green chemistry: V.K. Ahluwalia & M. Kidwai, Anamaya publishers New Delhi.
- Heterocyclic Chemistry, John Joule, Oxford University Press.

Paper- VII**Physical Chemistry-II**

60 Hours (4-Hours/week)

50 Marks

12 hours/Unit

Unit-I Chemical Dynamics:

- A) Kinetics of Complex reactions: Chain reaction ($H_2 + Br_2 \rightarrow 2 HBr$ thermal and photo chemical reaction), Homogeneous catalysis (acid-base and enzymes), oscillating reactions (Belousov-Zhabotinsky reaction, Lotka-Volterra mechanism, the brusselator and the oregonator). 6L
- B) Fast reactions: General features of fast reactions, Stopped flow method, relaxation method, nuclear magnetic resonance method, flash photolysis. Numericals. 6L

Unit-II Quantum Chemistry:

- A) Molecular orbital theory: Basic ideas, criteria for forming M.O. from A.O., Construction of M.O. by LCAO for H_2^+ ion. Calculation of energy levels from wave functions, physical picture of bonding & anti-bonding wave functions, concept of orbitals and their characteristics. 6L
- B) Hybrid orbitals- sp , sp^2 , sp^3 . Calculations of coefficient of A.O. used in hybrid orbitals. Huckel theory of conjugated systems, bond order & charge density calculations. Applications to ethylene, butadiene, cyclopropenyl radical, cyclo- butadiene. Numericals. 6L

Unit-III Macromolecules:

- A) Definition of macromolecule (Polymer), types of polymers, Random coils, configuration and conformation of macromolecules, electrically conducting molecular wires, fire resistant, liquid crystal polymers, kinetics of polymerization, mechanism of polymerization. The stability of biological polymers. 6L
- B) Number average & mass average molecular mass, molecular mass determination by Osmometry, Viscometry, Ultracentrifugation, Electrophoresis, Size-exclusion chromatography and Light scattering methods. Numericals. 6L

Unit-IV Electrochemistry:

- A) Electrochemistry of solutions: Debye-Huckel-Onsager treatment and its extension, ion solvent interactions. Theory of electron transfer processes, electron tunneling. The electrode-solution interface, structure of electrified interface, electric potential at the interface. 6L

- B) The rate of charge transfer, the Butler-Volmer equation, the low overpotential limit, the high overpotential limit, Tafel plot. Voltammetry, concentration polarization, experimental techniques. Corrosion, types of corrosion, corrosion inhibitors, corrosion monitoring and prevention methods. Numericals. 6L

Unit-V Statistical Thermodynamics

- A) Concept of distribution, Thermodynamic probability and most probable distribution. Ensemble averaging, postulates of ensemble averaging. Canonical, grand canonical and micro-canonical ensembles, corresponding distribution laws (using Lagrange's method of undetermined multipliers). 6L
- B) Partition function- Translational, rotational, vibrational and electronic partition functions, calculations of thermodynamic properties in terms of partition functions. Applications of partition functions. Numericals. 6L

List of Books:

- 1) Physical chemistry by P.W. Atkins & dePaula 7th Edition
- 2) Molecular reaction Dynamics and chemical reactivity, R.D. Levine and R.B. Benstn, Oxford University press. 1987.
- 3) Physical Chemistry by Alberty and Silby, Jolly Wiley
- 4) Adsorption and Catalysis by solids, by D.K. Chakraborti, Wiley Eastern, 1990
- 5) The Theory of Adsorption and catalysis, by A. Clark, Academic press, 1970
- 6) Micells Theoretical and applied aspects, by V. Moroy. Plenum
- 7) Modern Electrochemistry by A.K.N. Raddy
- 8) Theoretical electrochemistry by D.I. Antropov, Mir Publisher 1972
- 9) Electrochemistry by J. Dvorak, J. Koryta, V. Bohackova.
- 10) Introduction to radiation chemistry by J.W.T. Spinks and R.J. Woods

Paper VIII**Optical Methods and Environmental Chemistry**

60hrs(4hrs/week), 12hrs/Unit

50Marks

Unit-I Optical Method

12L

Spectrophotometry and Colorimetry: Interaction of radiations with matters, Fundamental laws of Spectrophotometry. Beer's Lambert's law and its limitation. Verification of Beer's law and deviation from Beer's law. Ringbom's plot. Photometric titrations. pK value of indicator. Outline of construction and working of the UV-Visible spectrophotometers. (Single and double beam).

Applications of quantitative and qualitative analysis, problems.

Theory, instrumentation and applications of fluorimetry, Nephelometry, turbidimetry, Polarimetry & Refractometry.

Unit-II Flame Emission and atomic spectrometry: 12L

Flame photometry: Elementary theory of flame photometry. Instrumentation and experimental techniques. Interferences, analytical techniques and applications. Atomic absorption spectrometry (AAS): introduction, principles, Advantages of AAS over FES, Instrumentation, Flame atomization. Hollow cathod lamps, interferences and applications. Comparison of atomic absorption with atomic emission methods.

Unit-III WATER POLLUTION 12L

Origin of wastewater, types, water pollutants and their effects. Sources of water pollution, domestic, industrial, agricultural soil and radioactive wastes as sources of pollution. Objective of analysis, parameter for analysis colour, turbidity, total solid, conductivity, acidity, alkalinity, hardness, chloride, sulphate, fluoride, silica, phosphates and different forms of nitrogen. Heavy metal pollution, public health significance of Cadmium, Chromium, Copper, Zinc Lead, Manganese, Mercury and Arsenic. General survey of instrumental techniques for the analysis of heavy metals in aqueous systems. Oxygen content of water and aquatic life. Measurements of DO, BOD, COD and their significance as pollution indicators. Pesticides as water pollutants and analysis. A brief idea of coagulation and flocculation.

Unit-IV AIR POLLUTION 12L

Sources and sinks of gases pollutants, classification of air pollutants, effect of air pollutants on living and non-living things. Sources of air pollution, air quality standards and sampling. Analysis of air pollutants (CO, CO₂, NO_x, SO_x, H₂S, NH₃ and Hydrocarbons and particulates). Green house effect, acid rain, ozone depletion and their consequences on environment. Effects of air pollution, photochemical smog and monitoring of air pollution.

Unit-V Soil Pollution and Pesticide Analysis 12L

Chemistry of soil, soil irrigation by effluents. Agricultural pollution, role of micronutrients in soil, trace element analysis in soil

Pesticides and pollution, Sources of pesticide residue in the environment, classification of pesticides, pesticide degradation by natural forces, effect of pesticide residue on life. Analytical techniques for pesticide residue analysis. DDT problem.

Radiation pollution-Classification and effects of radiation. Effects of ionizing radiation on Man. Effect of nonionizing radiation on life, Radioactivity and nuclear fall out, protection and control from radiation.

List of Books

1. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age International Publication.
2. Day & Underwood: Quantitative Analysis.
3. Findley: Practical Physical Chemistry:
4. Vogel : A Text book of Quantitative inorganic Chemistry, ELBS, London.
5. Strouts Galfillal: Analytical Y. Lyalikov: Physocochemical Analysis
6. S. M.Khopkar:Basic concept in Analytical Chemistry
7. Meites and Thomas: Advance Analytical Chemistry. (Mc Graw Hill)
8. H.H.Willard ,L.L.Merritt and J.A.Dean: Instrumental Methods of Analysis (Van Nostrand).
9. B. L. Kraye, H. H. Willard. L. Merrit, J. A. Dean & F. A. Settle: Instrumental Methods of Analysis (CBS Publishers, Delhi, 1986)
10. R. D. Brown, Instrumental Methods of Chemical Analysis ,McGraw Hill
11. L. R. Shyder & C. H. Harvath: An Introduction to Separation Science (Wiley Interscience).
12. Environmental Chemistry, S. E. Manahan, Lewis Publishers.
13. Environmental Chemistry, Sharma & Kaur, Krishna publishers.
14. Environmental Chemistry, A. K. De, Wiley Eastern.
15. Environmental Pollution Analysis, S. M. Khopkar, Wiley Eastern.
16. Environmental Toxicology, Ed. J. Rose, Gordon and Breach Science Publication.
17. Elemental Analysis of Airborne Particles, Ed. S. Landberger and M. Creachman, Gordon and breach Science Publication.
18. Atmospheric pollution, W. Buch, McGraw Hill, New York.
19. Fundamentals of Air Pollution, S. J. Williason, Addison ó Wesley Publishers.
20. Analytical Aspect of Environmental Chemistry, D. F. S. Natush and P. K. Hopke. John Wiley & sons. New York.

21. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age.
22. Environmental Chemistry, J.W.Vanloon, Oxford University Press.

Semester II

Practical III

Physical Chemistry

Practical Work load (9Hours/week) Duration: 6Hours Marks : 100

Use of Computer Programs 5 terms of practicals.

Treatment of experimental data, X-Y plots, programs with data preferably from physical chemistry practical. Students will operate two packages I) MS-Word and II) MS-Excel.

Part A

- 1) To find out molecular weight of given liquid by steam distillation method.
- 2) To find out the molecular weight of sulphur, alpha-naphthol and biphenyl by freezing point method using naphthalene as a solvent.
- 3) To find out degree of association of benzoic acid in benzene by cryoscopy method.
- 4) To study the effect of temperature on adsorption.
- 5) To determine the viscosity of different mixture benzene, nitrobenzene and also test the validity of Kendall's method.
- 6) Identify and separate given mixture of amino acid by paper chromatography.
- 7) Separation of metal cations (Co, Ni, Zn, Mn) and the Rf value by paper chromatography.
- 8) Separate and identify sugar present in honey by paper chromatography.
- 10) To check up by TLC technique whether the following ink consist of single or multiple mixtures of dyes.

Part-B:

- 1) Determination of pK value of acid-base indicator (methyl red, methylene blue & bromo cresol) by spectrophotometrically.
- 2) Determination of standard electrode potential of Zinc and Copper.
- 3) To find the strength of HCl and Acetic acid in given mixture potentiometrically.
- 4) To find the strength of mixture of halides by titrating it against AgNO_3 solution potentiometrically.
- 5) To determine the hydrolysis constant of aniline chloride by emf method.
- 6) To determine the solubility and solubility product of a sparingly soluble salt potentiometrically.

- 7) To determine the heat of reaction, equilibrium constant and other thermodynamic functions for the reaction $\text{Zn} + \text{Cu}^{2+} = \text{Zn}^{2+} + \text{Cu}$ potentiometrically.
- 8) To titrate ferrous ammonium sulphate solution with potassium dichromate solution potentiometrically using bimetallic electrode pair.
- 9) To determine the dipole moment of given liquid.
- 10) To obtain the phase diagram of ethanol-water-benzene system at room temperature.
- 11) To obtain solubility curve for liquid say water-acetic acid-chloroform system.
- 12) Determination of strength of commercial phosphoric acid/Vinegar by conductometric analysis.

Physical Chemistry Practical

Books Suggested :

- 1) Experimental physical chemistry, R.C. Das and B. Behera, Tata McGraw-Hill
- 2) Advanced physical chemistry J.B. yadao, Goel Pub House
- 3) Experiments in physical Chemistry, D.P. Shormaker, C.W. Garland and J.W. Nibler, Tata McGraw Hill Comp.
- 4) Post graduate physical chemistry, Patel, Turakhia, Kelkar, Himalaya Pub House
- 5) Experiments, in physical chemistry, D.v. Jahagirdar, Himalaya Pub House
- 6) Practical Physical Chemistry, A. Findlay Revised by J.A. Kitehner, Longmans , Green
- 7) Experiments in Physical Chemistry, F. Daniels and J. Williams, Mc Graw Hill.
- 8) Systematic Experimental Physical Chemistry, T.K. Chondekar & S.W. Rajbhoj, Anjali Pub. Aurangabad.
- 9) Advanced Physical Chemistry Experiments, J.N. Gurtu & A. Gurtu, Pragati Prakashan
- 10) Practical Physical Chemistry, A.M. James & P.E. Prichard, Longam Group Ltd.
- 11) Experiments in physical Chemistry, J.M. Wilson, K.J. Newcombe, A.R. Denko, and R.M.W. Richett, Pergamon Press,
- 12) Senior Practical Physical Chemistry, B.D. Khosle and V.S. Garg S.Chand & Comp.

Practical-III
Physical Chemistry

Time : 6-8 Hrs. (One day Examination)	Marks : 100
(1) Exercise-1 (Based on Part-A)	- 40 Marks
(2) Exercise-2 (Based on Part-B)	- 40 Marks
(3) Record	- 10 Marks
(4) Viva-Voce	- 10 Marks

Semester II
Practical IV
Inorganic Chemistry Practicals

Practical Work load 9 Hrs. /Week Marks 50

- I] Preparation of inorganic compounds and their characterization by elemental analysis, MW determination, decomposition temperatures and molar conductance studies. (Minimum 6)
1. [VO (acac)₂]
 2. *Cis* K [Cr (C₂O₄)₂(H₂O)₂]
 3. Na [Cr (NH₃)₂(SCN)₄]
 4. Mn (acac)₃
 5. K₃ [Fe (C₂O₄)₃]
 6. Hg [Co (SCN)₄]
 7. [Co (Py)₂Cl₂]
 8. TiO (C₉H₈NO)₂(H₂O)₂
 9. *Cis* [Co (trine)(NO₂)₂] Cl H₂O
 10. [Cu₂ (CH₃COO)₄(H₂O)₂]
 11. K₃ [Al (C₂O₄)₃](H₂O)₃
 12. Ni (dmg)₂
- II] A) Quantitative Analysis of mixture of two cations:
Quantitative analysis of binary mixture of cations involving their chemical separation and separate analysis of one cation by gravimetry and another by volumetric or colorimetric. Certain model examples are given below:
- i) Copper (II) and Nickel (II)
 - ii) Copper (II) and Zinc (II)
 - iii) Nickel (II) & Zinc (II)
 - iv) Copper (II) & Iron (III)
- B) Analysis of Limestone, Dolomite and Bauxite.
- III] Qualitative analysis of radicals
Qualitative analysis of inorganic mixture for a total of five radicals including interfering radicals (not more than one such radical in a mixture), rare earth (not more than two rare earths in a mixture) and combination of cations (minimum 8 mixtures).

Cations: Mercury (I, II), Pb, Ag, Bi (III), Cu (II), Cd (II), As (IV, V), Sb (IV, V), Sn (II, IV), Fe (III), Al (III), Cr (III), Ni (II), Co (II), Mn (II), Zn (II), Barium, Strontium, Calcium and Magnesium.

Interfering radicals: Phosphate, Oxalate, Fluoride and Borate.

Rare Earth: Tl, Mo, W, Se, Ti, Zr, Th, V, U, Ce.

The Practical examination will be based on the Inorganic Chemistry.

Time: 6-8 hours (one day examination)	Marks: 100
I) Exercise -1 (Synthesis/Radicals)	- 40 Marks
II) Exercise-2 (Estimation)	- 40 Marks
III) Record	- 10 Marks
IV) Viva- Voce	- 10 Marks
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Total	- 100 Marks

List of Books-

1. Synthesis and Characterization of Inorganic Compounds, W. L. Jolly, Prentice Hall.
2. Inorganic Experiments, J. Derck Woollins, VCH.
3. Practical Inorganic Chemistry, G. Mairand, B. W. Rockett, Van Nostrand.
4. A Text Book of Quantitative Inorganic Analysis, A. I. Vogel
5. EDTA Titrations. F. Laschka
6. Instrumental Methods of Analysis, Willard, Merit and Dean (CBS, Delhi).
7. Inorganic Synthesis, Jolly
8. Instrumental Methods of Chemical Analysis, Yelri Lalikov
9. Fundamental of Analytical Chemistry, Skoog D.A. & West D.M Holt Rinehart & Winston Inc.
10. Experimental Inorganic Chemistry, W.G.Palmer, Cambridge.

Syllabus for Semester III

Paper IX

Spectroscopy I

60 Hours (Four hours/week) 12 Hrs. / Unit. Max.Marks.50.

Unit-I

- A) Unifying principle: Electromagnetic radiation, interaction of electromagnetic radiation with matter- absorbance emission, transmission, reflection, refraction, dispersion, polarization and scattering. Uncertainty relation and natural line width and line broadening, transition probabilities, results of the dependent perturbation theory, transition moment, selection rule, intensity of spectral lines. Born-oppenheimer approximate, rotational, vibrational and electronic energy level.

B) Microwave spectroscopy: Classification of molecules, rigid rotor model, effect of isotopic substitution on the transition frequencies, intensities, non rigid rotor, Stark effect, nuclear and electron spin interaction and effect of external field, applications. 6L

Unit-II A) Ultraviolet and visible spectroscopy : Various electronic transition (185-800nm), Beer-Lambert law, effect of solvent on electronic transition, UV band for carbonyl compounds, unsaturated carbonyl compound, diene, conjugated polyenes. Fisher-Woodward rules for conjugated dienes and carbonyl compounds, UV spectra of aromatic and heterocyclic compounds. Steric effects in biphenyls. 4L

B) Infrared spectroscopy : Review of linear harmonic oscillator, vibrational energies of diatomic molecules, zero point energy, force constant and bond strength, anharmonicity, Morse potential energy diagram, vibration of polyatomic molecules, selection rules, normal modes of vibration, group frequencies, overtone band, factors affecting the band position and intensities, far IR region, metal ligand vibrations, Instrumentation and sample handling characteristics. Vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, amines. Detail study of vibrational frequencies of carbonyl compounds, (ketones, aldehydes, esters, amides, acids, acid chlorides and anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent on vibrational frequencies, overtones, combination bands and Fermi resonance. FT-IR, IR of gaseous solids and polyatomic materials. Modes of bonding of ambidentate ligands etc. 8L

Unit-III : Mass spectrometry: Introduction, theory, measurement techniques (EI, CI, FD, FAB) recording of mass spectrum. types of ions, isotopic contribution, fragmentation process, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds of various types, common functional groups, molecular ion, metastable ions, McLafferty rearrangement. Retro-Diels Alder fragmentation, nitrogen rule. High resolution mass spectrometry. Examples of mass spectral fragmentation of organic compounds with respect to their structural determination. 12L

Unit-IV Nuclear Magnetic Resonance Spectroscopy: General introduction and definition of nuclear spin, nuclear resonance shielding of magnetic nuclei, chemical shift, factors influencing chemical shift, deshielding, chemical shift values and correlation for protons bonded to carbons (aliphatic, olefinic, aldehydic, aromatic) and other nuclei. (alcohols, phenols, enols, acids, amides, and mercaptans), chemical exchange, effect of deuteration, spin spin coupling (n+1) rule, complex spin spin interaction between two, three, four, and five nuclei (first order spectra) factors affecting coupling constant δJ classification of spin system like AX, AX₂, ABX, AMX, ABC, A₂B₂ etc. Spin decoupling, basic idea about instrument, mechanics of measurement, Stereochemistry, hindered rotation. 12L

Unit-V A) Karplus curve-variation of δJ with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagent, solvent effects, Fourier transform technique, nuclear Overhauser effect (NOE). resonance of other nuclei like P, F. some application including biochemical system, an overview of NMR of metal nuclei with emphasis on ¹⁹⁵Pt and ¹¹⁹Sn NMR. 6L

B) Carbon : ¹³C NMR spectroscopy : General consideration, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl), coupling constants, general idea about two dimensional NMR spectroscopy δ COSY, NOESY- DEPT techniques, solid state NMR. 6L

Books suggested

- 1) Spectroscopic identification of organic compound-RM Silverstein, GC Bassler and TC Morrill, John Wiley
- 2) Introduction to NMR spectroscopy-RJ Abraham, J Fisher and Ploftus Wiely
- 3) Application of spectroscopy to organic compound-JR Dyer, Printice Hall
- 4) Organic spectroscopy-William Kemp, ELB with McMillan
- 5) Spectroscopy of organic molecule-PS Kalsi, Wiley, Esterna, New Delhi
- 6) Organic spectroscopy-RT Morrison, and RN Boyd
- 7) Practical NMR spectroscopy-ML Martin, JJ Delpench, and DJ Martyin
- 8) Spectroscopic methods in organic chemistry-DH Willson, I Fleming
- 9) Fundamentals of molecular spectroscopy-CN Banwell
- 10) Spectroscopy in organic chemistry-CNR Rao and JR Ferraro
- 11) Photoelectron spectroscopy-Baber and Betteridge

- 12) Electron spin resonance spectroscopy-J Wertz and JR Bolten
- 13) NMR δBasic principle and application-H Guntur
- 14) Interpretation of NMR spectra-Roy H Bible
- 15) Interpretation of IR spectra-NB Coulthop
- 16) Electron spin resonance theory and applications-W gordy
- 17) - Mass spectrometry organic chemical applications ,JH Banyon

Semester III

Paper X

Analytical Chemistry-I

Thermal & Electroanalytical Methods

Total Lectures: 60Hours, 4Hours per week, 12Hours/unit Total Marks: 50

- Unit-I : Thermal methods of Analysis: 12L**
 Introduction of different thermal methods, Thermogravimetry TG and DTG, Static thermogravimetry, quasistatic Thermogravimetry and dynamic thermogravimetry, Instrumentation, Factors affecting thermograms, Applications of thermogravimetry, Differential thermal analysis (DTA), DTA curves, Factors affecting DTA curves, instrumentation, applications of DTA. Simple numerical problems.
 Differential Scanning Colorimetry(DSC): Introduction, Instrumentation, DSC-curves, factors affecting DSC curves and applications. Thermometric Titrations; Introduction, apparatus, theory and applications.
- Unit-II : Electroanalytical Methods 12L**
 Conductometry: Principal of analysis, measurement of conductance, analytical applications of conductometry, conductometric titrations. High frequency titrations. Types of cells used, instrumentation and applications. Problems. Electrogravimery: Theory of electrolysis, electrode reactions, over voltage, characteristics of deposits and completion of deposition, separation of metals.
 Coulometry: Principal, coulometry at constant potential, coulometry at constant current, coulometric method of analysis, instrumentation, coulometric titrations. Advantages of coulometric titrations. Applications of coulometric titrations

- Unit-III : Electroanalytical Techniques 12L**
 Potentiometry & pH Metry: Potentiometry, Indicator electrodes: hydrogen electrode, quinhydrone electrode, antimony electrode and glass electrode, Reference electrodes, Bimetallic electrode, Theory of potentiometric titrations, Problems, Nernst equation, standard electrode potential, Determination of cell potential, n, Kf and Ksp. pH titrations. Ion Selective Electrodes: Terminology, types and construction of ion selective electrodes. Electrical properties of membrane, Glass membrane electrodes, solid-state sensors, gas sensing and enzyme electrodes. Glass electrode with special reference to H⁺, Na⁺, K⁺ ions, interference, ion activity evaluation methods, operations of solid membrane electrode, operation of liquid membrane electrode, coated type ion electrode. Applications of ion selective electrode in determination of some toxic metals and some anions (F⁻, Cl⁻, Br⁻, I⁻ and NO₃⁻). Advantages of ISEs.
- Unit-IV : Electroanalytical Techniques: 12L**
 Polarography : Basics of polarography, reference and working electrodes, operational amplifiers concepts, components of the limiting current, adsorption, kinetic, catalytic and diffusion currents and to distinguish them. Dropping mercury electrode, Ilkovic equation-diffusion current constant and capillary characteristics determination. Half wave potential, Polarographic maxima. Role of temperature on diffusion current. Reversible, quasi reversible and irreversible electrode reactions and evaluation of parameters using various reactions. Organic polarographic analysis. Limitations of polarography, advancements-pulse and differential pulse polarography.
- Unit-V : Electroanalytical Techniques 12L**
 Voltammetry & amperometric: Linear and Cyclic sweep voltammetry. Randleø Sevcik equation. Adsorption complications in voltammetry. Tests for electrode reactions coupled with chemical reactions, EC and ECE reactions. Application of voltammetry in the study of unstable reaction intermediates. Enzyme catalyzed reactions and applications of voltammetry in monitoring such reactions.
 Stripping Technique: Anodic and cathodic stripping voltammetry and their applications in the trace determination of metal ions and biologically important compounds. Principal, methodology and applications amperometric titrations. Chronopotentiometry.

List of Books-

1. Day and Underwood: Quantitative Analysis
2. A. I. Vogel: A text book of quantitative analysis.
3. Flaschka: EDTA Titration
4. Meites and Thomas: Advanced Analytical Chemistry.
5. G. W. Ewing: Instrumental Methods of Chemical Analysis.
6. R. S. Draga: Physical Methods in Inorganic Chemistry
7. G. D. Christian: Analytical Chemistry
8. S. M. Khopkar: Basic Concept of Analytical Chemistry.
9. Kolltath and Ligane: Polarography
10. Braun: Instrumental Methods of Chemical Analysis
11. Willard, Merritt and Dean: Instrumental Methods of Analysis
12. Strouts, Crifillan and Wison: Analytical Chemistry.
13. J. W. T. Spinks and R. J. Woods: Introduction to Radiation Chemistry.
14. S. A. Skoog and D. W. West: Fundamental Of Analytical Chemistry
15. R. V. Dilts: Analytical Chemistry

Semester III**Paper XI****Special Paper-I****Inorganic Chemistry (Bio-inorganic Chemistry)**

Total Lectures: 60Hrs, 4 Hrs per week, 12 Hrs/unit Total Marks-50

Unit-I**12L**

- A) Essential and trace metals in biological systems:** Biological functions of inorganic elements, biological ligands for metal ions. Coordination by proteins, Tetrapyrrole ligands and other macrocycle. Influence of excess and deficiency of V, Cr, Mn, Fe, Co, Cu, & Zn. Genetic defects in the absorption of trace elements. Regulation and storage of trace elements. Role of minerals. Toxic effects of metals.
- B) Metal storage, transport and biomineralization with respect to Ferritin, Transferrin and Siderophores, Na⁺/K⁺ pump. Role of Ca in transport and regulation in living cells**

Unit-II**12L**

Medicinal use of metal complexes as antibacterial, anticancer, use of cis-platin as antitumor drug, antibiotics & related compounds. Metal used for diagnosis and chemotherapy with particular reference to anti cancer drugs. Chelate therapy, chemotherapy with compounds of some non essential elements; platinum complexes in cancer therapy. Antiviral activity of metal complexes. Gold containing drugs used in the therapy of Rheumatic-Arthritis, Gold complexes as anticancer drug. Lithium in psycho pharmacological drugs. Antimicrobial agents.

Unit-III**12L**

- A) Bio-energetics and ATP cycle:** DNA polymerization, metal complexes in transmission of energy, chlorophylls, photosystem I and photosystem II in cleavage of water, Model systems.
- B) Electron transfer in Biology:** Structure and functions of metalloproteins in electron transfer proteins, cytochromes & Fe-S proteins, Non-heme iron proteins; Rubredoxins, Synthetic models. Biological Nitrogen fixation (in vitro and in vivo)

Unit IV**12L**

Transport & Storage of Dioxygen: Heme proteins & oxygen uptake, structure and functions of haemoglobin, myoglobin, hemocyanins & hemerythrin. Perutz mechanism showing structural changes in porphyrin ring system. Oxygenation and deoxygenation. Model compounds. Cyanide poisoning and treatment. Vanadium storage and transport.

Unit-V**12L**

Metallo enzymes: Apoenzymes, Haloenzyme & Coenzyme. The principle involved and role of various metals in-

- i) Zn-enzyme:- Carboxyl peptidase & Carbonic anhydrase.
- ii) Fe-enzyme:-Catalase Peroxidase & Cytochrome P-450
- iii) Cu-enzyme:-Super Oxide dismutase
- iv) Molybdenum:-Oxatransferase enzymes, Xanthine oxidase,Co-enzyme

Vit. B₁₂, Structure of vitamin B₁₂ Co-C bond cleavage, Mutase activity of co- Enzyme B-12, Alkylation reactions of Methyl Cobalamin. Synthetic model of enzyme action, stability and ageing of enzyme.

Books:

1. Akhmetov, N.: General and Inorganic Chemistry.
2. Aylett, B. and Smith, B.: Problems in Inorganic Chemistry, (English University Press)
3. Bertini, et al: Bioinorganic Chemistry (Viva)
4. Charlot, G and Bezier, D.: Quantitative Inorganic Analysis (John Wiley).
5. Douglas, B. E. McDaniel, D. H. et al: Concept and Models of Inorganic Chemistry (4th ed.) J. Wiley
6. Dutt P. K.: General and Inorganic Chemistry.(Sarat Books House)
7. Fenton, David E.: Biocoordination chemistry, Oxford
8. Jolly, W. L. : Inorganic Chemistry (4th edn.) Addison-Wesley.
9. Katakis, D. and Gordon, G: Mechanism of Inorganic Reactions.(J. Wiley).

10. Leigh, G. J.: IUPAC Nomenclature of Inorganic Chemistry (1990;Jain-Interscience)
11. Massey, A. G.: Main Group Chemistry.
12. Porterfield, W. W.: Inorganic Chemistry-A unified approach (Holt Saunders)
13. Banerjee,D.:Coordination Chemistry,TMH
14. Lee J.D.:Concise Inorganic Chemistry,ELBS
15. Lippard S.J and Berg,J.M.: Principal of Bioinorganic Chemistry,University Sci.Book.,Mill Valley
16. Hay R.W.:Bioinorganic Chemistry, Ellis Horwood, Chichester and NY
17. Das A.K.: Text Book of Medicinal Aspects of Bioinorganic Chemistry,CBS
18. Sigel H.:Metal ions in Biological systems,Marcell Dekker,NY(Vol. I-31)
19. Reddy K.H.,Bioinorganic Chemistry,New Age Int.Pub.
20. Kaim W.and Schwederski B.:Bioinorganic Chemistry:Inorganic elements in the Chemistry of Life,JohnWiley & Sons.
21. Medicinal Inorganic Chemistry, Edited by Jonathan L.Sessler, Oxford University Press.

Semester III

Paper XII

Special Paper-II

Inorganic Chemistry (Solid State Chemistry)

Total Lectures:60 Hours,4Hours/week, 12Hours/unit Total Marks-50

Unit-I : **12L**

Crystal Structure of Some Simple Compounds:

- i) Ionic Crystals & Their structures, radius ratio rule, effect of polarization on crystals.
- ii) Covalent structure type-Diamond, Sphalerite & Wurtzite.
- iii) Geometry of simple crystal AB type: NaCl, CsCl & NiAs & Wurtzite, reasons for preference for a particular structure in above AB type of compounds.
- iv) AB_2 type: Fluorite, antiferrofluorites, Rutile structures. Li_2O , Na_2O , etc. $CdCl_2$, CdI_2 structures, difference between them. AB_2 type: ReO_3 , BiI_3 , $CrCl_3$, A_2B_3 type: Fe_2O_3 , Corundum Al_2O_3 , Mn_2O_3 .
- v) Ternary Compounds ABO_3 type: Perovskite, Barium titanate, lead titanate, $CaTiO_3$ Tolerance factor, charge neutrality & deviation structures. $FeTiO_3$.

- vi) AB_2O_4 type- Spinel, Normal & inverse, 2-3 and 4-2 spinel, packing of oxygen in tetrahedral & octahedral sites, sites occupancy number of site surrounding each oxygen, application of charge neutrality principles, site preferences in spinel, distorted spinel. Hausmannite (Jahn-Teller distortions), Factors causing distortion in spinel.

Unit-II: **12L**

Lattice Defects: Perfect & Imperfect crystals, point defects, Interstitial, Schottky defect, Frenkel defect, line defect & other entities, thermodynamics of Schottky & Frankel defects. Dissociation, theory of dislocation, plane defects- Lineage boundary, grain boundary, stacking fault, 3D defects, Defects & their concentrations, ionic conductivity in solids, Non stoichiometric compounds. Electronic properties of Non-stoichiometric oxides, solid electrolytes, pyknetric & electrical conductivity methods of study of defects, radiation effects on solid nature and properties, photography, colour centers, order-disorder changes, defects, imperfection equilibrium, atom movements, and defect interactions.

Unit-III : **12L**

Electronic Properties of materials: Metals, Insulators & semiconductors, electronic structure of solid: band theory, band structure of metals, insulators & semiconductors. Intrinsic & extrinsic semiconductors, doping semiconductors. Seebeck effect and Hall effect. Organic semiconductors, properties & their applications. Types of ionic conductors, mechanism of ionic conduction, diffusion, superionic conductors, phase-transitions & mechanism of conduction in super ionic conductors, applications of ionic conductors.

Unit-IV : **12L**

Dielectric polarization: Piezo-electricity, pyroelectricity, ferrielectricity, antiferroelectricity, ferroelectricity & their applications.

Superconductivity: Introduction, discovery magnetic properties of super conductor, theory of super conductivity, Meissner effect, type I & II superconductors, Josephson effects, Hc- temperature superconductor, crystal structure of high temperature semiconductors, & its uses.

Lasers and Masers actions, laser production and applications

Unit-V : **12L**
Magnetic Properties of Materials: Introduction, Magnetization, Electronic Spin and Magnetic Moment, Classification of materials, magnetic susceptibility, paramagnetism in metal complexes, diamagnetism, ferromagnetic metals, ferromagnetic compounds (CrO_2), Antiferromagnetism- transition metal monoxides, ferrimagnetism (ferrites), magnetic anisotropy, magnetostriction, cooperative phenomena- magnetic domains, Domain Theory, hysteresis loops (hard & soft magnets) magnetic storage & applications of magnetic materials. Spin glasses.

Books:

1. Azaroff L. V., Introduction to Solids, TMH
2. West A. R., Solid State Chemistry and its Applications, Plenum
3. Rao C. N. R., Solid State chemistry, Dekkar
4. Hagenmuller, Preparative methods in solid state chemistry
5. Keer H. V., Principles of the Solid state, Wiley Eastern.
6. Hannay N. B., Solid State Chemistry
7. Chakrabarty D. K., Solid State Chemistry, New Age Int.
8. West A. R., Solid state Chemistry, John Wiley
9. Pillai S. O., Solid state Physics, Academic press
10. Rey T. J., The Defects Solid state, Interscience
11. Azoroff L. V. Brophy J. J., Electronic Process in Materials, McGraw Hills
12. Anderson and Leaver, Materials Science
13. Kirkendall, Analytical Methods of Materials Investigations
14. Greenwood N. N. Ionic Crystals, Lattice Defects and Nonstoichiometry, Butter worth
15. Kroger Chemistry of imperfect crystals, Holland
16. Callister W. D. Jr., Material Science and Engineering An Introduction, Wiley India
17. Van Bueren H. G., Imperfection in Crystals, Wiley-Interscience
18. Brandon D and Kaplan W. D. Microstructural Characterization of Materials, Wiley NY.
19. Hummel R. E. Electronic Properties of Materials, Springer-Verlag
20. Solymar L. and Walsh D., Electrical properties of Materials, Oxford University Press
21. Jiles D., Introduction to Magnetism and Magnetic Materials, Nelson Thornes, Cheltenham
22. Kotz J. C., and Treichel, P. Jr. Chemistry AND chemical Reactivity, Saunders

23. Masterton W. L. and Hurley C. N. chemistry, Principles and Reactions, Harcourt

SEMESTER III

Paper XI

Special Paper-I

Organic Chemistry (Organic Synthesis-I)

Total Lectures: 60 Hrs, 4 Hrs per week, 12 Hrs/unit Total Marks-50

Unit-I : Photochemistry.

Interaction of radiation with matter, types of excitation, rate of excited molecules, quenching, Quantum efficiency, quantum yield, transfer of excitation energy, actinometry, singlet and triplet states, experimental methods in photochemistry of carbonyl compounds, and transition, Norrish type I and Norrish type II reactions Paterno-Büchi reaction, Photoreduction, Photochemistry of enones, Hydrogen abstraction rearrangement of unsaturated ketones and cyclohexadienones, Photochemistry of parabenzoquinones, photochemistry of Aromatic compounds with reference to isomerisation addition and substitution Photochemical isomerization of cis and trans alkenes, Photochemical cyclization of reaction, Photo-Fries rearrangement, Photo theory reaction of anilides 12L

Unit-II : Pericyclic Reactions

Molecular orbital symmetry, Frontier orbitals of ethylene, 1, 3-butadiene, 1, 3, 5-hexatriene, allyl system, classification of pericyclic reaction. FMO approach, Woodward-Hoffman correlation diagram method and Perturbation of molecular orbital (PMO) approach of pericyclic reaction under photochemical conditions. Electrocyclic reactions, conrotatory and disrotatory motion $4n$ and $(4n+2)$ systems, with more emphasis on $(2+2)$ and $(4n+2)$

Cycloaddition of ketones Secondary effects in $(4+2)$ cycloaddition. Stereochemical effects and effect of substituents on rate of cycloaddition reaction, 1,3-dipolar-cycloaddition and chelotropic reaction. Sigmatropic rearrangement, suprafacial, and antarafacial shift involving carbon moieties, retention and inversion of configuration, $(3,3)$ and $(3,5)$ sigmatropic rearrangements, Claisen and Cope rearrangements. 12L

Unit-III: A) Oxidation-Reduction and Electron transfer reactions

- I) Oxidation: Principle, aromatisation, dehydration yielding C=C, oxidation aldehyde, ketone, cleavage of C-C single bond in glycols, ozonolysis, epoxidation, Oppenauer oxidation, Sommelet reduction.
- II) Reduction: Selectivity in reduction, reduction of nitro and nitroso compounds, metal hydride reduction, dissolving metal reduction, reduction of aldehydes, ketones to alcohols, reduction of carbonyl group to methylene.
- III) Electron transfer reaction: Selective oxidation of alkyl side chain in aromatic compounds, alcohols and acid using Co(III), Reduction with LiAlH_4 , NaBH_4 .

12L

Unit-IV: A) Formation of C-C bond

Principle, disconnection, synthons, electrophilic and nucleophilic carbon species, use of following reaction in carbon carbon bond formation, base catalysed condensation, Aldol, Claisen, Perkin, Stobbes, Knoevenagel use of malonic and acetoacetic esters. Michael addition. Wittig reaction, use of acetylides, acid catalysed condensation of olefins, FC reaction, Fries reaction and Diels Alder reaction.

12L

- Unit-V: A) Umpolung concept:** Dipole inversion, generation of acyl anion, use of 1,3-dithiane, methylthiomethylsulphoxide bis(phenylthiomethane). Metallated enol ethers, alkylidene dithiane. ketone thioacetals, 2-propenethiobismethyl thioallyl anion.
- B) Phosphorus and sulphur ylides:** Preparation and their synthetic application along with stereochemistry. Enamines: Chemistry of enamines and their synthetic applications.

12L

Books suggested.

- 1) Principle of organic synthesis. R.C. Norman & J.M. Coxon
- 2) Modern synthetic reaction. H.O. House W.A. Benjamin
- 3) Organic synthesis, The disconnection approach-S. Warren
- 4) Designing organic synthesis-S. Warren
- 5) Some modern methods of organic synthesis-W. Carruthers,
- 6) Advance organic reaction. Mechanism & structure-Jerry March
- 7) Advance organic chemistry Part-B-F.A. Carey & R.J. Sundberg, Plenum P.
- 8) Organic reaction and their mechanism-PS Kalsi
- 9) Protective group in organic synthesis-TW Greene, & PGM
- 10) The chemistry of organophosphorus-AJ Kirby, & SG Warren
- 11) Organosilicon compound-C. Eabon

- 12) Organic synthesis via Boranes-HC. Brown
- 13) Organoborane chemistry-TP Onak
- 14) Organic chemistry of boron-W. Gerrard
- 15) Fundamentals of photochemistry-KK Rohatgi & Mukharji
- 16) Photochemistry-Cundau & Gilbert
- 17) Aspects of organic photochemistry-WM Horspool
- 18) Photochemistry-JD Calvert
- 19) Photochemistry-RP Wayne

Semester-III**Paper XII****Special Paper-II****Organic Chemistry (Natural Product-I)****Unit-I : Carbohydrates**

Types of naturally occurring sugars, deoxy sugars, amino sugars, branched chain sugars, methyl ethers and acid derivatives of sugars, general methods of structure and ring size determination with reference to maltose, lactose, sucrose, starch and cellulose.

12L

Unit-II : A) Amino acids, protein and peptides.

Amino acids, structural characteristics, acid base property, stereochemistry of amino acids, optical resolution, Stecker synthesis, peptide and proteins. Structure of peptide and protein, primary, secondary, tertiary and quaternary structure. Reaction of polypeptide, structure determination of polypeptide, end group analysis, purines and nucleic acids, chemistry, structure and functional relation to gene of DNA and RNA.

8L

- B) Prostaglandins:** Occurrence, nomenclature, classification and physiological effects, synthesis of PGE₂ and PGE_{2a}

4L

Unit-III : Classification, Isolation, General Methods of structure determination of the following

12L

- A) Alkaloids:** Papaverine, Morphine, Reserpine, Nicotine.
B) Terpenoids: Camphor, Geraniol, Abietic acid, squalene

Unit-IV: A) Steroids and Hormones

12L

Cholesterol, Testosterone, Progesterone and Cortisone

- B) Biosynthesis of Natural Products.**

Biosynthesis of terpenes, alkaloids, and amino acids (Lysine and phenylalanine)

Unit-V: DYES

- A) Dyes:** General Introduction, classification on the basis of

structure and method of application dyeing mechanism, methods of dyeing, such as direct dyeing, vat dyeing, dispersive dyeing, formation of dye in fibre, dyeing with reactive dyes, study of quinoline yellow, cyamine dye, ethyl red, methylene blue, Alizarin, cyamine-green, fluorescein, eosin, erythrosine, Rhodomines and Indigo.

Books suggested :

- 1) Chemistry of alkaloids-SW Pelletier.
- 2) Chemistry of steroids-LF Fisher & M Fisher.
- 3) The molecules of nature-JB Hendrickson.
- 4) Biogenesis of natural compound-Benfield
- 5) Natural product chemistry & biological significance, J. Mann, R. S. Devison, J. B. Hobbs, D. V. Banthripde & J. B. Horborne.
- 6) Introduction to flavonoids-BA Bohm, Harwood
- 7) Chemistry of naturally occurring quinines-RH Thomson
- 8) The systematic identification of flavonoids-Marby, Markham, & Thomos
- 9) Text book of organic medicinal chemistry-Wilson, Geswold
- 10) Medicinal chemistry Vol I & II-Burger
- 11) Synthetic organic chemistry-Gurudeep Chatwal.
- 12) Organic chemistry of natural products Vol I & II-OP Agrawal
- 13) Organic chemistry of natural products-Gurudeep Chatwal
- 14) A textbook of pharmaceutical chemistry-Jayshree Ghosh
- 15) Synthetic dyes series-Venkatraman
- 16) Chemistry process industries-Shreve & Brink
- 17) Principles of modern heterocyclic chemistry-LA Paquette
- 18) Heterocyclic chemistry-Joule & G Smith
- 19) Heterocyclic chemistry-Morton
- 20) An introduction to chemistry of heterocyclic compound-JB Acheson
- 21) Introduction to medicinal chemistry-A Gringuade
- 22) Wilson & Geswold text book of organic medicinal & pharmaceutical chemistry-Ed. Robert F. Dorge
- 23) An introduction to drug design-SS Pandey, & JR Demmock
- 24) Goodman and Gilman's pharmacological basis of therapeutics-
- 25) Strategies for organic drug synthesis & design-D Lednicer
- 26) Polymer science-V. Govarikar
- 27) Principles of polymer chemistry-PJ Flory
- 28) An outline of polymer chemistry-James Q. Allen
- 29) Organic polymer chemistry-KJ Saunders.

Semester III
Paper- XI
(Special Paper-I)
Physical Chemistry

60 Hours (4-Hours/week)

50 Marks

12 hours/Unit

Unit-I Solid-state chemistry:

- A) Solid state reactions: General principles, experimental procedures, co-precipitation as a precursor to solid state reactions, other precursor methods, kinetics of solid state reactions. 6L
- B) Crystal Defects & Non-Stoichiometry: Intrinsic and extrinsic defects- point defects, line and plane defects, vacancies-Schottky defects and Frenkel defects. Thermodynamics of Schottky and Frenkel defect formation, color centers. Non-Stoichiometry and defects. Numericals. 6L

Unit-II Electronic properties and Band Theory:

- A) Metals, insulators and semiconductors, electronic structure of solids- band theory, band structure of metals, insulators and semiconductors. Intrinsic and extrinsic semiconductors, doping semiconductors, semiconductor p-n junctions. Color in inorganic solids, 6L
- B) Magnetic properties- Behavior of substances in magnetic field. Effect of temperature: Curie and Curie-Weiss Laws. Calculation of magnetic moments, magnetic materials, their structures and properties. Applications: structure / property relations. Numericals. 6L

Unit-III Glass, Ceramics and Multiphase materials:

- A) Factors influencing glass formation, kinetics and thermodynamics of glass formation, electrical (ionic) Conductivity of glasses, metallic glasses. Composition, properties and applications of glass-ceramics. 6L
- B) Properties and applications of ferrous and non-ferrous alloys. Phase diagram of iron-carbon system. Stainless steel, brass. 6L

Unit-IV Ceramics and Composites:

- A) Structure and properties of ceramic: Crystal structure, silicate ceramics, carbon, and imperfection in ceramic, diffusion in ionic materials, ceramic phase diagram. Type and application of ceramics, Glasses and glass ceramics clay product refractories, abrasive, cement and advanced ceramics, fabrication and processing of ceramics, fabrication and processing of glass and clay product, powder processing and tape casting. 6L

- B) Particle reinforced Composites: Large particle and dispersion-strengthened Composites, Fiber reinforced Composites: Influence of fiber length, fiber orientation and concentration. Metal- Matrix Composites, Ceramics- Matrix Composites, Carbon-Carbon and hybrid Composites.

6L

Unit-V Superconductivity:

- A) High T_c Materials: Superconductivity in cuprates, preparation and characterization of 1-2-3 and 2-1-4 materials. Normal and Superconducting state of cuprates. The BCS theory. Applications of Low-temperature and High-temperature Superconductors.
- B) Thin Films: Preparation techniques: evaporation/sputtering, chemical processes, MOCVD, sol-gel etc. Growth techniques, properties and applications of thin films.

6L

6L

List of Books:

- 1) Physical chemistry by P.W. Atkins & dePaula 7th Edition
- 2) Industrial Chemistry by B.K. Sharma, Goel Publication House.
- 3) Physical Chemistry of Surface, by A.W. Admson, John Wiley and Sons 1990.
- 4) Electronic structure and Chemistry of Solids by P.A. Cox, Oxford University Press. 1991.
- 5) Solid State Chemistry by D.K. Chakraburti, New Edge Internation Publication 1996.
- 6) Principles of Solid State by H.V. Kirr, Wiley Estern Publication.
- 7) Material Science & Engineering an Introduction, by W.D. Callister
- 8) Material Science by J.C. Anderson, K.K. Leaver, J.M. Alexander & R.D. Rawlings. ELBS.

Semester III**Paper- XII****Special Paper-II****Physical Chemistry**

60 Hours (4-Hours/week)

50 Marks

12 hours/Unit

Unit-I Polymers:

- A) Basic concepts: Monomers, repeat unit, degree of polymerization, linear branch, and network polymers, classification polymers, Polymerization: condensation, addition, radical chain ionic and coordination and copolymerisation. polymerization condition and polymer reaction, polymerization in homogeneous and heterogeneous system.

6L

- B) Polymer processing: Plastic, elastomer and fibers. Compounding, processing technique: Calendaring, die casting, rotational casting, film casting, injection molding, glow molding, extrusion molding, thermoforming, foaming, reinforcing and fibers spinning.

6L

Unit-II Polymer characterization:

- A) Polydispersion, average molecular weight concept. Number, weight and viscosity average molecular weight. Polydispersity and molecular weight distribution. The practical significance of molecular weight. Measurement of molecular weight. End group, viscosity, light scattering, osmotic and ultra centrifugation method.
- B) Analysis and testing of polymers: chemical analysis of polymer, X-ray diffraction study, microscopy. Thermal analysis and physical testing-tensile strength. Fatigue impact. Tear resistance. Hardness and abrasion resistance.

6L

6L

Unit-III Structure and properties of Polymers:

- A) Morphology and order in crystalline polymers, configuration of polymers chains. Crystal structure of polymers. Morphology of crystalline polymers, strain induced morphology, crystallization and melting.
- B) Properties and structure: Physical properties, crystalline melting point, T_m-melting point of homogeneous serious, effect of chain flexibility and other steric factors. Entropy and heat of fusion, the glass transition temperature, the relation between T_g and T_m. Effect of molecular weight, diluents, chemical structures, chain topology, branching and crossing linking. Property requirements and polymer utilization. Numericals.

6L

6L

- Unit-IV** A) Polymer composites: Polymer matrix material, reinforcement, properties of composite and compost system. Fabrication of polymer composite, processing science and quality assurance of composites, environmental effect on composites, Smart composites.
- B) Polyethylene, polyvinyl chloride, polyamide, polyester, phenolic resin, epoxy resin and silicon polymer, Functional polymer: electrically conducting polymer.

6L

6L

- Unit-V** A) Polymer degradation: Definition, Types: thermal, mechanical, degradation by ultrasonic waves, photo degradation, degradation by high-energy radiations, oxidative and hydrolytic degradation.

6L

- B) Polymer reactions: Hydrolysis, acetolysis, aminolysis, hydrogenation, addition and substitution reaction, reaction of various specific groups, cyclization reaction and cross linked reactions, reaction leading to graft and block copolymers, miscellaneous reactions. 6L

List of Books:

- 1) A Text Book of Polymer Science by Billmeyer, Jr. Wiley
- 2) Polymer Science by V.R.Gowarikar, N. V. Vishwanathan & J. Sreedhar, Wiley Estern.
- 3) Physical Chemistry Polymers by D.D. Deshapande, Tata McGraw Hill
- 4) Principles of Physical Chemistry by P.J.Flory, Cornell University Press
- 5) Introduction to Polymer Chemistry by R.B. Seymour, McGraw Hill.
- 6) A Practical Course in Polymer Chemistry by S.J. Pnnea, Program press.
- 7) Polymer Composite by M.C. Gupta & A.P. Gupta. New Age International Publication.

**Semester III
Paper XI
Special Paper-I**

Industrial Chemistry (Heat Transfer, Unit Operations and Material Balances)

60hrs (4hrs/week). 12hrs/unit

50 Marks

Unit-I : 12L

- A) Fundamentals of Heat transfer:
Methods of heat transfer, Fourier's law, Newton's law, heat transfer by conductance, by convection and by radiation. Heat exchanger, types of heat exchanger, overall heat transfer co-efficient, double pipe heat exchanger, Shell & tube type etc.
- B) Fluid flow :
Fluid flow phenomenon, introduction, Laminar flow, Turbulent flow, Reynolds number, Bernoulli's equation, fans, blowers, compressors, pumps etc.

Unit-II : Unit Operations: 12L

- A) Distillation: Flash distillation, differential distillation, rectification, plate columns, packed columns.

- B) Gas Absorption : Introduction, equipments, packed columns, spray column mechanically agitated contactors.
- C) Evaporation : Introduction, short tube evaporator, forced circulation evaporator, falling film, climbing film, agitated evaporators.
- D) Filtration : Introduction, Filter media, filter aids, equipments sparkler filter, sand filters, bag filters, rotary drum filter etc. centrifuge.
- E) Crystallisation : Introduction, solubility, supersaturation, nucleation, crystal growth, equipments tank crystallizer, Swenson-Walker crystallizer, Oslo crystallizer.
- F) Drying: Introduction, free moisture, bound moisture, drying curve, equipments: tray dryer, fluid bed dryer, drum dryer

Unit-III : Material Balances 12L

Material balance without chemical reactions, flow diagram, without recycle or by-pass for above processes.

Material balances involving chemical reactions, Concept of limiting reactant, conversion, purge operation and energy balance.

Unit-IV : Catalysis 12L

Introduction, types, homogeneous & heterogeneous, Basic Principles, mechanism, factors affecting the performance, Introduction to phase transfer catalysis.

Industrial catalysts : Raney nickel, other forms of nickel, palladium and Supported palladium, copper chromate, vanadium & Platinum basecatalyst.

Aluminium alkoxides, titanium tetrachloride & titanates Titanium dioxide & Zeigler Natta catalyst and zeolite Catalysts.

Unit-V : Materials of construction for chemical plant. 12L

- A) Metals and Alloys : Copper, Aluminium, Nickel, titanium and their alloys. Mechanical & chemical properties and their applications.
- B) Corrosion : Types of corrosion relevant to chemical industries, mechanism & prevention methods.
- C) Polymeric Materials: Industrial polymer and composite materials, their constitution, chemical and physical properties, industrial applications.

List of Books-

- 1) Heat transfer By Arora and Damkondwar, Pune
- 2) Heat and Mass transfer by A, G. Gavane, Nirali Prakashan. Pune VOL I & II

- 3) McCabe and Smith, Unit operations of Chemical Engineering, McGraw Hill.
- 4) Budger and Banchemo, Introduction to Chemical Engineering McGraw Hill. McGraw Hill.
- 5) Text Book of Industrial Chemistry Pragti Agencies Pune 2
- 6) Engineering Chemistry By Dr. S. S. Dara.
- 7) Catalysis in theory and practices, Ridder E. K. and Taylor H. S.
- 8) Phase transfer catalysis, Principles and techniques, Starles C.
- 9) Surface Chemistry by J. J. Bikermann, Academic Press.
- 10) Physical Chemistry of Surfaces, A. W. Aclamson.
- 11) Material science, O. P. Khanna, Khanna Publishers, Delhi

Semester III

Paper XII

Sp. Paper-II

Industrial Chemistry (Processes Economics And Industrial Management)

60hrs (4hrs/week). 12hrs/unit

50 Marks

- Unit-I : Manufacture of Heavy Chemicals 12L**
 Chemical processes for the manufacture of Heavy chemicals like- soda ash, bicarbonates, chlorine, caustic soda, bleaching power, calcium carbides and acids like H_2SO_4 , HCl, HNO_3 , H_3PO_4 .
- Unit-II : 12L**
 A) Industrial Gases: Heavy chemicals and production of gases. Chemistry, manufacture, storage, hazards & uses.- Hydrogen, Oxygen, nitrogen, carbon dioxide, chlorine, fluorine, SO_2 , phosgene, acetylene, argon, neon & helium.
 B) Fertilizers: Fertilizer industries in India, Manufacture of Ammonium salts, Urea, nitrates, Ammonia, Nitrogenous fertilizers, phosphatic fertilizers, superphosphates, complex fertilizers, nitrogen fixation.
- Unit-III: 12L**
 A) Cement: Types of cement, manufacture- processes, and setting of cements.
 B) Glass: Types, their composition & properties, manufacture of glass fitness, optical glass, coloured glasses, lead glass and neutron absorbing glass.
 C) Ceramics: Introduction, types, manufacturing process, applications & refractories.
- Unit-IV : Chemical Process Economics 12L**
 Factors involved in project cost, estimation methods employed for the estimation of capital investment.

Methods of determining depreciation.
 Competitive & monopoly markets, some aspects of marketing profitability criterion.
 Economics of selecting alternatives.
 Break even point, production scheduling

Unit-V: A) Industrial Management 12L

Concept of scientific management in industry.
 Functions of management : Decision making, planning, organizing, Material management, Inventory control, Information system & decision making.

B) Safety :

General occupational safety, flammable materials, Handling, fuel fighting equipments, control measures for Toxic chemicals. Safety with chemical engineering operations, hazardous chemicals process. Safety in Laboratories and pilot plant. Safety in transportation & storage of chemicals, management of safety & loss prevention.

List of Books-

1. Charles E. Dryden, Outline of Chemical Technology Edited by M. Gopal Rao and Marshall Siting, East West Press 2nd Edition 1973.
2. Manual of Chemical Technology VOL I & II by Venkatesharul Educational Development Center. IIT Madras, 1977.
3. Chemical Process Industries by R. N. Shreves and M. J. A. Brink. McGraw Hill Ltd. 4th Edition 1977.
4. Economics of chemical industry, Hempel E. M.
5. Industrial organization and management, Bethal L. L.

Semester III

Paper XI

Analytical Chemistry
 (Advance Separation Techniques)

Total Lectures: 60Hrs, 4Hrsper week, 12Hrs/unit Total Marks-80

Unit-I : 12L

Separation Methods: Filtration, precipitation, distillation, molecular sieve, dialysis, Reverse osmosis, Ring oven methods, relative merit & demerit. Purification Techniques (Solid organic compounds, liquids etc.) Criteria of purity. Theory of chromatography, Classification, principles of chromatography, Van Deemeters Equation, Plate theory, significance of E, D_v, D_w . Techniques of

chromatographic separation gradient, isocratic, selective specific separation, types of chromatographic methods

Unit-II : **12L**

Gas Chromatography:-

Introduction to different types of gas chromatography, How does it differ from liquid chromatography. Principles of gas chromatography, plate theory of gas chromatography, Instrumentation for gas chromatography, working gas chromatography, application of gas chromatography, programmed temperature chromatography, flow programming chromatography, gas-solid chromatography, Columns for Gas Chromatography, choice of columns, polarity indices, Gas chromatography and Chirality.

Ion chromatography - Principle, structure and characteristics of resins, eluent, suppressor columns and detectors used in ion chromatography, analytical applications, environmental speciation by ion chromatography and applications. Hyphenated techniques in Chromatography.

Unit-III : **12L**

Gel Filtration:-

Introduction, types of gels, techniques used in equilibrium studies, estimating size parameters, molecular wt. determinations separating plant aspects.

Electrophoresis-Theory and classification, factors affecting mobility, macromolecular size and charge interactions with supporting electrolyte, pH and concentration discontinuities, Factors affecting electrophoresis phenomena-electrolysis, electrosomosis, temperature and supporting media. Instrumentation, methodology, Preparation of gel staining and destaining, preparative zone electrophoresis, continuous electrophoresis and Applications.

Capillary Electrophoresis-Principle, theory, instrumentation, sample preparation and applications, Capillary electrochromatography and Miscellar electrokinetic capillary chromatography

Unit-IV : **12L**

Membrane-Based Methods:-Dialysis-working of techniques, membranes, general consideration of diffusion, Donnan Membrane equilibrium and Applications.

Electrodialysis- working of techniques, membranes, Electrodialysis cells and Applications.

Ultrafiltration- working of techniques, membranes, non-gelatinous membranes and Applications. Dialysis compared with other membrane-separation methods.

Other Separation Methods:-Ultracentrifugation-Principle, sedimentation constant, sedimentation equilibrium, sedimentation velocity, methodology and applications.

Zone refining- Principle, zone leveling and applications

Unit-V : **12L**

Kinetic Methods of analysis-

Theoretical basis of kinetic methods of analysis, Rates of chemical reactions, rate laws, first order, second order kinetics, pseudo first order and second order reactions, factors affecting rate of reaction, methods of determining amount of the substance (tangent method) fix time and concentration method, addition method, oxidation reactions of H_2O_2 (thiosulphate, iodide, unimol), enzyme catalyzed reaction, inhibition and activation. Types of kinetic methods, differential and integral, applications.

Books Suggested :

1. Basic Concept in Analytical chemistry, by S.M. Khopkar.
2. Day & Underwood: Quantitative Analysis.
3. A. I. Vogel A Text book of Quantitative inorganic Chemistry, ELBS, London.
4. Analytical Chemistry, D.C. Das, PHI Learning Pvt. Ltd, New Delhi
5. Chromatography. By E Heftman, 5th edition, part-A and part-B, Elsewhere Science Publisher, 1992
6. S. Wilson & P. Jones: Chemical Analysis Vol I
7. Chromatography Today. By C F Poole and S K Poole, Elsewhere Science Publisher, 1991.
8. H.H. Willard, L.L. Merritt and J.A. Dean: Instrumental Methods of Analysis (Van Nostrand).
9. B. L. Krayner, H. H. Willard. L. Merritt, J. A. Dean & F. A. Settle: Instrumental Methods of Analysis (CBS Publishers, Delhi, 1986)
10. Analytical Chemistry. By G D Christian 4th edition, John Wiley and Sons, 1986. L. R. Snyder & C. H. Harvath: An Introduction to Separation Science (Wiley Interscience)
12. F. J. Wicher Robert: Standard Methods Chemical Analysis.
13. G. L. Davis Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, KLN Reddy, C. Sudhakar, Analytical chemistry.
14. R. D. Budhiraja Separation Chemistry, New Age.
15. R.L. Peesok and L.D. Shield: Modern Methods of Chemical Analysis.

- 16 Electrophoresis- Analytical Chemistry. Open Learning by M Melvin John Wiley and Sons.1987
- 17 Analytical Chemistry, S.P.J. Higson, , Oxford University Press
18. Chemical Separations and Measurement; Theory and Practice, D.G.Peters, J.M.Hayes and G.M.Hieftje, Saunders Golden Sunburst Series.

Semester III

Paper XII

Analytical Chemistry (Special Paper-II)

Recent Advances in analytical chemistry

Total Lectures: 60Hrs, 4Hrsper week, 12Hrs/unit Total Marks-80

Unit-I : 12L

High Performance liquid Chromatography:-

Principles, Instrumentation, Pumping systems, sample injection system, Columns and columns packings, Stationary support in HPLC, applications, Validation of HPLC method . Preparative HPLC, Fast HPLC, Trouble shooting in HPLC, Flash chromatography, Capillary HPLC

Super critical fluid chromatography, Introduction, properties of super critical fluids, characteristics of super critical fluid, Instrumentation and applications of SFC, Comparison of HPLC with SFC..

Super critical fluid extraction-Introduction, advantages of SFE, instrumentation , supercritical fluid choice, offline and on-line extraction and application.

Unit-II : 12L

Functional group analysis- terminal methylene group, nitro and Grignard reagent by titrimetry. Analytical organic reagents, specificity, selectivity, sensitivity, stability, masking, demasking, types of organic reagents and principles of underlying the uses of 2-pyridylazo-nathtol (PAN), dithizone, 8- hydroxyquinoline, magneson I & II phenyl arsonic acid, rubeanic acid and ethylene-diamine tetraacetic acid EDTA.

Unit-III : Recent advances in Analytical chemistry:- 12L

Ultra purity, ultra trace analysis, laboratory designing, purifications of reagents, pre-concentration techniques, methods of trace analysis such as NAA, XRF, EDX, AAS, and ICP. High purity materials for electronics industry, contamination, control during analytical operations. Importance of speciation analysis

Unit-IV : 12L

Partical size determination- Introduction, low angle light scattering, instrumentation, theoretical models and application. Dynamic light scattering-principles, instrumentation and applications. Photosedimentation-settling velocity and partical size, instrumentation and applications.

Surface charactenzation by spectroscopy & microscopy:- Introduction to the study of surfaces, types of surface measurements, spectroscopic surface methods, general techniques in surface spectroscopy, sampling of surfaces, surface contamination. Scanning electron microscopy (SEM) and scanning probe microscopy.

Unit-V : 12L

Sensors:-

Glass membrane electrodes-solid state sensors-liquid membrane electrodes-gas sensing and enzyme electrodes-interferences-ion activity evaluation method-measurement of pH-glass electrode for pH measurements-electrometric measurement of pH. Bio-sensors-principles, types and applications

Book Suggested:

1. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age International Publication.
2. Day & Underwood: Quantitative Analysis.
3. Findley: Practical Physical Chemistry:
4. Vogel A Text book of Quantitative inorganic Chemistry, ELBS, London.
5. Strouts Galfillal: Analytical Y. Lyalikov: Physocochemical Analysis
6. S. M. Khopkar: Basic concep in Analytical Chemistry
7. Meites and Thomas: Advance Analytical Chemistry. (Mc Graw Hill)
8. H.H. Willard ,L.L. Merritt and J.A. Dean: Instrumental Methods of Analysis (Van Nostrand).
9. B. L. Krayar, H. H. Willard. L. Merrit, J. A. Dean & F. A. Settle: Instrumental Methods of Analysis (CBS Publishers, Delhi, 1986)
10. R. D. Brown Instrumental Methods of Chemical Analysis ,McGraw Hill
11. L. R. Shyder & C. H. Harvath: An Introduction to Separation Science (Wiley Interscience).

12. Elemental Analysis of Airborne Particles, Ed. S. Landberger and M. Creatchman, Gordon and Breach Science Publication.
13. Atmospheric pollution, W. Buch, McGraw Hill, New York.
14. Fundamentals of Air Pollution, S. J. Willason, Addison & Wesley Publishers.
15. Analytical Aspect of Environmental chemistry, D. F. S. Natush and P. K. Hopke. John Wiley & sons. New York.
16. Analytical chemistry- Problems and Solution- S. M. Khopkar, New Age.
17. Environmental Chemistry, J.W. Vanloon, Oxford University Press.

Semester III

Practical V

Inorganic Chemistry Practical

Practical Workload 9 Hrs./week

100 Marks

Quantitative Inorganic Analysis:

- 1) Detection and determination of Ascorbic acid from biological sample.
- 2) Determination of Phosphates from plant samples by spectrophotometry.
- 3) Determination of iron from pharmaceutical samples and coordination compounds.
- 4) Determination of Calcium from given drug sample by complexometry.
- 5) Determination of Iron, Calcium and Phosphorus from milk powder.
- 6) Simultaneous Spectrophotometric determination of-
 - i) Chromium and Manganese
 - ii) Titanium and Vanadium.
 - iii) Cobalt and Chromium
- 7) Analysis of stainless steel (Cr/Ni)
- 8) To determine the stability constant and stoichiometry of Ferric-thiocyanate complex by spectrophotometrically.
- 9) To study the stoichiometry and stability of Fe³⁺ salicylate complex by job's and mole ratio method spectrophotometrically.
- 10) Estimate the amount of copper (II) with EDTA photometric titration
- 11) Determination of capacity of anion and cation exchange resin by column method.
- 12) To estimate the amount of magnesium and zinc in the given sample solution by ion exchange chromatography method.
- 13) Separation and estimation of Fe²⁺, Co²⁺ and Ni²⁺ by anion exchanger.
- 14) Separation and estimation of Halide by anion exchanger.

- 15) Separation and estimation of-
 - i) Cobalt and nickel
 - ii) Calcium and Zinc and
 - iii) Zinc and Magnesium by anion exchange.
- 16) Separation and estimation of Fe³⁺ and Mg²⁺ by solvent extraction
- 17) Solvent extraction by binary mixtures i. e. Al/Mg, Mg/UO₂, Cu/Ni, Cu/Co etc. and quantitative determination by spectrophotometry.
- 18) Nickel / Molybdenum / tungston/vanadium / Uranium etc by extractive spectrometric method.
- 19) Separation, identification and quantitative determination of metal ions by paper chromatography.
- 20) Separation and identification of sugars/ honey/halides by paper chromatography and determination of R_f values
- 21) Thin layer chromatographic separation, identification and determination of R_f values of
 - a. Metal ions (Mn, Co, Ni, Cu, Zn, Cd, Pb, alkali metals etc)
 - b. Amino acids/ Organic compounds
 - c. Sulpha drugs in tablets and ointments.
- 22) Estimation of zinc/metals by fluorimetrically.
- 23) Nephelometric determinations of sulphate, phosphate, silver.
- 24) Potentiometric determination of the percentage of sodium carbonate in commercial washing soda.
- 25) Water analysis:
 1. Determination of hardness, alkalinity, salinity, Halides, Fluoride, Nitrite, Nitrate, phosphate and Sulphate.
 2. Determination of DO, COD and BOD.
 3. Determination of toxic metals viz As, Cd, Pb, Hg, and Ni in water and wastewater by suitable method.

The Practical examination will be based on the Inorganic Chemistry.

Time: 6-8 hours (one day examination)

Marks: 100

I) Exercise -1 (Based on Instrumental)	- 40 Marks
II) Exercise-2 (Based on Separation Method)	- 40 Marks
III) Record	- 10 Marks
IV) Viva- Voce	- 10 Marks

Total	- 100 Marks
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List of Books-

1. Day and Underwood: Quantitative Analysis
2. Vogel A.I: A textbook of quantitative Inorganic analysis, Longman.
3. Flaschka: EDTA Titration

4. Meites and Thomas: Advanced Analytical Chemistry.
5. Ewing, G.W.: Instrumental Methods of Chemical Analysis, McGraw-Hill
6. Drago, R.S.: Physical Methods in Inorganic Chemistry
7. Christian G.D.: Analytical Chemistry
8. Khopkar S.M.: Basic Concept of Analytical Chemistry.
9. Kolltath and Ligane: Polarography
10. Braun: Instrumental methods of chemical Analysis
11. Willard, Merritt and Dean: Instrumental methods of Chemical Analysis, Van Nostrand
12. Strouts, Crifillan and Wison: Analytical Chemistry.
13. Skoog S.A. and West D.W.: Fundamental of Analytical Chemistry
14. Dilts R. V.: Analytical Chemistry
15. Jahagirdar D.V.- Experiments in Chemistry
16. Chondhekar T.K.- Systematic Experiments in Physical Chemistry, Rajbog S.W., Anjali Pubn.
17. Wlehev G.J.- Standard methods of Chemical analysis, 6th Ed.
18. Ramesh R & Anbu M, Chemical Methods for Environmental Analysis: Water & Sediment, Macmillan India.

**SEMESTER III
ORGANIC
PRACTICAL VI**

9 Hours per week Total Hours: 90 hrs. Marks: 100

Unit-I : QUALITATIVE ANALYSIS.

Separation and identification of the components of a mixture of two organic compounds (two solids, one solid and one liquid, and all two liquids) using chemical methods or physical techniques. Purification of the compounds by crystallization, chromatographic techniques (Minimum of 12 mixtures to be done)

Unit-II : EXTRACTION

1. Isolation of caffeine from tea leaves.
2. Isolation of casein from milk.
3. Isolation of lactose from milk.
4. Isolation of nicotine from tobacco.
5. Isolation of piperine from black paper.
6. Isolation of lycopene from tomatoes.
7. Isolation of β -carotene from carrots.

Unit-III : SPECTRAL INTERPRETATION

Structure Elucidation of organic compounds on the basis of spectral data (UV, IR, ¹³CNMR and Mass) (Minimum 12 compounds are to be analysed during regular Practical).

Distribution of marks:

Unit I	40
Unit II í í	20
Unit III	20
Record	10
Viva voce	10
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TOTAL	100
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Book Suggested :

1. Modern Experimental Organic Chemistry-Royston M. Robert, John C. Gilbert, Lyu B. Rodewald, S. Wingrove.
2. Experimental Organic Chemistry- L. M. Harwood, C. I. Moodyø
3. Semi-microqualitative Organic analysis-N. D. Cheronis, J. B. Entrikin, E.M. Wodnett.
4. The Systematic identification of Organic compounds-R.L. Shrine, D.Y. Curtin.
5. Quantitative Chemical analysis ó A.I. Vogel.
6. Vogelø textbook of quantitative analysis (Revised)-J. Bassett, R.C. Denney, G.H. Jeffery and J. Mendham.
7. Experiment and technique in Organic chemistry-D. Pasto, C. Johnson and M. Miller.
8. Hand book of organic analysis ó qualitative and quantitative-H. Clark, Adward Arnold.

**Semester IV
Paper-XIII
SPECTROSCOPY-II**

60 Hours (Four hours/week) 12 Hrs. / unit Max.Marks 50

- Unit-I :** A) Emission spectroscopy based upon plasma: Arc and spark atomization, spectra from higher energy sources, emission spectroscopy based upon plasma sources, atomic fluorescence method based upon plasma atomization. Emission spectroscopy based upon arc and spark sources. X-ray fluorescence and its principle, instrumentation and application in analytical chemistry. 6L

- B) Photoelectron spectroscopy: Basic principle, photoelectric effect, ionization process, Koopmans theorem PES and X-PES, PES spectra of simple molecule, ESCA, chemical information from ESCA. Auger electron spectroscopy-basic idea. surface characterization by spectroscopy and microscopy, (SEM). 6L

- Unit-II :** A) X-ray diffraction :Interaction of x-ray with matter, scattering and diffraction. Bragg method Debye-Sherrer method of X-ray structural analysis of crystals, index reflection, identification of unit cell from systematic absence in diffraction pattern structure of simple lattice and x-ray intensities structure factor , its relation to intensity of electron density procedure for x-ray structure analysis. 4L
- B) Electron diffraction : Scattering intensity Vs scattering angle, wierl equation, measurment techniques, elucidation of structure of simple gas phase molecules.Low energy electron diffraction and stucture of surface. 4L
- C) Neutron diffraction: Scattering of neutrons by solids and liquids magnetic scattering, measurement techniques. Elucidation of structure of magnetically ordered unit cell. 4L

- Unit-III** A) Raman spectroscopy: Classical and quantum theories of raman effects,Pure rotational and vibrational and vibrationalrotational raman spectra,selection rules,mutual exclusion Raman spectroscopy,coherent antistokes Raman spectroscopy (CARS).Applications for the study of active sites of metalloproteins. 6L
- B) Electron Spin Resonance Spectroscopy : Introductiuon ,basic principle.zero field splitting and kramers degeneracy, factors effecting the δg values,hyperfying splitting, determination of δg values.Instrumentation,working of instruments,sensitivity,concentration,choice of solvent. presentation of ESR spectra,application of ESR to study the free radicals,structure determination,reaction velocities,application to inorganic compounds including biological system and to inorganic free radicals such as PH_4^- , F_2^- , $[\text{BH}_3]^-$,determination of oxidation state of metals,Eldor and Eldor techniques. 6L

- Unit-IV :** Mossbauer spectroscopy: Basic principle,spectral parameters and spectrum display.Doppler shift.recoilless emission of radition.isomer shift,quadrupole splitting,magnetic hyperfying splitting.application of the techniques to the studies of 1. Bonding and structure of Fe^{+2} ,and Fe^{+3} compounds including those of intermediate spin (2) Sn^{+2} and Sn^{+4} compounds - Nature of M-L bond, coordination number, Structure and (3) Detection of oxidation state and in equivalent MB atoms. Mossbauer spectroscopy of Biological Systems. 12L
- Unit-V :** Structural Problem : Problems based on IR, Mass, UV, PMR, ^{13}C NMR data and structure determination of organic molecules / inorganic compounds. 12L

Books suggested

- 1) Spectroscopic identification of organic compound-RM Silverstein,GC Bassler and TC Morril,John Wally
- 2) Introduction to NMR spectroscopy-RJ Abraham,J Fisher and Ploftus Wiely
- 3) Application of spectroscopy to organic compound-JR Dyer,Printice Hall
- 4) Organic spectroscopy-William kemp,ELB with McMillan
- 5) Spectroscopy of organic molecule-PS Kalsi,Wiley,Esterna,New Delhi
- 6) Organic spectroscopy-RT Morrison,and RN Boyd
- 7) Practical NMR spectroscopy-ML Martin,JJ Delpenck, and DJ Martyin
- 8) Spectroscopic methods in organic chemistry-DH Willson,I Fleming
- 9) Fundamentals of molecular spectroscopy-CN Banwell
- 10) Spectroscopy in organic chemistry-CNR Rao and JR Ferraro
- 11) Photoelectron spectroscopy-Baber and Betteridge
- 12) Electron spin resonance spectroscopy-J Wertz and JR Bolten
- 13) NMR óBasic principle and application-H Guntur
- 14) Interpritation of NMR spectra-Roy H Bible
- 15) Interpritation of IR spectra-NB Coulthop
- 16) Electron spin resonance theory and applications-W gordy
- 17) Mass spectrometry organic chemical applications ,JH Banyon

Semester IV
Paper XIV
General Analytical Chemistry

Total Lectures: 60Hours, 4Hours per week, 12Hours/unit Total Marks: 50

- Unit-I** : 12L
Radiochemical Methods: Elementary working, principles of Geiger Muller, Ionisation, proportional and I-ray counters. Radiotracer techniques, application of radiotracers in analytical chemistry. Neutron activation analysis (NAA): Principle, technique and applications in preparation of some commonly used radioactive isotopes. Isotopic Dilution Analysis (IDA), substoichiometric IDA, experimental technique and applications of IDA, advantages and limitations of IDA and comparison of IDA with NAA. Principle of Radiometric titrations, types, Experimental techniques and its applications. Carbon dating. Numericals.
- Unit-II** : **Online Analyzers** 12L
Automation in Chemical Analysis: Introduction, Classification of automated methods, principles and techniques of auto-analyzers employed for microanalysis with emphasis on the basis sequences in operational modes in segmented and non-segmented flow and applications. Selection of online analyzers.
Flow Injection Analysis: Introduction, principal, theoretical aspects of FIA, techniques, pretreatment of sample in packed reactors, components of FIA apparatus, Factors affecting FIA and applications for the determination F⁻, Cl⁻, PO₄⁻, SiO₃²⁻, NO₂⁻+NO₃⁻, SO₄²⁻, BO₃³⁻, Ca²⁺, Mg²⁺, Al³⁺, Mn²⁺, Cr⁶⁺, Fe³⁺ in water.
- Unit-III** : **Optical Methods Of Analysis:** 12L
A) Molecular Luminescence Spectroscopy: Introduction, Molecular fluorescence, phosphorescence and Chemiluminescence, theory, factors affecting fluorescence and phosphorescence, instrumentation and analytical applications. Applications of fluorimetry. Fluorescence quenching. Photoacoustic spectroscopy: Theory, Instrumentation, PAS-gases and condensed systems, chemical and surface applications. Qualitative and quantitative analysis.
B) Inductively Coupled Plasma Atomic Emission Spectroscopy (ICPAES):
Principles, atomization and excitation, ICP-source, Instrumentation and applications.

- Unit-IV: Analysis of Food, Body fluids and Drugs:** 12L
A) The chemical and nutritional composition of food: analysis of trace elements such as Pb, As, Cd in food, Analysis of Tea, Milk, Spices. Chemical preservation of food, Analysis of sodium benzoate and sodium metabisulphite, Analysis of adulterants in food, Analysis of artificial sweeteners in food and colouring agents.
B) Clinical Chemistry and Drug Analysis: Composition of blood, collection and preservation of samples, clinical analysis, serum electrolytes, blood glucose, blood urea nitrogen, uric acid, albumin, globulin, barbiturates, acid and alkaline phosphatases. Immunoassay :principles of radio immunoassy(RIA) and applications. The blood gas analysis trace elements in the body. Narcotics and dangerous drugs, classification of drugs, screening by gas and thin layer chromatography and spectrophotometric measurements
- Unit-V** : **Fuel analysis:** 12L
Solid, Liquid and gaseous fuels. Characteristics of ideal fuels. Ultimate and proximate analysis of coal, heating values, grading of coal, liquid fuels-flash point, aniline point, knocking, antiknock compounds, octane number, cetane number and carbon residue. Gaseous fuels, producer gas and water gas, determination of calorific value. Analysis of fuel Gas. Numerical problems.

List of Books-

1. Day and Underwood: Quantitative Analysis
2. A. I. Vogel: A text book of quantitative Inorganic analysis.
3. Flaschka: EDTA Titration
4. Meites and Thomas: Advanced Analytical Chemistry.
5. G. W. Ewing: Instrumental Methods of Chemical Analysis.
6. R. S. Drago: Physical Methods in Inorganic Chemistry
7. G. D. Christian: Analytical Chemistry
8. S. M. Khopkar: Basic Concept of Analytical Chemistry.
9. Kolltath and Ligane: Polarography
10. R.D.Braun: Instrumental methods of chemical Analysis
11. Willard, Merritt and Dean: Instrumental methods of Analysis
12. Strouts, Crifillan and Wison: Analytical Chemistry.
13. J. W. T. Spinks and R. J. Woods: Introduction to Radiation Chemistry.
14. S. A. Skoog and D. W. West: Fundamental Of Analytical Chemistry
15. R. V. Dilts: Analytical Chemistry

Semester IV
Paper-XV
Special Paper-III

Inorganic Chemistry (Photoinorganic & Organometallic Chemistry)

Total Lectures: 60Hrs, 4 Hrs per week, 12 Hrs/unit Total Marks-50

- Unit-I :** 12L
- A) Basics of Photochemistry:** Absorption, excitation, photochemical laws, quantum yield, electronically excited states-life times-measurements of the times. Flash photolysis, stopped flow techniques, Energy dissipation by radiative and no-radiative processes, absorption spectra, Frank-Condon principles; photochemical stages-primary & secondary processes.
- B) Properties of excited states:** Photochemical kinetics, Calculation of rates of radiative processes.
- Unit-II** 12L
- A) Excited States of Metal Complexes:** Electronically excited states of metal complexes, charge transfer spectra, charge transfer excitations, methods for obtaining charge transfer spectra.
- B) Ligand field Photochemistry:** photosubstitution, photo oxidation & photoreduction.
Liability and selectivity, zero vibrational levels of ground state and excited state, energy content of excited state, zero-zero spectroscopic energy, development of the equations for redox potentials of the excited states.
- Unit-III** 12L
- A) Redox reactions by Excited Metal Complexes:** Energy transfer under conditions of weak interaction & strong interaction & exciplex formation, conditions of excited states to be useful as redox reactants, excited electron transfer, metal complexes as attractive candidates (2,2-bipyridine & 1,10-Phenanthroline complexes.), illustration of reducing and oxidizing character of ruthenium (II); role of spin-orbit coupling, lie time of these processes. Application of redox processes of electronically excited states for catalytic purposes, transformation of low energy reactants in to high-energy products, chemical energy in to light.
- B) Metal Complex Sensitizers:** Metal Complex Sensitizers, electron relay, metal colloid systems, and semiconductor supported metal or oxide systems, water photolysis, nitrogen fixation & carbon dioxide reduction.

- Unit-IV :** 12L
- Organotransition Metal Chemistry:**
Alkyls and Aryls of Transition Metals:
Types, routes of synthesis, stability & decomposition pathways of alkyls & aryls of transition metals.
Organocopper in Organic synthesis.
Compounds of Transition Metal & Carbon Multiple bonds:
Alkylidenes, alkylidynes, low valent carbenes & carbynes & synthesis, nature of bond, structural characteristics, nucleophilic & electrophilic reactions on ligands, role in organic synthesis.
- Unit-V :** 12L
- Transition Metal Pi Complexes-**Carbon multiple bonds.
Nature of bonding, structural characteristics & synthesis, properties of transition metal pi- Complexes with unsaturated organic molecules, alkenes alkynes, allyl, diene, dienyl, arene & trienyl complexes. Application of transition metal, organometallic intermediates in organic synthesis relating to nucleophilic & electrophilic attack on ligands, role in organic synthesis.
- Books:**
1. Elschenbroich Ch. and Salzer A.: Organometallics, VCH, Weinheim, NY
 2. Balzani Vand Cavassiti V.: Photochemistry of Coordination compounds, AP, London
 3. Purcell K.F. and Kotz J.C., An Introduction to Inorganic Chemistry, Holt Sounder, Japan.
 4. Rohtagi K.K. and Mukharjee, Fundamentals of Photochemistry, Wiley eastern
 5. Calverts J.G. and Pitts J.N., Photochemicals of Photochemistry, John Wiley
 6. Wells, Introduction of Photochemistry
 7. Paulson, Organometallic Chemistry, Arnold
 8. Rochow, Organometallic Chemistry, Reinhold
 9. Zeiss, Organometallic Chemistry, Reinhold
 10. Gilbert A. and Baggott, J., Essential of Molecular Photochemistry, Blackwell Sci. Pub.
 11. Turro N.J. and Benjamin W.A., Molecular Photochemistry
 12. Cox A. and Camp, T.P. Introductory Photochemistry, McGraw-Hill
 13. Kundall R.P. and Gilbert A., Photochemistry, Thomson Nelson Coxon J and Halton B., Organic Photochemistry, Cambridge University Press.

Semester IV
Paper-XVI
Special paper-IV
Inorganic Chemistry (Materials Chemistry)

Total Lectures: 60Hrs, 4 Hrs per week, 12 Hrs/unit Total Marks-50

Unit-I : Glasses, Ceramics & Composites: 12L

Glass: A general idea of Glassy state, types, their composition & properties, glass formers & modifiers, optical glass, coloured glasses, lead glass, neutron absorbing glass.

Ceramics: General introduction, types, manufacturing process, structure, mechanical properties.

Unit-II 12L

A) Liquid Crystals: Mesomorphic behaviour, thermotropic liquid crystals, positional order, bond orientational order, nematics & smectic mesophases; smectic-Nematic transition clearing temperature-homeotropic, planar & schlieren textures twisted nematics, chiral nematics, molecular arrangement in smectic A & smectic C phases, optical properties of liquid crystals. Dielectric susceptibility & dielectric constants.

Lytotropic phases & their description of ordering in liquid crystals.

B) Bio-materials: Biomineralisation, controlled formation of biological composites, bone & other mineralised tissues, materials of construction, applications (General aspect only).

Unit-III : 12L

Nanoparticals & Nanostructural materials : Introduction, methods of preparation, physical properties, and chemical properties. Molecular Precursor routes to inorganic solids:- Introduction, sol-gel chemistry of metal alkoxide, hybrid organic-inorganic compounds

Nanoporous Materials: Introduction, Zeolites & molecular sieves, determination of surface acidity, porous lamellar solids, composition-structure, preparation & applications.

B) Solid State Reaction: General principles, reaction rates, reaction mechanism, reaction of solids, factors influencing reactivity, photographic process.

Unit-IV 12L

A) Fertilizers: Classification of fertilizers, nitrogen fertilizers, phosphate fertilizers, N, P, K fertilizers, H_3PO_4 production without using H_2SO_4 .

B) Coordination Polymers:

Natural polymers and reactions yielding coordination polymers. Synthesis of coordination polymers. Use of polymeric ligands in synthesis of coordination polymers. Metal coordination polymers. Silicon polymers. Organosilicon polymers. Synthesis and their uses.

Unit-V: 12L

Catalysis: Basic principals, thermodynamic and kinetic aspects, industrial requirements, classification, theories of catalysis, homogeneous and heterogeneous catalysis. Introduction, types & characteristics of substrate-catalyst interactions, kinetics and energetic aspects of catalysis, selectivity, stereochemistry, orbital symmetry and reactivity. Catalytic reactions of coordination and Organometallic compounds including polymerization activation of small molecules, addition to multiple bonds, hydrogenation, Zeigler-Natta polymerization of olefins, hydroformylations, oxidations, carbonylations and epoxidation.

Books Suggested:

1. Barsoum, M.W., Fundamentals of Ceramics, McGraw Hill, New Delhi
2. Ashcroft, N.W. and Mermin, N.D., Solid State Physics, Saunders College
3. Callister W.D., Material Science and Engineering, An Introduction, Wiley
4. Keer, H.H., Principles of Solid State, Wiley Eastern
5. Anderson J.C., Lever K.D., Alexander J.M and Rawlings, R.D., ELBS
6. Gray G.W. Ed. Thermotropic Liquid Crystals, John Wiley
7. Kelkar and Hatz Handbook of Liquid Crystals, Chemie Verlag.
8. Kalbunde K.I., Nanoscale Materials in Chemistry, John Wiley, NY.
9. Shull R.D., McMichael R.D. and Swartzendruber L.J., Studies of Magnetic Properties of Fine particles and their relevance to Materials Science, Elsevier Pub. Amsterdam
10. Breck D.W., Zeolite Molecular Sieves: Structure Chemistry and Use, Wiley Chichester, Eng.
11. Morrish A. H., Haneda K., Zhou X. Z. In Nanophase Materials: synthesis, properties, applications, Kulwer, London.

Organic Chemistry (Organic Synthesis: II)

Total Lectures: 60Hrs, 4 Hrs per week, 12 Hrs/unit Total Marks-50

Unit-I : A) **Chemo and Regio Selectivity.** **6L**
Selectivity in organic synthesis, chemo and regio selectivity, stereoselective and stereospecific reactions, Kinetic and Thermodynamic control in reaction.

B) **Application of organometallics in organic synthesis.**
Use of Organometallic compounds of Mg, Li, Zn, B, Sn and organocopper compounds in organic synthesis. Organotransition metal reagents of C, R, Fe, Co, Rh, Ni and Pd.

Unit-II : **Designing the synthesis based on retrosynthetic analysis** **12L**

A disconnection approach to the synthesis of organic compound. Different consideration in designing target molecule, concept of synthon, FGI, Chemoselectivity, regioselectivity, specificity, stereoselectivity, general strategy choosing a disconnection. Types of bond disconnection, some of the applications of these concepts in designing the synthesis of common important class of the compounds.

Unit-III: A) **Protection and Deprotection of functional groups** **12L**

Protection and deprotection of functional groups like, hydroxyl, amino, carbonyl and carboxylic acids groups, techniques employed for these.

B) **Phase Transfer Catalysis and Crown ethers.** Their methods of preparation and application in Organic Synthesis, Mechanism of Phase transfer reaction.

Unit-IV A) **Selective Organic Name Reaction** **12L**
Stark-Enamine reaction, Michel addition, Favorski reaction, Mannich reaction, Sharpless asymmetric epoxidation, Ene reaction, Baeyer-Villiger reaction.

B) **Reagents in Organic Synthesis:** Use of following reagents in Synthesis and functional group transformations such as complex metal hydrides, Gilman reagents, Lithium dialkyl cuprate, LDA, DCC, Trimethyl silyl Iodide, Tributyl Tin hydride, Woodward and Prevost Hydroxylation, DDQ, Peterson Synthesis, Wilkinson's Catalyst, Becker Yeast.

Unit-V: A) **Polynuclear Hydrocarbons:** **12L**
Introduction, Comparative study of the aromatic character of linear and nonlinear Ortho fused Polynuclear Hydrocarbon. General methods of preparation of fluorine, anthracene and phenanthrene.

B) **Heterocyclic Compounds:**
Nomenclature and familiarity with the heterocyclic ring (3-7 members containing up to 3 heteroatoms). Detailed chemistry of Pyrazole, imidazole, oxazole, thiazole, thiazine, pyrimidines, pyrazines and zepines

Books suggested.

- 1) Principle of organic synthesis. ROC Norman & JM coxon
- 2) Modern synthetic reaction. H.O. House W.A. Benjamin
- 3) Organic synthesis, The disconnection approach-S. Warren
- 4) Designing organic synthesis-S. Warren
- 5) Some modern methods of organic synthesis-W. Carruthers,
- 6) Advance organic reaction. Mechanism & structure-Jerry March
- 7) Advance organic chemistry Part-B-F.A. Carey & RJ Sundberg, Plenum P.
- 8) Organic reaction and their mechanism-PS Kalsi
- 9) Protective group in organic synthesis-TW Greene, & PGM
- 10) The chemistry of organophosphorous-AJ Kirby, & SG Warren
- 11) Organosilicon compound-C. Eabon
- 12) Organic synthesis via Boranes-HC. Brown
- 13) Organoborane chemistry-TP Onak
- 14) Organic chemistry of boron-W. Gerrard
- 15) Fundamentals of photochemistry-KK Rohatgi & Mukharji
- 16) Photochemistry-Cundau & Gilbert
- 17) Aspects of organic photochemistry-WM Horspoot
- 18) Photochemistry-JD Calvert
- 19) Photochemistry-RP Wayne

SEMESTER-IV**Paper XVI****ORGANIC CHEMISTRY (Natural Product-II)**

Unit-I : **Synthesis Polymers and Rubbers -** **12L**

A) **Synthesis Polymers-** Introduction, types of polymerization, Mechanism of condensation Polymerization, Addition polymerization free radical cationic, anionic and copolymerization, chain transfer agents, stereoregulated polymers. Atactic, Isotactic and syndiotactic polymers.

- B) Study of synthetic Rubbers: Buna S SBR, cold rubber, Buna N, NBR, Butyl Rubber, polyisoprene, polyurethanes, vulcanization mechanism, foaming agents, plasticizers, stabilizers, silicones.

Unit-II : General aspects of drug: 12L

Historical, Definitions used in drug chemistry-pharmacy, pharmacology, pharmacodynamics, pharmacodynamic agents, metabolite and antimetabolites, gram positive and gram negative Bacteria, Virus, Actinomycetes, Mutation, Chemotherapy, Nomenclature of medicinal compounds.

Classification of drugs on basis of their

Therapeutic actions.

1. Chemotherapeutic agents

2. Pharmacodynamic agents

Mechanism of Chemotherapeutic action:

1. Biological defences

2. Chemical defences

a) Surface active agents

b) Metabolic Antagonism

Assay of Drugs:

1. Chemical assay

2. Biological assay

3. Immunological assay

Unit-III DRUGS DESIGN: 12L

Development of new drugs, procedures followed in drug design. Concept Of lead compound and modification concept of Prodrugs and Softdrugs structure activity relationship (SAR) Factors affecting bioactivity resonance, inductive effect, isosterism, Biosterism, Spatial consideration, theories of drug activity occupancy theory, Rate theory induced fit theory, Quantitative structure activity relationship.

History and development of QSAR, Concept of drug receptor interaction, Physico-Chemical parameter. Lipophilicity, Partition coefficient Electronic ionization constants, Steric Hindrance and surface activity parameters and redox potential. Free Wilson analysis, Hansch analysis LD-50, ED-50 (Mathematical derivatives of equations included)

Unit-IV : MEDICINAL CHEMISTRY 12L

- A) Antibiotics: Introduction, Penicillin V And G, Streptomycin, Chloramphenicol, Tetracyclins.

- B) Antimalarial : Chemotherapy of malaria, Aminoquinolines, pamaquine, chloroquine and sulphones.

- C) Antipyretic and Analgesic: Aspirin, salol, phenacetin, antipyrin.

Unit-V: Vitamin and Natural Pigments 12L

- A) Vitamins: Structure determination and chemistry of Thiamine (Vitamin B1) Ascorbic acid (Vitamin C) Vitamin E and A.

- B) Natural Pigments: Chemistry of Carotenes, anthocyanins, General study of porphyrins, structure and synthesis of Hemoglobin and chlorophyll.

Books suggested :

- 1) Chemistry of alkaloids-SW Pelletier.
- 2) Chemistry of steroids-LF Fisher & M Fisher.
- 3) The molecules of nature-JB Hendrickson.
- 4) Biogenesis of natural compound-benfield
- 5) Natural product chemistry & biological significance, J. Mann, RS Devison, JB Hobbs, DV Banthripde & JB Horborne.
- 6) Introduction to flavonoids-BA Bohm, Harwood
- 7) Chemistry of naturally occurring quinines-RH Thomson
- 8) The systematic identification of flavonoids-marby, markham, & thomos
- 9) Text book of organic medicinal chemistry-wilson, geswold
- 10) Medicinal chemistry Vol I & II-Burger
- 11) Synthetic organic chemistry-Gurudeep chatwal.
- 12) Organic chemistry of natural products Vol I & II-OP Agrawal
- 13) Organic chemistry of natural products-Gurudeep chatwal
- 14) A textbook of pharmaceutical chemistry-Jayshree Ghosh
- 15) Synthetic dyes series-venkatraman
- 16) Chemistry process industries-shreve & brink
- 17) Principles of modern heterocyclic chemistry-LA Paquette
- 18) Heterocyclic chemistry-J Joule & G Smith
- 19) Heterocyclic chemistry-morton
- 20) An introduction to chemistry of heterocyclic compound-JB Acheson
- 21) Introduction to medicinal chemistry-A Gringuade
- 22) Wilson & Gisvold text book of organic medicinal & pharmaceutical chemistry-Ed. Robert F. Dorge
- 23) An introduction to drug design-SS Pandey, & JR Demmock
- 24) Goodman and Gilman's pharmacological basis of therapeutics-
- 25) Strategies for organic drug synthesis & design-D Lednicer
- 26) Polymer science-v Govarikar

- 27) Principle of polymer chemistry-PJ flory
 28) An outline of polymer chemistry-james q.allen
 29) Organic polymer chemistry-KJ Saunders.

Semester IV
Paper- XV
Special Paper-III
Physical Chemistry

60 Hours (4-Hours/week) 50 Marks 12 hours/Unit

Unit-I : Liquid Crystals:

- A) Mesomorphic behavior, thermotropic liquid crystals, nematic and smectic meso phases, smectic and nematic transitions, and clearing temperature, twisted nematics, chiral nematics molecular arrangement in smectic A and Smectic C phases, optical properties of liquid crystals
 6L
- B) General properties of liquids: liquid as dense gases, liquid as disorder solid, different types of intermolecular forces in liquids, theory of liquids.
 6L

Unit-II Isotope Effect:

Equilibrium isotope effects, equilibria in solution, primary kinetic isotope effect, semi classical treatment, quantum mechanical tunneling, reactions of Muonium, isotope effects of heavy atoms, secondary kinetic isotope effect.
 12L

Unit-III Reactions in solutions:

- A) Reaction between ions: Influence of solvent, dielectric constant & ionic strength, pre-exponential factor, single sphere activated complex.
 6L
- B) Ion dipole & dipole-dipole reaction, Diffusion controlled reaction, influence of hydrostatic pressure, substituent and correlation effect. Hammett equation, compensation effect, diffusion controlled reaction: full microscopic and partial microscopic diffusion controlled and ionic reactions.
 6L

Unit-IV Chemical kinetic methods:

- A) Basic principle of chemical relaxation method, chemical relaxation in two and multi-step systems, thermodynamic aspect of chemical relaxation.
 6L
- B) Experimental methods for relaxation kinetics and applications: Temperature jump method, electrical field jump method, ultrasonic relaxation method.
 6L

Unit-V Reaction Dynamics:

- A) Molecular dynamical calculations for $H + H_2$, $Br + H_2$, and more complex reactions. Chemi-luminescence: highly dilute flames, diffusion flames.
 6L
- B) Molecular beams: Stripping and rebound mechanism, state to state kinetics, influence of reactant vibrational energy and rotational energy, spectroscopy of transition species.
 6L

List of Books:

- 1) Physical chemistry by P.W. Atkins & dePaula 7th Edition
- 2) Chemical Kinetics by K.J. Laidler. IIIrd Edition. Pearson Education.
- 3) Liquid State by J.A. Pryde.
- 4) Theotropic Liquid Crystals by G.W. Gray, Wiley
- 5) Hand Book of Liquid Crystals by Kelkar & Hatz, Chemie Verlag.
- 6) A Dynamic Liquid State, A. F.M. Barton, Longman.
- 7) Chemical Kinetics & Dynamics by J.I. Steinfeld, J.S. Francisco & W.L.Hase. Printice Hall. 1989.
- 8) Kinetic & Mechanism of Chemical Transformation by J. Rajaram & J. Kuriacose, McMillion.

Semester IV
Paper- XVI
Special Paper-IV
Physical Chemistry

60 Hours (4-Hours/week) 50 Marks 12 hours/Unit

Unit-I Nuclear Chemistry:

- A) General characteristics of radioactive decay, decay kinetics parent daughter decay growth relationship. α - decay, β - decay, nuclear de-excitation, Secular and transient equilibrium, α - particle energy spectrum, Geiger-Nuttall's Law, Theory of α , and β decay process,
 6L
- B) Detection and measurement of activity: The electrometer, the ionization chamber, electro pulse counter, scintillation, semiconductor, thermo-luminescence and neutron detector.
 6L

Unit-II Nuclear reactions:

Bathe's notation, types of nuclear reactions, conservation in nuclear reaction, reaction cross section, compound nucleus theory, experimental evidence of Bohr's theory: Experiments of Ghoshal, of Alexander and Simonoff specific nuclear reactions, trans uraniens, photonuclear reactions, thermonuclear reaction, fusion reactors, origin and evolution of elements.
 12L

Unit-III Nuclear fission:

- A) Process of nuclear fission, fission fragments and their mass and charge distribution. Fission energy, fission cross-section and threshold. Theory of nuclear fission, fission neutrons, other types of nuclear fissions. 6L.
- B) Nuclear reactors: Nature of nuclear reactor, Natural Uranium reactor, classification of reactors critical size of thermal reactors, the breeder reactors. Reprocessing of spent fuel, nuclear waste management. 6L.

Unit-IV Radiation Chemistry:

Interaction of radiation with matter, Radiation track spurs and d-rays, linear energy transfer, Bathes equation for linear energy transfer, Bremsstrahlung effect. Passage of neutron through matter, Interaction of g-radiation with matter: photoelectric effect and Compton effect, pair production phenomenon, units of measuring radiation absorption, radiolysis of water, radiolysis of some aqueous solutions. 12L.

- Unit-V A) Radiation dosimetry:** Unit of radiation energy, chemical dosimeter, Fricke dosimeter and ceric sulphate dosimeter, conversion of measured dose values, Distribution of water, free radicals in water, radiation induced color centers in crystals. 6L.
- B) Applications of radioactivity:** Probing by isotopes, the Szilard-Chalmers reaction, cow and milk system. Principle and applications of radioisotopes as tracers, radioisotopes as source of electricity. 6L.

List of Books:

- 1) Introduction to radiation chemistry by J.W.T. Spinks and R.J.Woods.
- 2) Essentials of Nuclear chemistry by S.J.Arnikaar.

Semester IV**Paper XV****Special Paper-III****(Unit Processes)****Industrial Chemistry**

60hrs (4hrs/week). 12hrs/unit

50 Marks

- Unit-I A) Nitration:** Introduction, nitrating agents, equipment for nitration, manufacture of nitrobenzene, Ortho and para nitrochlorobenzene.

- B) Amination by reduction:** Introduction, methods of reduction metal & acid, sulphide reduction, metal & alkali reduction, manufacture of aniline, meta nitro aniline
- C) Halogenation:** introduction, reagents of halogenation, aromatic halogenation, manufacture of chlorobenzene, dichlorofluoromethane

- Unit-II A) Sulphonation:** introduction, sulphonating agents, factor affecting sulphonation, equipment, manufacture of benzene sulphonic acid, sulphonation of anthraquinone
- B) Oxidation:** introduction, oxidizing agents, vapour & liquid phase oxidation, manufacture of acetic acid, acetaldehyde, benzoic acid.
- C) Hydrogenation:** introduction, catalyst used for hydrogenation, hydrogenation of vegetable oil, manufacture of methanol,

- Unit-III A) Esterification:** Introduction, esterification by organic acids, esters by adding unsaturated systems, manufacture of ethyl acetate, cellulose acetate.
- B) Hydrolysis:** introduction, hydrolysis agents, acid hydrolysis alkali hydrolysis, enzymatic hydrolysis, factors affecting hydrolysis,.
- C) Alkylation:** Introduction, alkylating agents, factors affecting alkylation, manufacture of ethyl benzene, phenyl ethyl alcohol

Unit-IV - Petroleum Refining and Petrochemical Technology :

- A) Petroleum refining practice
- Petroleum Refining in India
 - Indian Standards for Motor gasoline, Kerosene and Diesel
 - Atmospheric and vacuum distillation of crude
 - Petroleum coking and visbreaking
 - Fluidised catalytic cracking, catalytic reforming, catalytic alkylation, catalytic isomerisation.
 - Hydrocracking & Hydrotreating
 - Lube processing.
- B) Petrochemical Industry :
- Petrochemical Industry in India
 - Petrochemical Feed stocks.
 - Naphtha cracking & separation and purification of olefins to get ethylene, propylene, butylenes etc.
 - Manufacture of BTX aromatics
 - Butadiene & Xylenes separation techniques.
 - Important monomers like, Styrene, DMT & Caprolactum.

Unit-V - Polymers

- 1) Nomenclature, classification of polymer : Natural and synthetic polymers, organic and inorganic polymers, thermoplastic and thermosetting polymers, plastic elastomers, fibres and liquid resin, block & graft copolymers.
- 2) Types of polymerization: Addition (chain) : Polymerization- free radical, ionic, coordination and their mechanism, condensation (step) polymerization polycondensation, polyaddition, ring opening, linear and cross-linked and their mechanism, copolymerisation.
- 3) Techniques of polymerization : Bulk, solution, suspension and emulsion polymerization.
- 4) Molecular weight and size : Number-average and weight-average molecular weights viscosity-average molecular weight, degree of polymerization, significance of polymer molecular weight, size of polymer molecule; molecular weight determination: by Osmometry (membrane & vapour phase), end group analysis, viscometry and light scattering methods.
- 5) Physical characteristics of polymers : Glass transition temperature and crystallinity of polymer, Determination of Glass transition temperature.
- 6) Manufacturing, properties and uses of following polymers:
 - i) Natural and synthetic rubber
 - ii) Synthetic fibers ó polyesters, polyamides, rayons
 - iii) Synthetic plastics : Polyoliefins, polyurathanes
 - iv) Silicones

List of Books-

1. Unit Process in Organic Synthesis, by P. H. Groves
2. Modern Petroleum Technology by G. D. Hobson and W. Pohl.
3. Petroleum refining and engineering by W. L. Nelson.
4. Petroleum refining technology and economics by J. H. Gary and G. E. Handwerk.
5. The Petroleum chemical industry by Goldstein and Waddams.
6. Petroleum processing handbook by W. E. Bland and R. L. Davidson.
7. The Text book on Petrochemical by Dr. B. K. Bhaskar Rao, Khanna Publishers New Delhi.
8. Modern Petroleum refining Processes by Dr. B. K. Bhaskar Rao, Oxford, IBH, 1984
9. Petroleum product handbook, V. B. Guthrie.
10. Textbook of polymer science by F. Bill Mayer, Wiley Inter Science.

11. Polymer Science by V. Govarikar, N. Viswanathan and J. Sreedhar, New Age International (P) Ltd. Publishers New Delhi
12. Physical chemistry of polymers by D. D. Deshpande, Tata McGraw Hill.
13. Principles of polymer chemistry By P. J. Flory, Cornell Univ. Press.
14. Introduction to polymer chemistry by R. B. Seymour McGraw Hill.
15. A Practical Course in polymer chemistry by S. J. Pnnea, Pergamon press.
16. Labortary preparation of macro chemistry by E. M. M. Effery McGraw Hill.

Semester IV
Paper XVI
Special Paper-IV
(Chemical Processes Industries)
Industrial Chemistry

60hrs (4hrs/week). 12hrs/unit

50 Marks

Unit-I : Dyes**12L**

- i) Chemistry of dyes :- Introduction, classification of dyes on the basis of structure and the mode of application to the fibre. Colour and chemical constitution of dyes. General methods of preparation of important azodyes, Cyanindyes and anthraquinone vat dyes.
 - ii) Chemistry of intermediates :- Introduction to the history of dyes. Natural to synthetic dyes.
 - 1) Manufacturing, properties and uses of following polymers:
 - i) Natural and synthetic rubber
 - ii) Synthetic fibers ó polyesters, polyamides, rayons
 - iii) Synthetic plastics : Polyoliefins, polyurathanes
 - iv) Silicones
- Mediates: - chloronitrobenzene Nitroanilines, diaminobenzenes.
- Napthalene intermediates :- Naphthyl sulphuric acids, Naphthyl amine sulphuric acids.
- Mescallaneous
- i) Amino anthraquinones, methyl & methylamino anthraquinones, Disperse dye intermediates, disperse ó reactive intermediates.

- ii) Analysis & applications of dyes :- Different methods used in analysis, Nitrate value determination, Coupling value, titanium chloride reduction, metal estimations of Cu, Ni, Cr etc.

Dyeing methods :- Dyeing methods for direct, acid, reactive disperse, vat, cationic, sulphur, indigo and azoics.

Unit-II : Sugar Industries 12L

Manufacturing of sugar from sugarcane : Introduction, agriculture, harvesting, preparation of cane for mashing, juice extraction, diffusion, juice purification, evaporation, crystallisation (production of raw sugar), centrifugation, sugar refining, decolouring, purification, filtration, crystallisation grade analysis.

Analysis of bagasse and molasses, byproducts of sugar industries.

Unit-III : Pulp and paper industries 12

- A) Chemistry of paper making, raw materials-
- physical properties of wood, classification of woods, plants used in pulp & paper, grass.
 - Chemical composition of wood, non-woody fibers used in pulping
 - Lignin-lignification of wood, chemical aspects of lignin formation.
 - Structure & properties of lignin
- B) Pulping:
- Preparation of pulp, wood, chips
- Manufacture of mechanical pulp, woods used, types, grades & uses.
- Equipment for ground wood pulping process
- Semichemical pulping, wood preparation, digesters
- Steam cooking
- Utilisation of secondary fibres.
- Rag pulping
- C) Bleaching
- bleaching of wood pulp-bleaching practice
 - stock preparation-internal sizing of papers
 - Filling paper manufacture - Additives
 - types of paper machine - sheet formation
 - press section - drying of papers
 - cylinder mould type - calendaring
 - Speciality papers-injection moulding

Unit-IV : Pharmaceuticals 12L

Product profile study of the following drugs and intermediates with particular stress on the manufacturing process engineering problems involved, quality control, equipment and economics ;

- i) Sulpha drugs :- Sulphaguanidine, sulphamethoxazole.
- ii) Antimicrobial :- chloramphenicol, streptomycin, Tetracyclines, ciprofloxacin.
- iii) Analgesic :- anti-inflammatory, Acetyl Salicylic acid, Ibuprofen, paracetamol.
- iv) Vitamin D, Vit. A, Vit. B₆, Vit. C
- v) Barbiturates :- Pentobarbital
- vi) Beta-blockers :- propranolol, atenolol, Beta-Nifedine, (Antihypertension)
- vii) Cardiovascular agent :- Methyldopa, enalapril maleate, Benazepril.
- viii) Antihistamines :- Chlorpheniramine maleate,
- ix) Antidepressants :- Reserpine, sertraline
- x) Anticancer drugs & antiacids.

Unit-V : Agrochemicals 12L

Inorganic insecticides :- Arsenic insecticides, fluoro insecticides

Insecticides of plant origin: - Nicotine, nicotine, pyrethroids, rotenoids, aldrin, allethrin.

Chlorinated hydrocarbon:- DDT, dieldrin, DDT, endosulfan.

Organophosphorus Insecticides :-

Dithiophosphoric acid derivatives :- Malathion, dimethoate, Dimecron.

Diphosphoric acid derivatives :- Parathion, methyl parathion, thiophos, chlorpyrifos, diazinon.

Pyrophosphoric acid derivatives.

Sulphate, phosphoramide.

Other organophosphorus Insecticides.

Isoproturon, trichlorfon.

Carbamate insecticides.

Carbofenthrin, phthalophenanthrin, pyrethrin.

Fungicides:-

Inorganic Fungicides:-

Sulphur, limesulphur, copper sulphate, Bordeaux paste, Bordeaux paint, Burgundy, copper oxychloride.

Organomercuric compounds:-

Ethyl mercuric chloride, cereasn Dithiocarbamates- Ziram, thiram, Zinc, captan.

Miscellaneous fungicides :- Polpet, Bavistin

List of Books-

1. Synthetic dyes by Venkatram (VOL I & II)
2. Fundamental processes of dye chemistry, by Fietz.
3. Dyes and Intermediates by Adrahaedt
4. Chemical Process Industries by R. N. Shreves and M. J. A. Brink.
5. Pulp and paper chemistry and chemical Technology by James P. Casey
6. The chemistry of cellulose by Emit Ptauseg, John wiley and sons, New York.
7. Indian Pharmacopoeia, 1985
8. British pharamacopoeia, 1990
9. Textbook of Organic Medicinal and Pharmaceutical Chemistry by Willson, Jisvold, Dejjia, Lippinett Toppan.
10. Essentials of Medicinal Chemistry by Korolkovas and Burkhatther-Wiley-Interscience.
11. Pharmaceutical Dosage forms
12. Pesticites-Color Publications, P. L. Bombay
13. Elements of Plant Protection by L. L. Pyenson, John Wiley and sons.
14. Chemistry of Pesticides by N. N. Melnikov Springer-Verlag, New York
15. Fungicites in Plant Disease control by Y. L. Nines, Oxford and IBH Publishing company New Dehli.
16. Methods Pesticides Analysis by Sree Ramuly, U. I. Oxford and IBH Publishers.
17. Charles E. Dryden, Outline of Chemical Technology Edited by M. Gopal Rao and Marshall Siting, East West Press 2nd Edition 1973.

Semester-IV

Paper XV

Analytical Chemistry

Analysis of commercial products

Total Lectures: 60Hrs, 4Hrsper week, 12Hrs/unit Total Marks-80

Unit-I : **12L**

Pharmaceutical analysis:-

Requirement of a quality control laboratory for pharmaceutical units, SOP of sophisticated instruments,

source of impurities in pharmaceutical raw materials such as chemicals, reagents and solvents, atmospheric and microbial contaminants, packing errors, chemical instability, container contamination, physical changes, temperature effects, manufacturing and storage effects. General manufacturing processes, stability studies, shelf life fixation for formulated products. Introduction to pharmaceutical formulations, Standardization, Evaluation analysis of common drugs, Antibiotics-Chloramphenicol, Ampicilline, Terramycine.

Vitamins- Vitamin B₁₂, B₆, Vitamin K

Sulpha drugs-Sulphaguandine, Sulphapyrazine, Sulphanilamide Analysis of common drugs (aspirin, paracetamol etc..)

Unit-II : **12L**

a) Analysis of petroleum and petroleum products- Introduction, constituents and fractionation, Quality control requirements of petrol and petroleum products, safety and hazardous aspects. Analysis of petroleum products-specific gravity, viscosity, doctor test, sulphuric acid absorption, aniline point, vapour pressure and colour determination, cloud point, pour point. Determination of water, neutralization value, ash content estimation of sulphur and lead in petrol.

b) Analysis of Explosive -General methods, heat of explosion, hygroscopicity, moisture by Karl Fischer titration, qualitative tests of explosives, qualitative analysis of explosive mixtures, Dynamites. Blasting caps and electric detonators, primers, liquid propellants and solid propellants

Unit-III : **12L**

Analysis of Paints, soap and detergents

Analysis of Paints and Pigments- Preliminary inspection of sample, Test on the total coating. Separation of pigments, binder and thinner of latex paints, determination of volatile and non volatile constituents, flash points, separation of pigments, estimation of binders and thinners. Modification of binder. Identification and analysis of thinner.

Analysis of soaps-

General idea of soaps and detergents, sampling, separation, identification, determination of soap composition-fatty acids, total anhydrous soap and combined

alkali, potassium, water, determination of inorganic fillers and soap builders, determination of other additives.

Analysis of Detergents- types, method of analysis, sampling, separation, identification of components, determination of surfactants, determination of surfactants-anionic, cationic, non-ionic. Determination of Abrasives, Ammonia, Carbonates, Cellulose, Glycerine, Silicates, Sulphates, Phosphates, moisture content, saponification value.
Analytical techniques used for analysis of soaps and detergents

Unit-IV :**12L****Forensic Analysis-**

General introduction of forensic analysis, sampling, sample storage, sample dissolution, classification of poisons, lethal dose, significance of LD-50 and LC-50, general discussion of poisons with special reference to mode of action of cyanide, organophosphate and snake venom.

Analytical toxicology: Isolation, Identification, Estimation of poisonous materials such as lead, mercury and arsenic in biological samples. Quantification of drugs, insecticides, alkaloids and other products of synthetic and natural origin, ethyl alcohol, methyl alcohol, Zinc phosphides, effects of Kerosene and cooking gas. General discussion, Diagnosis and Management of poison, food poisoning, narcotic, stimulants, paralytic, antihistamine.

Unit-V :**12L**

Analysis of cosmetics, creams, lotions and hair dyes:-

- a) **Composition of creams and lotions:** Determination of water, propylene glycol, non-volatile matter and ash content, analysis of borates, carbonates, sulphates, phosphate, chloride, Titanium and Zinc oxide.
- b) **Analysis of face powder:** Estimation of boric acid, Mg, Ca, Zn, Fe, Al and Ba
- c) Analysis of deodorants and antiperspirants-composition, analysis of fats and fatty acids, boric acid, zinc, iron, aluminium, lead, copper, mercury, phosphorus and urea.
- d) Analysis of ingredients of hair dyes.
- e) Analysis of Vanishing cream
- f) Analysis of Lipsticks

List of Books-

1. Pharmacopoeia of India Volume I and II.
2. Aids to the Analysis of Food and Drug by Nicholls
3. Standard Methods of Chemical Analysis. 6th Ed. Vol I & II (D. Van. Nostard comp) by F.J. Welcher
4. Forensic pharmacy by B.S Kuchekar, A.M Khadatare (Nirali Prakashan)
5. Treatise on Analytical Chemistry Vol..I & II by L.M. Kolthoff.
6. Separation Chemistry in Chemistry and Biochemistry. By Roy Keller, M Decker Inc
7. G D. Christian: Analytical Chemistry
8. Handbook of Analysis and Quality, Control for Fruits and Vegetable Products 2nd Ed Mc.Graw hill) by S.Ranganna.
9. Encyclopedia of Industrial chemical Analysis Vol I to 20 (John Wiley) Riech
10. Cosmetics by W D Poucher (Three volumes)
11. Willard, Merritt and Dean: Instrumental methods of Analysis
12. Strouts, Crifillan and Wison: Analytical Chemistry.
13. Textbook of Forensic pharmacy- B. M. Mithal 9th Edn (1993) National Centre, Calcutta. V. Malik, Drug and Cosmetics Act.
14. Textbook of Forensic Pharmacy by B M Mithal 9th edition 1993, National Centre Kolcutta
15. Forensic Pharmacy by B.S Kuchekar, and A.M Khadatare Nirali Prakashan

Semester-IV**Paper XVI**

Analytical Chemistry (Special Paper-IV)

Applied analytical chemistry

Total Lectures: 60Hrs, 4Hrs per week, 12Hrs/unit Total Marks-80

Unit-I :**12L**

Agricultural analysis-I

Soil analysis- Classification and composition, Soil formation, weathering, (especially SRMs), composition soil sampling, field description of soils, physical analysis, determination of major and minor constituents, exchange capacity, soil reaction, chemical analysis as a measure of soil fertility. Analysis of constituents such as Nitrogen, Phosphorus, Potassium and micronutrients.

Stock feeds analysis - feeding stuffs, qualitative analysis and quantitative analysis.

Plant analysis- Preparation of sample, moisture determination- methods of washing, methods of plant

analysis- starch, sugars, determination of mineral constituents (Fe, Mn, Mo, Si, Ca, Mg, P, S, C and N).

Unit-II : Agricultural Analysis-II 12L

Analysis of Fertilizers- Sampling, sample preparation. Analysis of nitrogen, phosphorous and potassium. Nitrogen: urea nitrogen, total Kjeldahl nitrogen method, Ammonianitrogen, phosphorous: total phosphorous. available and non-available, alkalimetric ammonium molybdophosphate method, potassium : potassium by sodium tetraphenylborate method.

Pesticides and insecticides analysis- Introduction, classification, Analysis of organochlorine, organophosphorus and carbonate pesticides, analysis of DDT, gammexane, endosulphan, zinab, ziram, malathion, thiram, thiometon, simazine and chloridane . Green technologies in agriculture industries and water resource managements

Unit-III 12L

Analysis of minerals, ores and alloys

- a) Minerals and ores-Hematite, pyrolusite, ypsum, dolomite chromate, bauxite, limestone, illmenite and uranium ores.
- b) Metal and alloys analysis- iron, different kinds of iron, steel, Cu-Ni alloy, solder, bronze, aluminium alloy, ferroalloys of silicon, molybdenum, chromium, titanium and vanadium.

Unit-IV : 12L

Industrial pollution- Sugar industry, paper and pulp industry, nuclear power plant, polymer drugs, radionuclide analysis, disposal of wastes and their management. Principles of decomposition Biodegradability, classification of hazardous substances and water, chemical classes of hazardous wastes, hazardous substances to health better industrial process. Industrial Operation and Green Methodology . Introduction and evolution of green chemistry, green reagents, solvents and catalysts

Hazardous substance analysis- nature, source, treatment and disposal of hazardous waste, classification of hazardous substances and wastes, origin, toxic substances, chemical, classification hazardous wastes, physical and chemical methods of wastes treatment and preparation of waste and ultimate disposal of hazardous waste.

Case studies-Bhopal gas, chronobyal, Three Mile Island minamata disasters.

Unit-V : Analysis of mineral materials: 12L

a) Cement- Loss on ignition, insoluble residue, total silica, sesquioxides, lime, magnesia, ferric oxide, sulphuric anhydride, air and dust pollution from cement plants, atmospheric dispersion of pollutants in cement industry.

b) Glass and Glass-Ceramics- Introduction, composition, methods of analysis- sampling and sapling preparation, composition analysis- preliminary testing, decomposition. Chemical method for the individual constituents-Si, B, Pb, Zn, Al, Cl, Mg, Ti.

List of Books-

1. Agricultural Analysis. By Kanwar
2. A. I. Vogel: A text book of quantitative Inorganic analysis.
3. Soil Analysis. By Jackson.
4. Encyclopedia of Industrial Methods of Chemical Analysis. By F D Snell (All senus).
5. G. W. Ewing: Instrumental Methods of Chemical Analysis.
6. Standard Methods of Chemical Analysis. By F J Welchar
7. G D. Christian: Analytical Chemistry
8. S. M. Khopkar: Basic Concept of Analytical Chemistry.
9. Handbook of Air Pollution. By Stern, APHA , 1980.
10. Fundamentals of Analytical Chemistry 6th edition by D. A. Skoog, D. M. West and F. S. Holler
11. Industrial Chemistry by B. K. Sharma.
12. Strouts, Crifillan and Wison: Analytical Chemistry.
13. Principle and practice of Analytical chemistry by F. U. Fifeild and D. Keuley 3rd edition, Blackie and sons Ltd..
14. S. A. Skoog and D. W. West: Fundamental Of Analytical Chemistry.
15. Pollution Control in Process Industries by S. P. Mahajan.

Semester IV

Practical-VII

Inorganic Chemistry Special

Practical Workload 9 Hrs./week Time: 9-12 hours Marks: 100

- Unit-I**
- 1) Extraction and absorption spectral study of chlorophylls from green leaves.
 - 2) Determination of Phosphates from cold drink samples by spectrophotometry.

- 3) Analysis of talcum and nyclin powders (Mg-complexometry, ZnO/H_3BO_3)
- 4) Determination of iron in soap bar.
- 5) Analysis of N, P, K from fertilizer
- 6) Analysis of cement/paint/soil.

Unit-II : Study of complex formation:

- 1) To determine the formula and formation of a complex by spectrophotometry (Job's/ mole/Slope ratio methods)
- 2) To determine stepwise proton-ligand and metal-ligand stability constant of complex by Irving-Rossotti method.
- 3) To determine the instability constant of complex by potentiometry ($AgNH_3$, Ag-thiosulphate)
- 4) To determine the composition and formation constant of a Fe-SSA complex by conductometry.
- 5) Determination of composition and stability constant of complex by polarography.

Unit-III: Inorganic reaction mechanism:

Kinetics and mechanism of following reactions:

- 1) Substitution reactions in octahedral complexes (Acid/Base hydrolysis)
- 2) Redox reactions in octahedral complexes.
- 3) Isomerization reaction of octahedral complexes.
- 4) Enzyme kinetics in presence of metal ions.
- 5) To determine the corrosion rate of metal strip.
- 6) To study the 1,10 phenanthroline as corrosion inhibitor for mild steel in sulphuric acid.
- 7) To study the adsorption and desorption of gases on heterogeneous catalyst.

Unit-IV: Solid State:

- 1) Preparation of oxides and mixed oxides (Mn_2O_3 , NiO, Cu_2O , Fe_3O_4 , $ZnFe_2O_4$, $ZnMn_2O_4$, $CuMn_2O_4$ and $NiFe_2O_4$)
- 2) Preparation of Silica and Alumina by sol-Gel technique.
- 3) To study the electrical conductivity of ferrites, Magnetites, doped oxides and pure samples and determine band gap.

Unit-V : Two/Three steps synthesis and characterization:

Synthesis of metal complexes/Polymers/Lanthanide complexes and their structural characterizations by possible physical methods such as: elemental analysis (N, S, M % etc.), m.p. Solubility, MW, molar conductance, magnetic moment, thermogravimetric analysis, IR and electronic spectral data, determination of crystal field parameters (minimum five)

Book Suggested:

1. Synthesis and Characterization of Inorganic Compounds, W. L. Jolly, Prentice Hall.
2. Inorganic Experiments, J. Derck Woollins, VCH.
3. Practical Inorganic Chemistry, G. Mairand, B. W. Rockett, Van Nostrand.
4. A Text Book of Quantitative Inorganic Analysis, A. I. Vogel, Longman.
5. EDTA Titrations. F. Laschka
6. Instrumental Methods of Analysis, Willard, Merit and Dean (CBS, Delhi).
7. Inorganic Synthesis, Jolly
8. Instrumental Methods of Chemical Analysis, Yelri Lalikov
9. Fundamental of Analytical Chemistry, Skoog D.A. & West D.M Holt Rinehart & Winston Inc.
10. Experimental Inorganic Chemistry, W.G.Palmer, Cambridge.
11. Solid state Chemistry, N.B.Haney
12. Introduction to Thermal Analysis, Techniques & Applications, M.E.Brown, Springer
13. Preparation and Properties of solid state Materials, Wilcox, Vol. I&II, Dekker
14. The Structure and Properties of Materials Vol.IV, John Wulff, Wiley Eastern.

The Practical examination will be based on the Inorganic Chemistry.

Time: 6-8 hours (Two days examination)	Marks: 100
I) Exercise -1 (Synthesis & Analysis)	- 40 Marks
II) Exercise-2 (Kinetics/complex)	- 40 Marks
III) Record	- 10 Marks
IV) Viva- Voce	- 10 Marks
Total	-100 Marks

SEMESTER IV**Practical VII****Organic Chemistry Special**

Practical Workload 9 Hrs./week Time: 9-12 hours Marks: 100

Unit-I : QUALITATIVE ANALYSIS.

Separation of the components of a mixture of three organic compounds (three solids, two solids and one liquid, two liquids and one solid, all three liquids and identification of any two components using chemical methods or physical techniques. Purification of the compounds by crystallization, chromatographic techniques (Minimum of 12 mixtures to be done)

UNIT-II: ORGANIC ESTIMATION

Organic Estimation.

1. Estimation of nitrogen.
2. Estimation of halogen.
3. Estimation of sulphur.

Spectrophotometric/calorimetric Estimation.

4. Estimation of streptomycin sulphate.
5. Estimation of B-12.
6. Estimation of amino acids.
7. Estimation of proteins.
8. Estimation of carbohydrates.
9. Estimation of Ascorbic acid.
10. Estimation of Aspirin.
11. Solvent extraction of oil from oil seeds and determination of saponification value, iodine value of the same oil.

Organic practical :

Two Days Examination - 9-12 Hrs.

100 Marks

Distribution of marks:

Unit I í í	40
Unit II í í í	40
Record	10
Viva-voce	10
TOTAL	100

BOOKS SUGGESTED :-

1. Textbook of practical organic chemistry qualitative and quantitative analysis (Vol I & II)- A.I. Vogel.
2. Elementary practical organic chemistry small scale preparation (Langman)- A.I. Vogel.
3. A handbook of organic analysis.-H.T.Clark.
4. Systematic qualitative organic analysis óH. Middleton.
5. Advanced practical organic chemistry-N. K. Vishnoi.

6. Small scale organic preparation-P.J. Hill
7. Practical organic chemistry-H. Dupont Durst & George W.Gokal.
8. Experimental organic chemistry Part I & II, P. R. Singh, D. S. Gupta & K.S. Bajpai.
9. Vogel's textbook of practical organic chemistry-A.R. Tatchell

Semester IV**Practical-VII****Physical Chemistry Special**

Practical Workload 9 Hrs./week Time: 9-12 hours Marks: 100

Use of Computer Programmes 5 terms of practicals.

Treatment of experimental data, X-Y plots, programs with data preferably from physical chemistry practical. Students will operate two packages I) MS-Word and II) MS-Excel.

Part-A

- 1) To find out Energy of activation & Temperature coefficient of hydrolysis of methyl / ethyl acetate
- 2) To find out Energy of activation of the reaction between potassium persulphate & potassium iodide.
- 3) Determination of partial molar volume of solute and solvent in binary mixture.
- 4) To study the variation of solubility of calcium sulphate with ionic strength and hence determine thermodynamic solubility product.
- 5) To study the adsorption of acetic acid on charcoal and prove the validity of Freundlich and Langmuir adsorption isotherm.
- 6) To determine the critical micelle concentration of soap.
- 7) To determine the molecular weight of high polymer by viscosity measurement.
- 8) To find out partition coefficient of Iodine/Benzoic/Salicylic acid between benzene and water.

Part-B

- 1) Determination of half wave potential of metal ions by polarography.
- 2) Simultaneous determination of suitable of metal ion by polarography
- 3) Analysis of aspirin conductometrically and potentiometrically
- 4) Determination of sodium, potassium, lithium and calcium by Flame photometric individually and mixture.
- 5) Electronics measurement of resistance with multimeter and use of Wistone Bridge for accurate measurement of resistance.
- 6) Determine the dipole moment of given liquid.

- 7) Plot the current voltage curve for copper sulphate and sulphuric acid using bridge platinum electrode.
- 8) Determine the transport number of ions by moving boundary method.
- 9) Determine the composition of binary mixture spectrophotometrically

Physical Chemistry Practical :

Distribution of marks:

Two Days Examination - 9-12 Hrs.	100 Marks
Unit A í í	40
Unit B í í í	40
Record	10
Viva-voce	10
TOTAL	100

Semester IV Practical-VII Industrial Chemistry Special

Practical Workload 9 Hrs./week Time: 9-12 hours Marks: 100

Multi step organic Synthesis:

- 1) Nitrobenzene - m-dinitrobenzene ó m-nitroaniline- m-nitrophenol. Anthranilic acid ó phenylglycine orthocarboxylic acid ó indigo
- 2) Cyclohexanone ó cyclohexanone oxime ó caprolactum.
- 3) Preparation of P- bromoaniline from aniline.
- 4) Preparation of Synthetic Zeolites.
- 5) Determination of NH_4^+ and PO_4^{3-} nitrogen and phosphorus containing fertilizer respectively by suitable methods.
- 6) Determination of Iron and Calcium from Cement by suitable methods.
- 7) Determination of Lead (Pb) from Opal Glass by suitable methods.
- 8) Experiments based on distillation under reduced pressure, fractional and steam distillation.
- 9) Measurement of flash point, ignition point, kinematic viscosity by U-tube method.
- 10) Estimation of Copper from ó fungicides.
- 11) Determination of pesticide contents in the soil.
- 12) Preparation of Methyl orange, Methyl red, orange II, Fluorescein, Quinoline, Anthraquinone.
- 13) Quantitative estimations of important commercially available drugs.

- 14) Qualitative analysis of commercial available drugs including chromatographic technique.
- 15) Preparation of simple drugs involving two or three steps.
- 16) Preparation of melamine ó HCHO resin.
- 17) Determination of number average molecular weight (Mn) by end group analysis by conductometric method.
- 18) Determination of average molecular weight of polymer by viscometric method.
- 19) Determination of reducing sugar in cane juice.
- 20) Determination of moisture content and ash content of wood sample.
- 21) Experiments based on simple & fractional crystallization.
- 22) Analysis of nonfibrous materials used in pulp industries such as caustic soda as Na_2O , Soda ash as Na_2O , lime as CaO .
- 23) Extraction of essential oils from medicinal plants (Tikhadi).
- 24) Separation of Chromium (VI) & Chromium (III) by TLC in wastewater sample from electroplating industry.
- 25) Preparation of selected pesticide formulations in the form of dusts, emulsions, sprays.
- 26) Determination of calorific value of fuels.

Distribution of marks:

The Practical examination will be based on the syllabus for Industrial Chemistry (Elective Paper).

Time: 9-12 hours (Two days examination)	Marks: 100
I) Exercise -1 (Synthesis)	- 40 Marks
II) Exercise-2 (Analysis)	- 40 Marks
III) Record	- 10 Marks
IV) Viva- Voce	- 10 Marks
Total	- 100 Marks

List Of Books-

1. Practical Engineering by S. S. Dara.
2. Laboratory Preparation of Microchemistry by E. M. M. Effery, McGrawHill.
3. Practical Course in Polymer Chemistry by S. J. Pnnea, Pargaman Press
4. Practical Pharmacognosy by T. B. Willis.
5. Practical Pharmacognosy by T. N. Vasudevan.
6. Indian Pharmacopea-1985, British Pharmacopea-1990.
7. Handbook of Drugs and Cosmetics by Mehrotra
8. Methods of Pesticide Analysis by Sree Ramuly U. I. Oxford and IBH Publishing Co.

9. Methods of testing for petroleum and petroleum products. IS 1448-1960 Part I to Part IV. Published by ISI New Delhi 1967
10. IP Stands for Petroleum and products Published Applied Service Publisher Ltd. London, 33rd Edition 1974.
11. American Stds. For testing Materials, New York 1967.
12. Textbook of Inorganic Chemistry by A. I. Vogel.
13. Instrumental Methods of Analysis by Willard, Merit and Dean
14. Industrial Chemicals, Faith et. al. Wiley Interscience New York
15. Textbook Of Practical Organic Chemistry by I. C. Voley.
16. Industrial Organic Chemistry by J. K. Stille
17. Unit Operations by Kale
18. Reagents for Organic Synthesis Fisher and Fisher.
19. Technique of Organic Chemistry Vol I, Part I- IV A. Weishberger.

Semester IV

Analytical Chemistry Practicals (Special)

Total Hours: 90 hrs. (9 Hours per week)

Marks: 100

- 1) Solvent extraction of Al/Mg or Mg/UO₂ using 8- hydroxy quinoline complex and determination by spectrophotometry.
- 2) Separation and estimation of copper and cobalt on cellulose Column.
- 3) Analysis of pyrolomite with respect to I) iron II) Manganese
- 4) Assay of sulphadiazine
- 5) Analysis of vit. C in juice and squashes
- 6) Determination of saponification value and iodine value of oil.
- 7) Determination of p- nitrophenol by colorimetry.
- 8) Determination of iron in syndets by colorimetric method.
- 9) Determination of Phenol by Conductometry.
- 10) Potentiometric determination of thiourea.
- 11) Estimation of calcium/sodium in the sample of dairy whitener by flame photometry.
- 12) Analysis of pigments with respect to Zn and Cr.
- 13) To determine the amount of each copper and bismuth or copper and iron (III) from the given mixture at 745 nm by spectrophotometric titration using solution of
- 14) EDTA identification of sulphadiazine in tablets and ointments by TLC.
- 15) Fertilizer analysis for N, P, K
- 16) Analysis of iodized table salt for its iodine content.
- 17) Estimation of the purity of given azo dye colorometrically.
- 18) Chemical analysis of chilly and turmeric powder.
- 19) Simultaneous estimation of Cl and I by potentiometric method.

- 20) Colorimetric determination of simple ions (phosphate, sulphate, nitrate/nitrite, toxic heavy metals).
- 21) Analysis of soap and detergent.
- 22) Determination of alcohol from beverages spectrophotometrically using dichromate.
- 23) Determination of amount of Zinc from the given sample solution by Nephelometric/Turbidimetric titration using standard solution of Ba (NO₃)₂ or
- 24) Pb (NO₃)₂ Analysis of Pharmaceutical mixtures
- 25) Simultaneous determination of Vitamic C and Vitamin E
- 26) Analysis of some common pesticides insecticides, plastics and detergents
- 27) To determine the amount of each para nitro-phenol and meta nitro-phenol from the given mixture by spectrophotometric titration using standard solution of NaOH (max-280 nm)
- 28) Estimation of sodium benzoate/sodium metabisulphite. boric acid and salicylic acid in food
- 29) Analysis of chrome steel alloy for chromium and nickel content
- 30) Agricultural analysis of soil sample, animal feeds, soil micronutrients, milk powder for Ca, Fe and P content.
- 31) Any other relevant expt. may be added

The Practical examination will be based on the syllabus of Analytical Chemistry (Special Papers).

Time: 6-8 hours (one day examination)

Marks: 100

- I) Exercise -1 - 40 Marks
 II) Exercise-2 - 40 Marks
 III) Record - 10 Marks
 IV) Viva- Voce - 10 Marks

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 Total -100 Marks

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M.Sc. (Chemistry)

Semester-IV

Practical-VIII - Project Work

Time : 9 Hrs. Per Week

Marks : 100

The Students will develop utilities such as analytical spectra, simulation programmes that will supplement laboratory exercises in their subject of specialization. For this, variety of small research project designed by the teacher based on the interest of the student and capabilities should be worked out.

The project will be evaluated by external and internal examiners.

Study Tour: Educational / Industrial tour is compulsory for M.Sc. Chemistry.

(i) Semesters I / II : Visit to local industry.

(ii) Semester III / IV : Education tour to visit the industry / Research Laboratory.

List of equipments/apparatus required for the M.Sc. Chemistry Semester-I to IV Practicals.

1. Conductivity meter	03 nos./batch
2. pH meter	03 nos./batch
3. Potentiometer	03 nos./batch
4. Polarimeter	02 nos./batch
5. Centrifuge machine	02 nos./batch
6. Vacuum Pump	01 no./batch
7. Hot air oven	01 no./batch
8. Blower hot & cold	03 nos./batch
9. Stop watch	10 nos./batch
10. Weight box con. 100 gm.	10 nos./batch
11. Analytical double pan balance	10 nos./batch
12. One pan electrical balance	10 nos./batch
13. Tripple beam balance	02 nos./batch
14. Melting point apparatus	02 nos./batch
15. Spectro photometer	02 nos./batch
16. Water still	01 no./lab
17. Colorimeter	02 nos./batch
18. Thermostate	01 no./batch
19. Electrodes platinum	03 nos./batch
Silver	03 nos./batch
Glass	03 nos./batch
Reference	03 nos./batch
20. Heating mantle	02 nos./batch
21. Glass double distillation unit	01 no./lab
22. Flamed Photometer	01 no./batch
23. LCR meter	01 no./lab
24. Polarograph with recorder	01 no./lab
25. U. V. visible spectrophotometer	1 no./lab
26. Standard cell	02 nos./batch
27. Muffle furnace	01 no./lab
28. D.C. Voltmeter	01 no./lab
29. Infrared lamp	05 nos./lab

30. Refrigerator	01 no./lab
31. Magnetic stirrer 2 ml, 5 ml.	02 nos./batch
32. Dimmer state	01 no./lab
33. Abbe's refractometer	01 no./batch
34. Sodium lamp for polarimeter	02 nos./batch
35. T.L.C. Kit	01 no./lab
36. Calorimeter	01 no./lab
37. Bomb Calorimeter	02 nos./batch
38. BOD analyser	01 no./lab
39. Water analysis kit	01 no./lab
40. Computer-386/486	01 no./lab
41. U.V. Lamp	02 no./lab
42. Ice making machine	01 no./lab
43. LCR bridge	01 no./lab
44. HPLC	01 no./lab
45. Deioniser	01 no./lab
46. Ion exchange column	04 no./lab
47. Turbidity meter	01 no./lab
48. Optical densitometer	01 no./lab
49. Orsat apparatus (gas analysis)	01 no./lab
50. Interferometer (ultrasound)	01 no./batch
51. Youyou balance	01 no./lab
52. Hydraulic press	01 no./lab
53. Shaking machine	01 no./lab
54. G.M. Counter	01 no./lab
55. Electrophoresis apparatus	01 no./lab
56. Karl-Fisher Titration apparatus	01 no./lab
57. Power supply (regulator)	01 no./batch
58. Regulated furnace	01 no./lab
59. Thermocouple	01 no./lab
60. Vacuum oven	01 no./lab
61. Top pan balance	01 no./lab
etc.,	

List of glasswares (main) for M.Sc. Chemistry Semester-I to IV Practicals

1. Soxhlet set	02 nos./batch
2. Kjeldahl's apparatus set (for Nitrogen element estimation)	02 nos./batch
3. Distillation unit	04 nos./batch
4. Separating funnel	10 no./batch

5. Steam distillation unit	02 nos./batch
6. Vaccum desicator	01 no./batch
7. Paper chromatography chamber	03 nos./batch
8. Silica crucibles	20 nos./batch
9. Sintered glass crucibles g4/g5	20 nos./batch
10. Spot test plates	10 nos./batch
11. Wash bottles	10 nos./batch
12. Density bottles	10 nos./batch
13. Viscometer	10 nos./batch
14. Kippø apparatus	10 nos./batch
15. Beakers, capacity :50 ml, 100 ml, 250 ml, 400 ml, 500 ml, 1000ml,	
16. Conical flask : 100 ml, 250 ml.	
17. Burettes with stop cock, capacity : 2ml, 5 ml, 10ml, 25 ml.	
18. Lambda pipette	02 nos./batch
19. Voumetric flasks, capacity : 10 ml, 25 ml, 50 ml, 100 ml, 250 ml, 500 ml, 1000ml.	
20. Measuring cylinder, capacity : 10 ml, 25 ml, 50 ml, 100 ml, 500 ml, 1000 ml	
21. Pipette, capacity : 1 ml, 2 ml, 5 ml, 10 ml, 25 ml.	
22. Stalagnometer	10 nos./batch
23. Thermometer (b-24) 0 to 3600C (quick fit)	05 nos./batch
24. Water suction pump (glass)	05 nos./batch
25. Filtration flasks with buckner funnels 50 ml	10 nos./batch
100ml	10 nos./batch
250ml	10 nos./batch
500ml	10 nos./batch
26. Quick fit stand joints b-14, b-19, b24	
27. China dishes	10 nos./batch
28. Dessicators	10 nos./batch
29. Thielø tube for melting point	05 nos./batch
30. Quick fit water condensers b-19, b-24	10 nos./batch
31. Quick fit flasks, Capacity 50 ml, 100 ml, 250 ml, 500 ml, 1000 ml.	10 nos./batch

M.Sc. Sem-I to IV

Prospectus No. 2013126

संत गाडगे बाबा अमरावती विद्यापीठ

SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका
विज्ञान पारंगत परिक्षा (वनस्पतीशास्त्र)
सत्र- १ ते ४

PROSPECTUS
OF
MASTER OF SCIENCE EXAMINATION
IN
BOTANY
Semester -I, Winter 2012,
Semester -II, Summer 2013,
Semester -III, Winter 2013,
Semester -IV, Summer 2014



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**SYLLABUS PRESCRIBED FOR M.Sc. PART-I BOTANY
SEMESTER – I**

PAPER-I: CELL BIOLOGY, CYTOLOGY AND GENETICS

- Unit-I** 1.1 Cell wall and Plasma membrane: Structural organization and function.
- 1.2 Cell organelles: Golgi bodies, Lysosomes, Endoplasmic Reticulum and Ribosomes: Structural organization and their functions
- 1.3 Techniques in Cell Biology: Confocal microscopy, Phase Contrast microscopy, Flow Cytometry: Principle and working.
- Unit-II** 2.1 Cell Cycle and Apoptosis: Mechanism of Cell division; Regulation, Roles of Cyclins and Cyclin dependent kinases, Cell Plate formation, PCD.
- 2.2 Cell to cell Interaction and Signal transduction : Intercellular junctures, Hormones and neurotransmitter signalling, receptors, G-proteins, kinases and messengers.
- 2.3 Protein sorting: Targeting of proteins to nucleus, chloroplasts and secretory pathways of leader polypeptides.
- Unit-III** 3.1 Chromosome Organisation : Eukaryotic chromosome structure and DNA packaging, Nucleoproteins, Organisation of centromeres and telomeres, nucleolus and r-RNA Genes, Euchromatin and heterochromatin..
- 3.2 Specialised Chromosomes: Polytene, Lampbrush, B-Chromosomes, Sex Chromosomes.
- 3.3 Structural aberrations of Chromosomes: Origin, Meiosis and breeding behaviour of duplication, deficiency, inversions and translocation- Heterozygosity.
- 3.4 Karyotype and Banding Patterns: Types, Evolution of Karyotype, Analysis and its significance. Application of banding techniques.
- Unit-IV** 4.1 Genetics of Mitochondria and Chloroplast: Semi autonomous, Genome character, size and regulation, cytoplasmic male sterility.
- 4.2 Mutations: Origin, Physical and Chemical mutagenic agents, Molecular basis and mutational breeding.
- 4.3 Transposable elements in Prokaryotes: IS elements, Composite transposons, transposition mechanisms and their effect on phenotype and genotype
- 4.4 Physiology of Cancer; Genetics of Cancer: C-Oncogenes, V-Oncogenes, Tumor Suppressor genes.

- Unit-V** 5.1 Genetic Code: Triplet nature of code, Breaking of code, Wobble Hypothesis, Properties, Evolution and Central dogma - transcription, types of RNAs, Initiation and termination signals, differences between eukaryotic and prokaryotic transcription (promoters, caps and tails, Introns, RNA editing).
- 5.2 Regulation of gene expression in Prokaryotes: Gene structure, Lac - operon, Trp-operon, Phage operon, transcriptional-control systems, translational control and post translational control.
- 5.3 Genetics of Nitrogen fixation: Organization, function and regulation of nitrogen fixing genes in klebsiella, hup genes.

Suggested Readings:

- Lewin, B. 2000. Genes VII, Oxford University Press, New York.
- Rost, T. et al.. 1998. Plant Biology. Wadsworth Publishing Co., California, USA.
- Krishnamurthy, K.V.2000. Methods in Cell wall Cytochemistry, CRC Press, Boca Raton, Florida.
- De, D.N. 2000. Plant Cell Vacuoles: An introduction. CSIRO Publication, Collingwood, Australia.
- Atherly, A.G., Girton, J.R. and McDonald, J.F. 1999. The Science of Genetics. Saunders College Publishing, Fort Worth, USA.
- Burnham, C.R. 1962. Discussions in Cytogenetics. Burgess Publishing Co., Minnesota.
- Busch, H. and Rothblum, L. 1982. Volume X. The Cell Nucleus & DNA Part A. Academic Press.
- Hartl, D.L. and Jones, E.W. 1998. Genetics: Principles and Analysis (4th Edition). Jones and Bartlett Publishers, Massachusetts, USA.
- Khush, G.S. 1973. Cytogenetics of Aneuploids. Academic Press, New York, London.
- Lewin B., 2000. Gene VII. Oxford University Press, New York, USA.
- Lewis R., 1997. Human Genetics: Concepts and Applications (2nd Edition). WCB McGraw Hill, USA.
- Russel, P.J. 1998. Genetics (5th Edition). The Benjamin/ cummings Publishing Company Inc., USA.
- Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics (2nd Edition). John Wiley and Sons Inc., U.S.A.
- Gunning, B.E.S. and Steer, M.W. 1996. Plant Cell Biology: Structure and Function. Jones and Barlett Publishers, Boston, Massachusetts.
- Hall, J.L. and Moore, A.L. 1983. Isolation of Membranes and

Organelles from Plant Cells. Academic Press, London, U.K.

16. Harris, N. and Oparka, K.J. 1994. Plant Cell Biology: A Practical Approach. IRL Press, at Oxford University Press, Oxford, U.K.
17. Fukui, K. and Nakayama, S. 1996. Plant Chromosomes: Laboratory Methods. CRC Press, Boca Raton, Florida.
18. Sharma, A.K. and Sharma, A. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harwood Academic Publishers, Australia.
19. R.S.Shukla and P.S.Chandel, 3rd Edition, 2004. Cytogenetics, Evolution and Plant Breeding.

Laboratory Exercises:

1. Squash and smear preparation; materials; *Tradescantia*, *Colix*, *Allium cepa*, *Allium sativum*; *Barley*, *Vicia faba*, *Wheat*, *Rhoeo discolor*, *Aloe vera* or any other ideal material
2. Isolation of chloroplast.
3. Demonstration of SEM and TEM.
4. Linear Differentiation of chromosomes through banding techniques, such as C-banding, O-banding and Q-banding.
5. Orcein and Feulgen staining of the salivary gland chromosomes of *Chironomus* and *Drosophila*.
6. Characteristics and behaviour of B-chromosomes using maize or any other appropriate material.
7. Working out the effect of monosomy and trisomy on plant phenotype, fertility and meiotic behaviour.
8. Induction of polyploidy using colchicine; different methods of the application of colchicine.
9. Effect of induced and spontaneous polyploidy on plant phenotype, meiosis, pollen and seed fertility and fruit set.
10. Meiosis of complex translocation heterozygotes.
11. Isolation of chlorophyll mutants following irradiation and treatment with chemical mutagens.
12. Estimation of nuclear DNA content through microdensitometry and flow cytometry.
13. Isolation of mitochondria.
14. Comparative study of normal and banded karyotype.
15. Determination of chiasma frequency in any plant species
16. Incompatibility studies in ideal plant material.
17. Problems on interaction of genes; linkage and crossing over.
18. Determination of mitotic index in any plant species.

PAPER-II: RESOURCE UTILIZATION AND CONSERVATION

- UNIT I:**
- 1.1 Concept of Biodiversity; Species diversity; Genetic diversity; Ecosystem diversity.
 - 1.2 Origin of Biodiversity; values of Biodiversity; loss of Biodiversity.
 - 1.3 Biodiversity and agriculture; Biodiversity and food diversity; Bioprospecting; commercial values of Biodiversity.
 - 1.4 Conservation of Biodiversity; Implementation process in India CBD.
- UNIT II:**
- 2.1 World centers of primary diversity of domesticated plants; Indo Burmese centers.
 - 2.2 Plant introduction and secondary centers.
 - 2.3 Origin, evolution, botany, cultivation and uses of:
 - i. Food, Forage and Fodder crops.
 - ii. Fibre crops.
 - iii. Medicinal and Aromatic plants.
 - iv. Vegetable and Oil yielding plants.
- UNIT III:**
- 3.1 Important fire wood and timber yielding plants and non wood forest products (NWFPS) such as Bamboo, Rattam raw materials for paper making, gums, resins, tannins, dyes, fruits
 - 3.2 Green revolution; Benefits and adverse consequences, sustainable agriculture, agroecosystem approach.
 - 3.3 Innovative approaches for meeting world food demands; modern agricultural approach.
 - 3.4 Plants used as Avenue trees' for shade, pollution control and aesthetics.
- UNIT IV:**
- 4.1 Strategies for conservation of Biodiversity, global scenario, decline of bioresources.
 - 4.2 Protected areas concept: Sanctuaries, National parks, Biosphere reserves (Tiger reserves with reference to Melghat Tiger Project) Wildlife Management and Sacred groves.
 - 4.3 Conservation of wild germplasm with reference to threatened species.
- UNIT V:**
- 5.1 Principles and practices for *Ex-situ* conservation, Botanical gardens, Field Gene Banks, Seed Banks.
 - 5.2 *In-vitro* repositories, Cryobanks, Legal aspects of conservation of Biodiversity in India.
 - 5.3 General accounts and activities of national institutes like Botanical Survey of India (BSI), National Bureau of Plant Genetic Resources (NBPGR), Indian Council of Agricultural

Research (ICAR), Council of Scientific and Industrial Research (CSIR), Department of Biotechnology (DBT), Non formal efforts, Medicinal Plant Board, Ministry of Environment and Forests.

SUGGESTED READINGS:

1. Atwell, B.J., Kriedermann, P.E. and Jurnbull, C.G.N. (eds) in Cultivation, MacMillan Education, Sydney, Australia.
2. Bewley, J.D. and Black, M. 1994. Seeds: Physiology of Development and Germination. Plenum Press, New York.
3. Burgess, J. 1985, An Introduction to Plant Cell Development. Cambridge University Press, Cambridge.
4. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology (4th Edition). Wadsworth Publishing, Belmont, California.
5. Anonymous 1997. National Gene Bank: Indian Heritage on Plant Genetic Resources (Booklet). National Bureau of Plant Genetic Resources. New Delhi.
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10. Cristi, B.R. (ed.) 1999. CRC Handbook of Plant Sciences and Agriculture. Vol.I, In-situ conservation. CRC Press, Boca Raton, Florida, USA.
11. Conway, G. 1999. The Doubly Green Revolution: Food for all in the 21st Century. Penguin Books. Earthscan Press, London.
12. Conway, G. and Barbier E., 1994. Plant, Genes and Agriculture. Jones and Bartlett Publishers, Boston.
13. Council of Scientific & Industrial Research 1986. The Useful Plants of India. Publications and Information Directorate, CSIR, New Delhi.
14. Council of Scientific & Industrial Research (1948-1976). The Wealth of India. A Dictionary of Indian Raw Materials and Industrial Products. New Delhi. Raw Materials I-XI, Revised Vol. I-III (1985-1992) Supplement (2000).
15. Cronquist, A. 1981. An integrated System of Classification of Flowering Plants. Columbia University Press, New York, USA.
16. Directory of Indian Wetlands, 1993. WWF INDIA, New Delhi and AWB, Kuala Lumpur.
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22. Heywood, V. (Ed), 1995. Global Biodiversity Assessment. United Nations Environment Programme. Cambridge University Press. Cambridge, U.K.
23. Heywood, V.H. and Wyse Jackson, P.S. (Eds) 1991. Tropical Botanical Gardens. Their Role in Conservation and Development. Academic Press. San Diego.
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25. Kothari, A. 1997. Understanding Biodiversity : Life Sustainability and Equity. Orient Longman.
26. Kohli, R., Arya, K.S., Singh, P.H. and Dhillon, H.S. 1994. Tree Directory of Chandigarh. Lovedale Educational, New Delhi.
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40. Wagner, H., Hikino, H. and Farnsworth, N. 1989. Economic and Medicinal Plant Research, Vols. 1-3. Academic Press, London.
41. Walter, K.S. and Gillett, H.J. 1998. 1997 IUCN Red List of Threatened Plants. IUCN, the World Conservation Union, IUCN, Gland, Switzerland, and Cambridge, U.K.

Suggested laboratory Exercises:

The Practical course is divided into three units: (1) Laboratory work, (2) Field survey and (3) Scientific Visits.

Laboratory Work:

1. Food Crops: Wheat, Rice, Maize, Chickpea (Bengal gram), Potato, Tapioca, Sweet potato, Sugarcane. Morphology, Anatomy, Microchemical tests for stored food materials.
2. Forage / fodder crops: Study of any five important crops of the locality (for example fodder Sorghum, Bajra, Berseem, clove, guar bean, gram, ficus sp.)
3. Plant fibres :
 - (a) Textile fibres : Cotton, Jute, Linen, Sunn hemp, Cannabis.
 - (b) Cordage fibres : Coir.
 - (d) Fibres for stuffing: Silk cotton or kapok
 Morphology, anatomy, microscopic study of whole fibers using appropriate staining procedures.
4. Medicinal and aromatic plants: Depending on the geographical location of college/ university select five medicinal and aromatic plants each from a garden crop field (or from the wild only if they are abundantly available).

Papaver somniferum, Atropa belladonna, Catharanthus roseus, Adhatoda zeylanica (Syn A. vasica), Allium sativum, Rauvolfia serpentina, Withania somnifera, Phyllanthus amarus, (P. fraternus), Andrographis paniculata, Aloe barbadense, Mentha arvensis, Rosa sp., Pogostemon cablin, Origanum vulgare,

Vetiveria zizanioides, Jasminum grandiflorum, Cymbopogon sp., Pandanus odoratissimus, Abrus precatorius, Asparagus racemosus, Melia azadirac, Dioscorea pentaphylla, Vitex negundo, Oscimum sanctum.

Study of live or herbarium specimens or other visual materials to become familiar with these sources. (Identification, uses and products like oils).

5. Vegetable Oils: Mustard, Groundnut, Soyabean, Coconut, Sunflower and Castor. Morphology, microscopic structure of the oil-yielding tissues, tests for oil and Iodine number. (Any three)
6. Gums, resins, tannins, dyes: Perform simple tests for gums and resins. Prepare a water extract of vegetable tannins (*Acacia, Terminalia, mangroves, tea, Cassia spp, myrobalans*) and dyes (*turmeric, Bixa orellana, Indigo, Butea monosperma, Lawsonia inermis*) and perform tests to understand their chemical nature. (One from each category)
7. To prepare ombrothermic diagrams for different sites on the basis of given data and comment on climate.
8. To find out association between grassland species using chi square test.
9. To analyse plant community using Bra-curtis ordination method.
10. To determine diversity indices for protected and unprotected cropland stands.
11. To determine IVI of grassland.
12. To prove the biological spectrum of vegetation under study using Raunkiar's life forms classification.

SEMESTER – I

PRACTICAL I: CELL BIOLOGY, CYTOLOGY, GENETICS, RESOURCE UTILIZATION & CONSERVATION.

PRACTICAL SCHEDULE

Time: 6 hrs.		Marks - 40
Q.1	Karyotype Analysis	06
Q.2	Isolation of any cell organelle	0
	5	
Q.3	Smear/Squash Technique/ Specialized Chromosome	04
Q.4	Problem on interaction of genes	04
Q.5	Identification and morphological description of given economically important plant	05
Q.6	Chemical Characterization of tannins, resins, dyes, fibers (any –2)	05

- Q.7 Spotting 06
Q.8 Viva-Voce 05

**PAPER – III: BIOLOGY AND DIVERSITY OF
ALGAE AND BRYOPHYTES**

Unit -I: General account and reproduction.

- 1.1: Range of habitat and thallus organization in Algae.
1.2: Cell structure;
i) Ultrastructure
ii) Pigments in Algae
iii) Reserve food material
iv) Flagella.
1.3 Classification by F.E. Fritsch (1935), G.M. Smith; Chapman (1938); Round (1965)
1.4: Cyanophyta- Ultrastructure of cell, heterocyst, reproduction and affinities.
1.5: Reproduction in Algae and alternation of generations.

Unit -II : Diversity and Phylogenetic considerations

- 2.1: Chlorophyta: Volvocales, Chlorococcales, Ulotricales, Cladophorales, Charales, Siphonales, Charales.
2.2 Chrysophyta: Chrysophyceae, Xanthophyceae, Bacillariophyceae
2.3 Cryptophyta: Cryptophyceae
2.4 Dinophyta: Dinophyceae

Unit- III : Diversity; Phylogeny and Importance of Algae

- 3.1: Range of thallus, reproduction and life-cycle in
i) Phaeophyta, ii) Rhodophyta
3.2: Economic importance of Algae as biofertilizer; food; feed; and use in industry.
3.3: Algae in Symbiotic association, as pollution indicator; phytoplanktons and water blooms.
3.4: Fossil Algae

Unit- IV: Bryophyta : General account and significance.

- 4.1: Classification and distribution of Bryophytes.
4.2: Vegetative propagation in Bryophytes.
4.3: Fossil Bryophytes.
4.4: Economic and ecological importance of Bryophytes.

Unit -V : Morphotaxonomy and Phylogeny of Bryophytes.

- 5.1: Thallus Organization; internal structure and reproduction in
i) Sphaerocarpaceae, ii) Marchantiales, iii) Anthocerotales,

- iv) Jungermanniales.
5.2: Thallus organization; internal structure and reproduction in
i) Sphagnales, ii) Andreales, iii) Bryales
5.3: Progressive and retrogressive evolution in Gametophytes and Sporophytes.

Suggested Readings:

1. Kumar, H.D. 1988, Introductory Phycology. Affiliated East- West Press Ltd., New Delhi.
2. Morris, I. 1986. An Introduction to the Algae. Cambridge University Press, U.K.
3. Parihar, N.S. 1991, Bryophyta, Central Book Depot, Allahabad.
4. Parihar, N.S. 1996, Biology and Morphology of Pteridophytes. Central Book Depot, Allahabad.
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7. Stewart, W.N. and Rothwell, G.W. 1993. Paleobotany and the Evolution of Plants. Cambridge University Press.
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12. Kumar, H.D. (1989) Algal Cell Biology, 2nd Edition, East west Press, New Delhi.
13. Desikachary, T.V. (1959), Cyanophyta, ICAR, New Delhi.
14. Round, F.E. (1981) The Ecology of Algae. Cambridge University Press, Cambridge.
15. Round, F.E. (1973) The Biology of Algae. 2nd Edition, Edward and Arnold, London.
16. Campbell, D.H. (1961) The evolution of Land Plants. Central Book Depot, Allahabad.
17. Smith G.M (1955) Cryptogamic Botany Vol-II. Bryophyta and Pteridophyta McGraw Hill. Book Co., New York
18. Watson, E.V. (1967) The structure and Life of Bryophytes, 2nd Edition. London, Hutchinson.
19. Ram Udhar (1970) An introduction to Bryophyta, Sadashiv Malviya Prakashan, Lucknow.
20. B.R. Vashishta (Revised by A.K. Sinha), Reprint Edition 2005.

21. B.R.Vashishta : Algae

Laboratory Exercises: -

1. Morphological study of Algae :(Any 12 of the following)
Oscillatoria, Nostoc, Anabaena, Spirullina, Gleotricha, Chlamydomonas, Eudorina, Volvox, Closterium, Hydrodictyon, Pediastrum, Cladophora, Ulva, Pithophora, Draparnaldia, Cosmarium, Chlorella, Acetabularia, Chara, Nitella, Laminaria, Sargassum, Padina, Ectocarpus, Batrachospermum, Gracillaria, Gellidium, Polysiphonia,
2. Morphological, anatomical and reproductive studies of following members: *Targonia, Cyathodium Marchantia, Plagiochasma, Deumortiera, Anthoceros, Notothylus; Polytrichum, Pogonatum, Sphagnum,*
3. Field study: i) Collection of Algal material from water reservoirs (ii) Collection of Bryophytic material.

Field visits: Visits to the field to study distribution of algal flora and bryophytic forms.

PAPER – IV: PLANT DEVELOPMENT AND REPRODUCTION

- UNIT I:** 1.1 Unique features of plant development, differences between plant and animal development.
1.2 Structure of seed, germination of seed and seedling growth and control.
1.3 Metabolism of nucleic acids, proteins and mobilization of reserve food.
1.4 Seed dormancy: types, importance and means to break the seed dormancy.
- UNIT II:** 2.1 Organisations of shoot apical meristem (SAM). Cytological and molecular analysis of SAM, Root apical meristem.
2.2 Types of meristem, tissue differentiation, structures, development and importance of tissue differentiation: Vascular cambium and cork cambium, evolution of Xylem.
2.3 Wood development in relation to environmental factors, secondary growth: stem and root.
2.4 Leaf development and structure, differentiation of epidermis and mesophyll. Structure and function of secretory ducts and laticifers.
- UNIT III:** 3.1 Plant reproduction: Means of reproduction, flower development, homeotic mutants in *Arabidopsis* and *Antirrhinum*, sex determination.

3.2 Structure of anther, microsporogenesis, and pollen development, pollen viability, male sterility, pollen germination, pollen storage, pollen embryo.

3.3 Types of ovules, ovule development and structure, megasporogenesis, embryo sac development and structure.

UNIT IV: 4.1 Flower structure and floral characteristics, mechanism of pollination, flower vectors.

4.2 Breeding system, structure, pollen pistil - interaction, sporophytic and gametophytic self-incompatibility.

4.3 Double fertilization, development of embryo, endosperm and seed development.

4.4 Dynamics of fruit growth, biology of fruit maturation.

UNIT V: 5.1 Polyembryony, apomixis, *In-vitro* plant regeneration through embryo, pollen and anther culture.

5.2 Metabolic changes associated with senescence and its regulation.

5.3 Influence of hormones and environmental factors on senescence.

Suggested Readings:

- 1) Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi.
- 2) Fageri, K. and Van der Pol, L. 1979. The Principles of Pollination Ecology. Pergamon Press, Oxford.
- 3) Fahn, A. 1982. Plant Anatomy, (3rd edition). Pergamon Press, Oxford.
- 4) Fosket, D.E. 1994. Plant Growth and Development. A molecular Approach. Academic Press, San Diego.
- 5) Howell, S.H. 1998, Molecular Genetics of Plant Development. Cambridge University Press, Cambridge.
- 6) Leins, P., Tucker, S.C. and Endress, P.K. 1988. Aspects of Floral Development. J. Cramer, Germany.
- 7) Lyndon, R.F., 1990. Plant Development. The Cellular Basis. Unwin Hyman, London.
- 8) Murphy, T.M. and Thompson, W.F. 1988. Molecular Plant Development. Prentice Hall, New Jersey.
- 9) Proctor, M. and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.
- 10) Raghavan, V. 1997. Molecular Embryology of Flowering Plants. Cambridge University Press, Cambridge.
- 11) Raghavan, V. 1999. Developmental Biology of Flowering Plants. Springer-Verlag, New York.

- 12) Raven, P.H., Evert, R.F. and Eichhorn, S.E. 1992. *Biology of Plants* (5th Edition). Worth, New York.
- 13) Steeves, T.A. and Sussex, I.M. 1989. *Patterns in Plant Development* (2nd edition). Cambridge University Press, Cambridge.
- 14) Sedgely, M. and Griffin, A.R. 1989. *Sexual Reproduction of Tree Crops*, Academic Press, London.
- 15) Waisel, Y., Eshel, A. and Kafkaki, U. (eds) 1996. *Plant Roots: The Hidden Hall* (2nd edition.) Marcel Dekker, New York.
- 16) Shivanna, K.R. and Sawhney, V.K. (eds) 1997. *Pollen Biotechnology for Crop Production and Improvement*, Cambridge University Press, Cambridge.
- 17) Shivana, K.R. and Rangaswamy, N.S. 1992. *Pollen Biology: A Laboratory Manual*. Springer-Verlag, Berlin.
- 18) Shivana, K.R. and Johri, B.M. 1985. *The Angiosperm Pollen: Structure and Function*. Wiley Eastern Ltd., New York.
- 19) *The Plant Cell. Special issue on Reproductive Biology of Plants*, Vol. 5(10) 1993. The American Society of Plant Physiologists, Rockville, Maryland, USA.

Suggested Laboratory / Field Exercises (Any 10):

1. Effect of gravity, unilateral light and plant growth regulators on the growth of young seedlings.
2. Role of dark and red light / far-red light on the expansion of cotyledons and epicotylar hook opening in pea.
3. Study of living shoot apices by dissections using aquatic plants such as *Ceratophyllum* and *Hydrilla*.
4. Study of cytohistological zonation in the shoot apical meristem (SAM) in sectioned and double-stained permanent slides of a suitable plant such as *Coleus*, *Kalanchoe*, *Tobacco*. Examination of shoot apices in a monocotyledon in both T.S. and L.S. to show the origin and arrangement of leaf primordia.
5. Study of alternate and distichous, alternate and superposed, opposite and superposed; opposite and decussate leaf arrangement. Examination of rosette plants (*Launaea*, *Mollugo*, *Raphanus*, *Hyoscyamus* etc) and induction of bolting under natural conditions as well as by GA treatment.
6. Microscopic examination of vertical sections of leaves such as *Cannabis*, *Tobacco*, *Nerium*, Maize and Wheat to understand the internal structure of leaf tissues and trichomes, glands etc. Also study the C3 and C4 leaf anatomy of plant.
7. Study of epidermal peels of leaves such as *Coccinia*, *Gallardia*, *Tradescantia*, *Notonea*, etc. to study the development and final structure of stomata and prepare stomatal index. Demonstration of the effect of ABA on stomatal closure.

8. Study of whole roots in monocots and dicots. Examination of L.S. of root. from permanent preparation to understand the organization of root apical meristem and its derivatives. (use maize, aerial roots of banyan, *Pistia*, *Jussieua* etc.). Origin of lateral roots. Study of leguminous roots with different types of nodules.
9. Study of microsporogenesis and gametogenesis in sections of anthers.
10. Examination of modes of anther dehiscence and collection of pollen grains for microscopic examination (Maize, Grasses, *Cannabis sativa*, *Crotolaria*, *Tradescantia*, *Brassica*, *Petunia*, *Solanum melongena*, etc.)
11. Tests for pollen viability using stains and *in vitro* germination. Pollen germination using hanging drop and sitting drop cultures, suspension culture and surface culture.
12. Estimating percentage and average pollen tube length *in vitro*.
13. Role of transcription and translation inhibitors on pollen germination and pollen tube growth.
14. Pollen storage, pollen-pistil interaction, self-incompatibility, *in vitro* pollination.
15. Study of ovules in cleared preparations; study of monosporic, bisporic and tetrasporic types of embryo sac development through examination of permanent stained serial sections.
16. Field study of several types of flower with different pollination mechanisms (wind pollination, thrips pollination, bee/butterfly pollination, bird pollination).
17. Emasculation, bagging and hand pollination to study pollen germination, seed set and fruit development using self compatible and obligate outcrossing systems. Study of cleistogamous flowers and their adaptations.
18. Study of nuclear and cellular endosperm through dissections and staining.
19. Isolation of zygotic globular, heart-shaped, torpedo stage and mature embryos from suitable seeds and polyembryony in citrus, jamun (*Syzygium cumini*) etc. by dissections.
20. Study of seed dormancy and methods to break dormancy.

Semester – I**PRACTICAL –II: BIOLOGY AND DIVERSITY OF ALGAE AND BRYOPHYTES AND PLANT DEVELOPMENT AND REPRODUCTION****Practical schedule**

Time 6 hrs.	Marks: 40
Q.1 : Isolation and identification of any two algal forms	06
Q.2 : Characterization and identification of given Bryophytic material.	06
Q.3 : Setting and working of any experiment based on plant development	10
Q.4 : Microtomy	05
Q.5 : Spotting algal, bryophyte Plant DW; flower	08
Q.6 : Viva-voce	05

Semester – II**PAPER –V: CYTOGENETICS AND MOLECULAR BIOLOGY**

- Unit I :** 1.1 Cytogenetics of polyploids: Types, origin and production of polyploids; genome constitution, meiotic behaviour, analysis and evolution in major crop plants; induction and characterization of trisomics; significance in crop improvement.
- 1.2 Breeding of polyploids: heterosis and inbreeding depression.
- 1.3 Plant Breeding: Methods of breeding in self-pollinated and cross-pollinated crops, genetic variability, male sterility in plant breeding.
- Unit II :** 2.1 Molecular Cytogenetics: Nuclear DNA content, C-value paradox; cot curve and *in-situ* hybridization.
- 2.2 Physical mapping of genes on chromosomes and their analysis, problems on linkage and crossing over, single nucleotide polymorphism (SNP).
- 2.3 Multigene families evolution, types of multigene families and the proteins produced, chaperones.
- Unit III:** 3.1 Gene expression and its regulation in Eukaryotes: fine structure of gene, cis-trans test, introns, mRNA splicing, RNA editing, CAAT BOX, TATA BOX, Homeo box, role of transcription factors.
- 3.2 Genetic Recombinations: Molecular mechanism of crossing over, role of Rec- A, B, C, D enzymes site specific recombination, independent assortment and crossing over.

- 3.3 Genetics of Yeast: Yeast genome, yeast genome characterization, Yeast artificial chromosome.
- Unit IV:** 4.1 Genetic and Restriction Mapping: Restriction digestion of DNA, single and double digest, restriction map construction.
- 4.2 Molecular markers: Isozymes, proteins, RAPD, AFLP.
- 4.3 Techniques in genetic engineering: DNA finger printing, Southern blotting and Electrophoresis.
- Unit V:** 5.1 Methods of DNA sequencing: Maxam and Gilbert technique, Sanger's Dideoxy nucleotide method, application of sequencing.
- 5.2 Biostatistics: Mean, mode, central tendency, standard deviation, variance, covariance, correlation, regression; sampling, chi-square test and its significance.
- 5.3 Molecular Biology and Bioinformatics: Overview, scope, development, introduction to databases, computers in bioinformatics, applications.

Suggested Reading:

1. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., and Watson, J.D. 1999. Molecular Biology of the Cell. Garland Publishing, Inc., New York.
2. Wolfe, S.L. 1993, Molecular and Cellular Biology. Wadsworth Publishing Co., California, USA.
3. Buchanan, B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
4. Kleinsmith, L.J. and Kish, V.M. 1995. Principles of Cell and Molecular Biology (2nd Edition). Harper Collins College Publishers, New York, USA.
5. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell, J. 2000. Molecular Cell Biology (4th Edition) W.H. Freeman and Co., New York, USA.
6. Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K. and Watson, J.D. 1989. Molecular Biology of the Cell (2nd Edition). Garland Publishing Inc., New York.
7. Atherly, A.G., Girton, J.R. and McDonald, J.F. 1999. The Science of Genetics. Saunders College Publishing, Fort Worth, USA.
8. Burnham, C.R. 1962. Discussions in Cytogenetics. Burgess Publishing Co., Minnesota.
9. Hartl, D.L. and Jones, E.W. 1998. Genetics: Principles and Analysis (4th Edition). Jones and Bartlett Publishers, Massachusetts, USA.

10. Khush, G.S. 1973. Cytogenetics of Aneuploids. Academic Press, New York, London.
11. Karp G 1999. Cell and Molecular Biology: Concepts and Experiments. John Wiley & Sons, Inc., U.S.A.
12. Lewin B., 2000. Gene VII. Oxford University Press, New York, USA.
13. Lewis R., 1997. Human Genetics: Concepts and Applications (2nd Edition). WCB McGraw Hill, USA.
14. Malacinski, G.M. and Freifelder, D., 1998. Essentials of Molecular Biology (3rd Edition). Jones and Barlet Publishers, Inc., London.
15. Russel, P.J. 1998. Genetics (5th Edition). The Benjamin/ Cummings Publishing Company Inc., USA.
16. Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics (2nd Edition). John Wiley and Sons Inc., U.S.A.
17. Glick, B.R. and Thompson, J.E. 1993. Methods in Plant Molecular Biology and Biotechnology. CRC Press, Boca Raton, Florida.
18. Glover, D.M. and Hames, B.D. (Eds), 1995, DNA Cloning 1: A Practical Approach; Core Techniques, 2nd edition. PAS, IRL Press at Oxford University Press, Oxford.
19. Gunning, B.E.S. and Steer, M.W. 1996. Plant Cell Biology: Structure and Function. Jones and Barlett Publishers, Boston, Massachusetts.
20. Hackett, P.B., Fuchs, J.A. and Messing, J.W. 1988. An Introduction to Recombinant DNA Techniques: Basic Experiments in Gene Manipulation. The Benjamin/Cummings Publishing Co., Inc Menlo Park, California.
21. Harris, N. and Oparka, K.J. 1994. Plant Cell Biology: A Practical Approach. IRL Press, at Oxford University Press, Oxford, U.K.
22. Shaw, C.H. (Ed.), 1988. Plant Molecular Biology: A Practical Approach, IRL Press, Oxford.
23. Fukui, K. and Nakayama, S. 1996. Plant Chromosomes: Laboratory Methods. CRC Press, Boca Raton, Florida.
24. Sharma, A.K. and Sharma, A. 1999. Plant Chromosomes: Analysis, Manipulation and Engineering. Harwood Academic Publishers, Australia.

Laboratory Exercises:

- 1] Isolation of mitochondria and the activity of its marker enzyme, succinate dehydrogenase (SDH).
- 2] Isolation of chloroplasts and SDS-PAGE profile of proteins to demarcate the two subunits of Rubisco.
- 3] Isolation of nuclei and identification of histones by SDS-PAGE.
- 4] Isolation of Plant DNA and its quantitation by a spectrophotometric method.

- 5] Isolation of DNA and preparation of "cot" curve.
- 6] Restriction digestion of plant DNA, its separation by agarose gel electrophoresis and visualization by ethidium bromide staining.
- 7] Isolation of RNA and quantitative estimation by a spectrophotometric method.
- 8] Separation of Plant RNA by agarose gel electrophoresis and visualization by EtBr staining.
- 9] Southern blot analysis using a gene specific probe.
- 10] Fluorescence staining with FDA for cell viability and cell wall staining with calcofluor.
- 11] Silver banding for staining nucleolus-organizing region, where 18S and 28S rDNA are transcribed.
- 12] To perform plant hybridization
- 13] Estimation of nuclear DNA content through microdensitometry and flow cytometry.
- 14] Fractionation and estimation of repetitive and unique DNA sequences in nuclear DNA.
- 15] Study of protein profile by gel electrophoresis.
- 16] Determination of pollen sterility with staining techniques.
- 17] Statistical Analysis (standard error, standard deviation, variance, significance) of the given data.

Semester – II

PAPER –VI: BIOLOGY AND DIVERSITY OF MICROBES AND FUNGI

- UNIT I:** 1.1 Archaeobacteria and Eubacteria- General account, nutrition, reproduction and economic importance.
1.2 Ultrastructure of Eubacteria.
1.3 Important bacterial diseases of regional crops.
- UNIT II:** 2.1 Viruses: characteristics and ultrastructure of Virions, chemical nature, replication, transmission of viruses.
2.2 Important viral disease of regional crops.
2.3 Phytoplasma: General account and important plant disease.
- Unit III:** 3.1 Classification of Fungi proposed by Ainsworth (1971)
3.2 Economic importance of Fungi.
3.3 Myxomycotina: General account.
3.4 Mastigomycotina: General account of Chytridiomycetes, Oomycetes, Plasmodiophoromycetes.
3.5 Zygomycotina: General account (studies up to order level and their respective genera.)
- UNIT IV:** 4.1 Ascomycotina: General, vegetative and reproductive

characters of Hemiascomycetes, Plectomycetes and Discomycetes.

4.2 Basidiomycotina: General vegetative and reproductive characters of Teliomycetes, Hymenomycetes and Gastromycetes.

4.3 Deuteromycotina: General account and importance.

UNIT V: 5.1 Heterothallism and Parasexuality in Fungi.

5.2 Mycorrhiza: Ectomycorrhizae and Endomycorrhizae, general account and VAM Fungi.

5.3 Fungi as Biological Agent.

Suggested Readings:

- 1) Agrios, G.N. (1980) Plant Pathology, academic Press, INC, New York.
- 2) Ainsworth, G.C. and A.S.Sussman (eds). The Fungi, An advance Treatise Vol.I, II, III & IV Academic Press, New York.
- 3) Alexopoulos, C.J. (1962). Introductory Mycology John Wiley Eastern Pvt.Ltd.
- 4) Alexopoulos, C.J. and Mims C.W. (1979). Introductory Mycology 3rd Edition, John Wiley and Sons, Inc. Wiley, New York.
- 5) Alexopoulos, C.J., Mims and Black well (1996) 4th ed. John Wiley and Sons, Inc. Wiley, New York.
- 6) Aneja, K.R. (1993) Experimental in Microbiology, Plant Pathology & Tissue Culture, Wiswa Prakashan, New Delhi.
- 7) Bessey, E.A. (1950) Morphology and Taxonomy of Fungi. The Blakiston co. Philadelphia.
- 8) Bharat Rai, D.K.Arora, N.K.Dube and P.D.Sharma (1994) : Fungal Ecology and Biotechnology, Rastogi Publication.
- 9) Bilgrami, K.S. and H.C.Dube (1985) A text Book of Modern Plant Pathology, Vikas Publication House, New Delhi.
- 10) Balkhande L.D. & L.V. Gangawane (2000) Production of auxins Phyllosphere mycoflora and wheat plant resource development, Saraswati Prakashan Aurangabad, P.160-165.
- 11) Barnett, J.H. (1968) Fundamentals of Mycology. The English Language Book Society and Edward Arnold Publication, Limited.
- 12) Butler E.J. and S.J.Jones (1949) Plant Pathology, Macmillan & Co. New York.
- 13) Buckyng Pugh G.J.F. (1971) Auxin productions by phyllosphere fungi Nature Vol. 231 P.332.
- 14) Dickenson and Preece Micrology of arial plant surfaces, Academic Press, New York,
- 15) Dube, R.C. and D.K.Maheshwari (1999) A.Text Book of microbiology, S.Chand & Co. Ltd.

- 16) Dube, R.C. and D.K.Maheshwari (2000) Practical Microbiology - S.Chand & Co. Ltd.
- 17) Gruen, H.E. (1959) The production of IAA by *Phycomyces blakesleanus* Mycol.57 683-694.
- 18) Gupta, V.K. and M.K.Behl (1994) Indian Plant Viruses and Mycoplasma Kalyani Publishers, 1/1, Rejinder Nagar, Ludhiana.
- 19) Jha, D.K. (1993) A Text Book of Seed Pathology, Vikas Publication House.
- 20) Manibhushan Rao, K. and A.Mahadevan - Recent Development in biocontrol of plant pathogenes. Today and Tomorrow publishers, New Delhi.
- 21) Mehrotra, R.S. and Aneja, K.R. (1990) An Introduction to Mycology, Willey Eastern Private Limited.
- 22) Mehrotra, R.S. (1989) Plant Pathology, Tata McGraw Hill.
- 23) Mehrotra, R.S. and K.R.Aneja (1998) An Introduction to Mycology, New Age Intermidiate Press.
- 24) Mukadam, D.S. (1997) The Illustrated Kingdom of fungi, Akshar Ganga Prakashan, Aurangabad.
- 25) Mukadam, D.S. and L.V.Gangawane (1978) Experimental Plant Pathology (edited) Marathwada University Aurangabad.
- 26) Pande, P.B. (1997) Plant Pathology, S.Chand & Co. New Delhi.
- 27) Pelzer, M.J. , Jr.Cahn, E.C.S. and N.R.Krieg (1993) Microbiology, Tata McGraw Hill.
- 28) Preece and Dickeson. Ecology of leaf surface microorganism Academic Press, New York.
- 29) Rangaswamy, G. and A.Mahadevan (1999) Diseases of Crop Plant in India, Prentice Hall of India.
- 30) Raychoudhari, S.P. and Nariani, T.K. (1977) Virus and Mycoplasma Diseases of Plant in India, Oxford and IBH Publication Co.
- 31) Reddy, S.M. *et al* (1997) Microbial Biotechnology, Scientific publishers, Jodhpur.
- 32) Schlegel, H.G (1996) General Microbiology, 7th Edition, Cambridge University Press.
- 33) Snowdon, A.L. (1991) A colour Atlas of Post harvest diseases & disorders of fruits & vegetables Vol.I & II Wolfe Scientific, London.
- 34) Sing, R.S. (1994) Plant Pathology, Oxford and IBH Publication Co. New Delhi.
- 35) Sunder Rajan, S. (2001) Tools and Techniques of Microbiology, Anmol Publ.New Delhi.
- 36) Thind, T.S. (1998) Diseases of field crops and their management, National Agricultural Technology, Information Centre Ludhiana.
- 37) Vaidya, J.G. (1995) Biology of the fungi, Satyajeet Prakashan, Pune.

- 38) Walker, J.G. (1952) Diseases of Vegetables Crops. McGraw Hill, New York.
- 39) Walker, J.C. (1968) Plant Pathology, McGraw Hill, New York.

Laboratory Exercises:

- Morphological Studies of Fungi (any 15 of the following)
Stemonities, Perenospora, Phytophthora, Albugo, Mucor, Rhizopus, Yeast, Aspergillus, Penicillium, Chaetomium, Taphrina, Peziza, Erysiphe, Phyllactenia, Uncinula, Melamosora, Uromyces, Drechslera, Ravenallia, Ustilago, Polyporus, Morchella, Cyathus, Alternaria, Helminthosporium, Curvularia, Colletotrichum, Phoma, Plasmodiophora, Cercospora, Fusarium, Claviceps.
- Symptomology of some diseased plants (any 10 of the following).
White rust of Crucifers, Downy mildew, powdery mildew, Rusts, Smuts, Ergot, Groundnut leaf spot (Tikka disease), False smut of paddy, red rot of Sugarcane, Wilt disease, Citrus canker, Angular leaf spot of cotton, Leaf mosaic of bhindi/ papaya, Leaf curl of tomato/Potato/Papaya, Little leaf of brinjal.
- Identification of Fungal cultures (Any 5)
Rhizopus, Mucor, Aspergillus, Penicillium, Drechslera, Curvularia, Phoma, Colletotrichum, Alternaria, Helminthosporium.

Semester-II

PRACTICAL-III

(CYTOGENETICS, MOLECULAR BIOLOGY, BIOLOGY & DIVERSITY OF MICROBES AND FUNGI)

Time : 6 hrs.

Marks : 40

- | | |
|---|----|
| Q. 1. Isolation and Estimation of DNA by UV-VIS spectrophotometry. | 08 |
| Q. 2. Experiment on Plant Breeding/Polyploids. | 05 |
| Q. 3. Biostatistical analysis of given data | 04 |
| Q. 4. Identification of given Fungal culture and plant disease material with its diagnostic characters and classification | 08 |
| Q. 5. Identify the given plant disease as per its symptoms | 05 |
| Q. 6. Spotting. | 05 |
| Q. 7. Viva-voce | 05 |

Semester- II

PAPER VII: PLANT PHYSIOLOGY

- Unit-I:** 1.1 Energy flow: Principle of thermodynamics, kinetics, dissociation and association constants; Gibb's free energy,

redox reactions, structure and function of ATP.

- 1.2 Enzymology: Allosteric mechanisms, regulatory and active sites; isozymes; Michaelis- Menton Equation and its significance.

- Unit-II:** 2.1 Transport of water through xylem; plant water relations, SPAC.

- 2.2 Translocation of solutes in phloem transport, passive & active, transport; nutrient uptake through root microbe interaction; membrane transport proteins.

- 2.3 Stress physiology: Overview; types of stresses and plant responses, mechanism for tolerance of biotic and abiotic stresses. (Water, temperature, salinity and metal)

- Unit-III:** 3.1 Photochemistry: Light energy, components of electromagnetic radiation, photons, absorption spectrum, action spectrum, light harvesting complexes.

- 3.2 Photosynthesis: Evolution of photosynthetic apparatus, photooxidation of water, Hills reaction, two-pigment system, mechanism of electron and proton H⁺ transport, carbon assimilation pathways in C₃, C₄ and CAM plants. Photosynthetic productivity in these plants. Physiological, ecological consideration and significance.

- 3.3 Photobiology: Discovery, structure and properties (biochemical and photochemical) of photochromes and cryptochromes, photomorphogenesis, G-proteins, signaling.

- Unit-IV:** 4.1 Respiration: Mitochondrial electron transport; Glycolysis; synthesis of ATP, respiratory pathways- PPP; regulation of respiration.

- 4.2 Photorespiration: Glyoxylate pathway, biochemical basis of photorespiration, photorespiration and crop productivity and significance.

- 4.3 Senescence and PCD; Mechanism, physiology of senescence; role of hormones, biochemical aspects, significance in fruit ripening

- Unit-V:** 5.1 Growth Regulators and Elicitors: Physiological effect and mechanism of action of Auxins Gibberellins, Cytokinins, Ethylene, Abscissic acid, Brassinosteroids, Jasmonic acids, Polyamines, salicylic acid; receptors and expression.

- 5.2 Flowering Process: Photoperiodism and significance of Florigen in floral induction, development, genetic analysis, vernalization and its role in flowering.

- 5.3 Plant Movements: Classifications of plant movements, physiological basis of plant movements.

Suggested Reading:

1. Buchanan B.B., Gruissem, W. and Jones, R.L. 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
2. Galston, A.W. 1989. Life Processes in Plants. Scientific American Library, Springer-Verlag, New York, USA.
3. Hooykaas, P.J.J., Hall, M.A. and Libbenga, K.R. (eds) 1999. Biochemistry and Molecular Biology of Plant Hormones, Elsevier, Amsterdam, The Netherlands.
4. Hopkins, W.G. 1995. Introduction to Plant Physiology. John Wiley & Sons, Inc., New York, USA.
5. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D., and Darnell, J. 2000. Molecular Cell Biology (fourth edition). W.H. Freeman and Company, New York, USA.
6. Moore, T.C. 1989. Biochemistry and Physiology of Plant Hormones (second edition). Springer-Verlag, New York, USA.
7. Nobel, P.S., 1999. Physicochemical and Environmental Plant Physiology (second edition), Academic Press, San Diego, USA.
8. Salisbury, F.B. and Ross, C.W. 1992. Plant Physiology (4th edition). Wadsworth Publishing Co., California, USA.
9. Singhal, G.S., Renger, G., Sopory, S.K., Irrgang, K.D. and Govindejee 1999. Concepts in Photobiology. Photosynthesis and Photomorphogenesis, Narosa Publishing House, New Delhi.
10. Taiz, L. and Zeiger, E. 1998. Plant Physiology (2nd edition). Academic Press, San Diego, U.S.A. Westhoff, P. (1998) Molecular Plant Development: from Gene to Plant. Oxford University Press, Oxford, UK.
11. Plummer, D.T. 1988. An Introduction to practical Biochemistry. Tata McGraw Hill Publishing Co.Ltd. New Delhi.
12. Wilson, K. and Goulding, K.H. (Eds), 1992. A Biologist Guide to Principles and Techniques
13. Practical Biochemistry (3rd Edition). Manas Saikia for Foundation Books, New Delhi.
14. Sadasivam, S. and Manickam A., 1996. Biochemical methods (2nd Edition). New Age International Publishers New Delhi
15. Sharma, J.R. 1994. Principles and Practice of Plant Breeding. Tata McGraw Hill Publishing Company Ltd. New Delhi.
16. Rubenstein, I. Gengenbach, B. Phillips, R.L. and Green C.E. (Eds), 1980. Genetic improvement of crops. University of Minnesota Press. U.S.A.
17. Chaudhary, R.C. 1986. Introduction to Plant breeding, Oxford & IBH Publishing Co., New Delhi.

18. Gupta, S.K. 2000. Plant Breeding. Theory and Techniques. Agrobios (India) Jodhpur
19. Singh, P. 2001. Essentials of Plant Breeding (2nd Edition). Kalyani Publishers, New Delhi.

Laboratory Exercises:

1. Extraction of chloroplast pigments from leaves and preparation of absorption spectrum of chlorophylls and carotenoids.
2. To determine chlorophyll a, chlorophyll b and total chlorophyll ratio in C3 & C4 plants.
3. Estimation of sodium and potassium in plant material by flame photometry.
4. Determination of Ca: Mg ratio by spectrophotometry in plant tissue.
5. Preparation of the standard curve of proteins (BSA) by Biuret method.
6. Determination of Isoelectric point of Legumin.
7. Effect of GA/IAA on plant growth.
8. Isolation of intact chloroplasts and estimation of chloroplast proteins by spot protein assay.
9. To demonstrate photophosphorylation in intact chloroplasts, resolve the phosphoproteins by SDS-PAGE & performs Western blotting.
10. Estimation of protein content in extracts of plant material by Lowry's or Bradford's method.
11. Assay of the enzyme Phosphatases.
12. Assay of the enzyme nitrate reductase.
13. Principles of colorimetry, spectrophotometry and fluorimetry.
14. Demonstration of an electron transport system.
15. Estimation of carbon dioxide liberated during respiration.
16. To demonstrate the process of antagonism.
17. To demonstrate the process of fermentation by Kunhe's vessel.
18. To demonstrate the process of tissue tension.
19. Detection of amino acids by chromatography.
20. Effect of various salts on the permeability of the plasma membrane.
21. Estimation of Ascorbic Acid in the given material.
22. Estimation of reducing, Non-reducing and total sugars.

Semester-II**PAPER – VIII: PLANT METABOLISM.**

- Unit-I :** 1.1 Carbohydrates in Biosphere, properties, functions and importance

- 1.2 Carbohydrate Metabolism: - Biosynthesis of starch and sugars, catabolic pathways, interaction between Hexose Pentose Phosphate and Triose phosphate pools.
- Unit-II :** 2.1 Amino Acid Metabolism: Assimilation of inorganic nitrogen in amino acids, Biosynthesis of amino acids in plants, Proline metabolism– a target for metabolic engineering of stress tolerance.
- 2.2 Protein: Regulation of cytosolic protein biosynthesis in eukaryotes, post-translational modification of proteins; storage proteins, degradation of proteins.
- Unit-III:** 3.1 Lipid Metabolism: Classification, structure and function of lipids, biosynthesis of fatty acids, membrane lipids, structural lipids and storage lipids.
- 3.2 Catabolism of storage lipids, phospholipids and derived lipids (steroids).
- Unit-IV:** 4.1 Nitrogen Metabolism: Overview of nitrogen fixation, ammonia uptake and reduction, nitrite reduction.
- 4.2 Sulphur Metabolism: Sulphur chemistry and fixation, uptake and transport, reductive sulphate assimilation pathways, synthesis and function of glutathione and its derivatives.
- Unit-V :** 5.1 Metabolism Biochemistry: Primary and secondary metabolites in plants as important natural products; types of alkaloids, phenols, flavonoids, glycosides, and their applications; distribution and localization.
- 5.2 Phosphate Metabolism.
- 5.3 Phytochemical Techniques: Quantitative and Qualitative analysis methods; TLC, HPLC, HPTLC principle and techniques.

Suggested Readings:

1. Brachet J. & Mirshy, A.E., ed., The Cell Biochemistry, Physiology, Morphology, Vol.II. Academic Press Inc. London LTD. 1961.
2. Buchanan, B.B.; Grisse, W.; Jones, R.L.; Biochemistry & Molecular Biology of Plants, American Society of Plant Physiologists, Rockville, Maryland, 2000.
3. Daniel, M. and R.P. Purkayastha Ed., Handbook of Phytoalexin metabolism & action, Marcel Dekker, Inc., New York, 1995.
4. Davies, D.D., ed., The Biochemistry of Plants, Vol.II, Academic Press, London, 1987.
5. Duke, J.A. CRC Handbook of Phytochemical Constituents of GRAS Herbs, Foods & other Economic Plants. CRC Press, Boca Raton, FL, 1992.
6. Epstein, E., Mineral Nutrition of Plants: Principles & Perspectives. John Wiley & Sons, New York, 1972.

7. Kaufman, P.B.; L.J. Cseke; S. Warber; J.A. Duke & H.L. Brielmann. Natural products from plants. CRC Press LLC New York, 1999.
8. Marchner, H. Mineral Nutrition of Higher Plants, 2nd ed. Academic Press, London, 1995.
9. Nishimura, S.; C.D. Vance & N. Doke, Eds. Molecular determinants of Plant diseases. Japan Scientific Press, Tokyo / Springer Verlag, Berlin, 1987.
10. Staples, R.C. Ed. Plant Disease Control, John Wiley & Sons, New York, 1981.
11. Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzell, D.B. (eds) 1997. Plant Metabolism (second edition), Longman, and Essex, England.
12. Hooykaas, P.J.J., Hall, M.A. and Libbenga, K.R. (eds) 1999. Biochemistry and Molecular Biology of Plant Hormones, Elsevier, Amsterdam, The Netherlands.
13. Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D., and Darnell, J. 2000. Molecular Cell Biology (fourth edition). W.H. Freeman and Company, New York, USA.
14. Alice Kurian and M. Asha, 2007. Medicinal plants. New India Publishing House, New Delhi.
15. Raaman N., 2006 Phytochemical techniques. New India Publishing House, New Delhi.
16. Van Damme J.M., Willey J. Penmans, Arpad Pustazi and Susan Bardocz Hand Book of Plant Lectins: Properties and Biomedical Applications. Jain Books and Pub. Distributers.

LABORATORY EXERCISES:

1. Effect of time and enzyme concentration on the rate of enzyme action (e.g. acid phosphatase, nitrate reductase).
2. Estimation of stress induced amino acid (Proline)
3. Determination of total carbohydrates by Anthrone method.
4. Extraction of seed proteins depending upon solubility.
5. Determination of succinate dehydrogenase activity, its kinetics, & sensitivity to inhibitors.
6. Separation of isozymes of esterases, peroxidases by native polyacrylamide gel electrophoresis.
7. Estimation of total fats in fatty seeds.
8. Separation of Alkaloids/Phenols by TLC.
9. Estimation of Phenols by chemical method.
10. Extraction of secondary metabolites from callus tissue.
11. Qualitative analysis of secondary metabolites.
12. Detection of secondary metabolites by TLC (any one)
13. Profile study of secondary metabolites by TLC (any one)

14. Separation of Amino acids by chromatographic techniques
15. Spectrophotometer estimation of secondary metabolites.
16. Estimation of phytoalexins.

Semester – II

PRACTICAL – IV: PLANT PHYSIOLOGY AND PLANT METABOLISM PRACTICAL SCHEDULE

Time: 6 Hours.	Marks: 40
Q. 1: Setting and working of any one major physiology experiment.	08
Q. 2: Setting and working of one major Plant Metabolism experiment.	08
Q. 3: Comment on any one minor physiology experiment.	05
Q. 4: Comment on any one minor Metabolism experiment	05
Q. 5: To perform Phytochemical tests.	04
Q. 6: Principle and working of instrument.	05
Q. 7: Viva Voce	05

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Syllabus for M.Sc. Part-II Botany

Semester – III

PAPER-IX: BIOLOGY AND DIVERSITY OF PTERIDOPHYTES AND GYMNOSPERMS.

Unit-I : General account of Pteridophyta.

- 1.1 Geological Time Scale & Fossilization process.
- 1.2 Stelar organization and evolution.
- 1.3 Origin of leaf and telome concept.
- 1.4 Heterospory and seed habit.
- 1.5 Classification of Pteridophyta – G.M. Smith.

Unit-II : Morphology, anatomy and reproduction.

- 2.1 Psilopsida : Psilophytales and Psilotales.
- 2.2 Lycopsidea : Lycopodiales, Selaginellales, Isoetales.
- 2.3 Sphenopsida : Calamitales, Equisetales.
- 2.4 Pteropsida : Filicales.
- 2.5 Evolutionary trends among Pteridophytes.

Unit-III: General account of Gymnosperms.

- 3.1 Characteristic features of gymnosperms. Distribution and economic importance of gymnosperms.
- 3.2 Variations in structure of pollen grains, pollen germination.
- 3.3 Evolutionary trends in female gametophyte.
- 3.4 Classification of gymnosperms: D.D.Pant and S.V.Meyen

- 3.5 Contributions of Professors Birbal Sahni, D.D. Pant, K.R. Surange etc.

Unit-IV : Morphology, anatomy, reproduction and evolutionary tendencies

- 4.1 Pteridospermales: Lyginopteridaceae, Medullosaceae, Glossopteridales, Caytoniales.
- 4.2 Bennettitales: Cycadeoidaceae and Williamsoniaceae.
- 4.3 Cycadales: Nilssonaceae and Cycadaceae.
- 4.4 Pentoxylales: Pentoxylaceae.
- 4.5 Cordaitales: Cordaitaceae.

Unit-V: Morphology, anatomy, reproduction and affinities:

- 5.1 Ginkgoales: Ginkgoaceae.
- 5.2 Coniferales: Araucariaceae, Podocarpaceae, Cupressaceae and Cephalotaxaceae.
- 5.3 Taxales: Taxaceae.
- 5.4 Ephedrales; Gnetales; Welwitschiales

Suggested Readings:

1. Sporne, K.R.(1976) : Morphology of Pteridophytes.
2. Stewart, W.N. and Rothwell G.W. (1993), Palaeobotany and the Evolution of Plants, Cambridge University Press.
3. Smith, G.M. (1976): Cryptogamic Botany Vol.II, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
4. Rashid, A (1976): An introduction to Pteridophyta, Vikas Publishing House, New Delhi.
5. Parihar N.S. (1976): The biology and morphology of the Pteridophyta, Central Book Depot, Allahabad.
6. Foster A.S. & Gifford F.M. (1967): Comparative morphology of vascular plants, Freeman Publishers, San Fransisco.
7. Eames, A.J.(1974): Morphology of Vascular Plants- lower groups, Tata Mc-Graw Hill publishing Co., New Delhi.
8. Arnold, C.A. (1947): Introduction to Palaeobotany, Mc-Graw Hill Book Co. Inc., New York and London.
9. Kubitzki K. (1990), The families and genera of vascular plants Pteridophytes and Gymnosperms, springer Verlag, New York
10. Agashe, S.N. (1995), Palaeobotany, Oxford & IBH, New Delhi.
11. Biswas, C & Johri, B.N. (2004), The Gymnosperms, Narosa Publishing House, New Delhi.
12. Coulter J.M. & Chamberlain C.J.(1978): Morphology of Gymnosperms, Central Book Depot, Allahabad.
13. Kakkar, R.K. and Kakkar, B.R. (1995), The Gymnosperms (Fossils & Living), Central Publishing House, Allahabad.
14. Sharma O.P. (2002) Gymnosperms, Pragati Prakashan, Meerut.

15. Siddiqui, K.A. (2002) Elements of Palaeobotany, Kitab Mahal, Allahabad.
16. Bhatnagar, S.P. and Moitra A. (1996), Gymnosperms, New Age International Pvt. Ltd., New Delhi.
17. Singh, H. (1978), Embryology of Gymnosperms, Encyclopedia of Plant Anatomy X, Gebryder, Bortragear, Berlin.
18. Stace, C.A. (1989) Plant Taxonomy and Biosystematics (2nd Edition) Edward Arnold Ltd., London.
19. Takhtajan, A.L.(1997): Diversity and Classification of flowering Plants. Columbia University Press, New York.
20. Woodland, D.W. (1991), Contemporary Plant Systematics, Prentice Hall, New Jersey.
21. Khullar, S.P. (1994), An illustrated Fern Flora of west Himalayas Vol. II, International Book distributors, Rajpur Road, Dehradun
22. Pant, D.D. (2003): Cycas and allied Cycadophytes, BSIP, Publications.
23. Bierhorst D.W. (1971): Morphology of vascular plants McMillan, New York.
24. Thomas, B.A. & Spicer R.A. (1987): The Evolution and Palaeobiology of land plants. Discordies Press, Fortland, USA.
25. Spicer, R.A. & Thomas, B.A. (1986) Systematic and taxonomic approaches in Palaeobotany. Systematic Association Special Volume.
26. Chamberlain C.J. (1986); Gymnosperms, structure and Evolution, CBS publishers and distributors, New Delhi.

Laboratory Exercises:

- A. Study of morphology, anatomy and reproductive structure of Pteridophytic forms.
 - i.) *Psilotum, Lycopodium, Selaginella, Isoetes, Equisetum, Gleichenia, Pteris, Ophioglossum, Azolla, Salvinia, Adiantum, Angiosperis.*
 - ii) Study of fossil forms:
Rhynia, Calamites, Calamostachys, Lepidodendron, Psaronius, Zygopteris, Stauropteris.
- B. Comparative Study of vegetative and reproductive parts of – *Cycas, Zamia, Cedrus, Abies, Pinus, Cupressus, Cryptomeria, Taxodium, Podocarpus, Agathis, Thuja, Gnetum, Ephedra, Juniperus, Cephalotaxus, Taxus*, Permanent micropreparations to be submitted by the students.
- C. *Ginkgo*: Morphology to be studied from Museum specimens & anatomy from permanent slides only.

- D. Study of important fossil gymnosperms from material and permanent slides.
- E. Visit to palaeobotanical Institutes, localities and collection of specimens.
- F. Field visits to ecologically different localities to study living gymnosperms.

Semester- III

PAPER- X: TAXONOMY OF ANGIOSPERMS.

- UNIT I** : Systems of Angiosperm classification: - Phenetic versus phylogenetic systems. Relative merits and demerits of following systems of classification. Engler and Prantls system: Hutchinsons system; Bessey's system; Cronquist's system.
- UNIT II** : Origin of intrapopulation variation. Population and Environment. Ecads & Ecotypes. Evolution and differentiation of species. Different models.
- UNIT III** : Taxonomic hierarchy, concept of species, genus, families and other categories (above the family and below the species rank). Principles used in assessing relationship. Salient features of international code of Botanical nomenclature.
- UNIT IV** : Evolutionary trends in Angiosperms with special reference to vegetative floral anatomical and chemical characters. Systematic studies of following families with emphasis on origin, evolution and interrelationship. Magnoliaceae, Ranunculaceae; Papaveraceae; Capparidaceae; Meliaceae; Leguminosaceae, Myrtaceae; Cucurbitaceae; Cactaceae.
- UNIT V** : Gentianaceae; Rubiaceae; Asteraceae; Apocynaceae; Asclepiadaceae; Convolvulaceae, Boraginaceae. Scrophulariaceae, Acanthaceae, Lamiaceae, Polygonaceae; Nyctaginaceae; Caryophyllaceae; Loranthaceae Podostemonaceae; Poaceae; Cyperaceae Cannaceae; Orchidaceae, Arecaceae.

Suggested Readings:

- 1) Bhatnagar, S.P. and Moitra, A., 1996, Gymnosperm. New Age International Pvt.Ltd.New Delhi.
- 2) Cole, A.J., 1969, Numerical Taxonomy, Academic Press, London.
- 3) Davis P.H. and Heywood, V.H. 1973, Principles of Angiosperms Taxonomy, Robert, E. Kreiger, Publishing Company, New York.
- 4) Grant, V. 1971. Plant Speciation, Columbia University Press, New York.
- 5) Grant, W.F., 1984, Plant Biosystematics, Academic Press, London.

- 6) Harrison, H.J. 1971. New Concepts in Flowering Plant Taxonomy. Hiemn Educational Books limited, London.
- 7) Hislop-Harrison, J. 1967, Plant Taxonomy. English Language Book Society and Edward Arnold, Publishing Ltd. New Delhi.
- 8) Heywood, V.H. and Moore, D.M., 1984. Current Concepts in Plant Taxonomy, Academic Press, London
- 9) Jones, A.D. and Wilbins Lady, 1971. Variations and Acceptance in Plant Species. Heman and Co., Educational Books Ltd. London.
- 10) Jones, S.B., Jr. and Luchsinger, A.E. 1986. Plant Systematics (2nd Edition). McGraw Hill Book, Co. New York.
- 11) Nordenstam, B., El Gazaly and Kassas, M. 2000. Plants Systematics for 21st Century. Fortland Press, Ltd. London.
- 12) Radford, A.E. 1986. Fundamentals of Plant Systematics. Harper and Raw Publications, U.S.A.
- 13) Singh, H. 1978. Embryology of Gymnosperms Encyclopedia of Plant Anatomy X. Gebryder Bortraeger, Berlin.
- 14) Solbrig, O.T. 1970. Principles and Methods of Plant Biosystematics. A Macmillan Co.-Colliar Macmillan Ltd. London.
- 15) Solbrig, O.T. and Solbrig, D.J. 1979. Population Biology and Evolution Addison Wesley Publication Co., Inc, U.S.A.
- 16) Stebbins, G.L. 1974. Flowering Plant - Evolution above species Level. Edward Arnold Ltd. London.
- 17) Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd Edition) Edward Arnold Ltd. London.
- 18) Takhtajan, A.L. 1997. Diversity and Classification of Flowering Platns. Columbia University Press, New York.
- 19) Woodland D.W., 1991. Contemporary Plant Systematics. Prentice Hall New Jersey.

Laboratory Exercise:

Angiosperms :

- 1) Technical description of plant species available locally and identification upto family.
- 2) Study of species belonging to single genus and preparation of key at genus level.
- 3) Preparation of herbarium specimens following standard techniques. At least 100 specimens should be presented collectively by the class of locally abundant species.
Frequent field trips should be arranged to get acquainted with local flora. One tour within state and one outside the state should be arranged to study the biodiversity of gymnosperms and angiosperms. Field tour reports should be supported by exhaustive field notes and photographic representations of plant species studied.

SEMESTER-III

PRACTICAL – V: PTERIDOPHYTA, GYMNOSPERMS AND TAXONOMY OF ANGIOSPERMS. PRACTICAL SCHEDULE

Time : 6 Hrs.

Max. Marks: 40

- Q.1. Identify and describe the given pteridophytic material 06 Marks
- Q.2. Identify, describe and make a double stained permanent micropreparation of gymnosperm material 07 Marks
- Q.3. Systematic description of a given angiospermic two plant species. 14 Marks
- Q.4. Spotting: 08 Marks
 - i) Pteridophyte- 2
 - ii) Gymnosperm- 2
 - iii) Fossil Specimen- 2
 - iv) Angiosperm- 2
- Q.5. Viva-voce 05 Marks

Semester- III (Elective)

PAPER-XI: PLANT TISSUE CULTURE-I

Unit-I : Concept and Scope

- 1.1 Introduction, definition and scope of plant tissue culture.
- 1.2 Historical Developments.
- 1.3 Laboratory structure, instruments, requirement and general techniques, Designing of green house, Polyhouse for hardening, maintenance and multiplication.
- 1.4 Cellular totipotency; role of growth hormones in differentiation.
- 1.5 Role of photoperiod, humidity and temperature for *in-vitro* cultures.

Unit II : Media composition and sterilization.

- 2.1 Media constituents (inorganic & organic); growth hormones; gelling agents, media preparation and maintenance, autoclaving of media, Different media compositions.
- 2.2 Sterilization: dry and wet heat sterilization, sterilization of glasswares, steel material.
- 2.3 Surface sterilization of explants; selection of explant, size of explant.
- 2.4 Differentiation: Organogenic differentiations, Cytodifferentiation.

Unit III : Cell and suspension culture

- 3.1 Cell culture, isolation of single cell, techniques; factors

affecting single cell culture, Induction of callus.

3.2 Cell suspension culture: techniques and maintenance of suspension culture.

3.3 Preparation of cloning of single cell and its regeneration to whole plant

Unit IV: Variability and Micropropagation :

4.1 Nuclear and genetical variation; factors affecting variation.

4.2 Role of variability in selection and improvement of plant; somaclonal and gametoclonal variations.

4.3 Practical application of variability in tissue culture.

4.4 Techniques of micropropagation ; factors affecting *in-vitro* stages of micropropagation; technical problems in micropropagation techniques.

Unit V: In-vitro selection and Application.

5.1 Commercial exploitation of micropropagation technique in horticultural and agronomical crops.

5.2 *In-vitro* selection for abiotic and biotic stresses, Isolation of useful nutrients at cellular level, Single cell proteins.

Semester –III

PAPER XII: PLANT TISSUE CULTURE-II (Elective)

Unit I : Somatic Embryogenesis:

1.1 Concept and mechanism of somatic embryogenesis; difference in zygotic and somatic embryos.

1.2 Factors affecting somatic embryogenesis.

1.3 Production of synthetic seeds, application of synthetic seeds in cryopreservation, maintenance of germplasm in storage.

Unit II : Haploid and Triploid Culture:

2.1 Haploid production and its significance.

2.2 Anther and pollen culture technique, monoploid and polyploid culture *in-vitro*.

2.3 Factors affecting Morphogenesis, Role of haploid and polyploids in plant improvement.

2.4 Gynogenesis: Ovule and ovary culture, *in-vitro* pollination and fertilization; Embryo rescue technique, Haploid production through distant hybridization, Triploid production (Endosperm culture).

Unit III: Protoplast Culture

3.1 Isolation and purification of protoplast, culture of protoplast and regeneration of protoplast.

3.2 Somatic Hybridization; culture and selection system for hybrids.

3.3 Cybridization and production of cybrids.

3.4 Role of somatic hybrids and cybrids in plant improvement, application of protoplast culture.

Unit IV: Genetic Transformation:

4.1 Methods of genetic transformation.

i) *Agrobacterium tumefaciens* mediated gene transfer.

ii) *A. rhizogenes* mediated transformation.

iii) Virus mediated transformation.

iv) Direct Gene transfer.

4.2 Selection and identification of transformed cells. Recovery of transformed plants. Transgenic plants; its production, prospects and problems.

4.3 Production of pathogen free plants, virus- elimination through *in-vitro* technique.

Unit V : Secondary metabolites and Cryobiology.

5.1 Production of secondary metabolites from cultured cells, strategies for induction of secondary metabolite production through suspension, hairy root culture, shoot organ culture for alkaloids, pigments, perfumes, flavours, insecticides, anticancerous agents and pharmaceutically important compounds.

5.2 Germplasm Storage: Cryobiology of plant cell culture; plant banks; freeze preservation technology; Role of Cryopreservation and future prospects.

5.3 Industrial applications of plant Biotechnology.

a) Pharmaceuticals b) Food additives, c) Speciality chemicals, d) Quality oils, e) Molecular farming, f) Edible vaccines.

Suggested Readings:

- 1) Amirato, P.Y.D.A. Evans, W.P.Sharp and Bajaj Y.P.S. (1990) Hand book of plant cell culture volumes I-V. McGraw Hill publishing Co. New York.
- 2) Bhojwani S.S. and Rajdan M.K. (1983) Plant Tissue Culture, Theory and Practice.
- 3) Reinert J. and Bajaj Y.P.S. (1977) Applied and Fundamental aspects of plant cell, Tissue and Organ culture, by Springer Verlag, Berlin.
- 4) Gupta P.K. (1995) Elements of Biotechnology, Rastogi and Company.
- 5) S.Narayan Swamy (1994) Plant Cell and tissue culture. Tata McGraw Hill Publishing Company Limited New Delhi.

- 6) Dr.U.Kumar (1999) Methods in Plant Tissue Culture, Agrobios (India)
- 7) J.Reinert and Y.P.S. Bajaj (1980) Plant Cell, Tissue, and Organ Culture, Narosa Publishing House.
- 8) J.Prakash and R.L.M. Pierik (1993) Plant Biotechnology. Oxford and IBH publishing Co. Pvt. Ltd.
- 9) Kalyan Kumar De (1992) Plant Tissue Culture. New Central Book Agency P. Ltd.
- 10) M.K.Razdan (1993) An Introduction to plant Tissue Culture. Oxford and IBH Publishing Co.Pvt. (LTD)
- 11) Surendra Prasad and L.K.Pareek (1996) Impact of Plant Biotechnology on Horticulture. Agro Botanical Publishers (India).
- 12) R.A.Dixon and R.A. Gonzales (1994) Plant Cell Culture. A practical approach, Oxford University Press, New York, Tokyo.
- 13) Philip V.Ammirato, David A.Evans, William R.Sharp, Yasuyuki Yamaha, (1984) Hand Book of Plant Cell culture. Macmillan Publishing Company, New York.
- 14) Dr.Ning-sun Yang, Dr.Paul Christoce, (1994) Practical Bombardment Technology for Gene Transfer. Oxford University Press.
- 15) S.B.Primrose (1987) Molecular Biotechnology Blackwell Scientific Publications London Edinburgh Boston.
- 16) Islam A.S. (1996), Plant Tissue Culture, Oxford & IBH Publishing Co.Pvt.Ltd.
- 17) Reinert J. and M.M.Yeoman, (1982) Narosa Publishing House.
- 18) Reher D.Hall (1999) Plant Cell Culture Practicals - Humana Press.
- 19) Chanela, H.B. (2000), Introduction to Plant Biotechnology, Oxford & IBH Publishing Co.Pvt.Ltd.
- 20) Vasil I.K. and Thorpe T.A. (1994), Plant Cell and Tissue culture, Kluwer Academic Publishers, Netherland

Laboratory Exercises:

- 1) Preparation of media.
- 2) Surface sterilization.
- 3) Isolation of explant, induction of callus, establishment and maintenance of callus.
- 4) Organogenesis and plant regeneration through clonal propagation.
- 5) Embryogenesis in cultured cell from different explants.
- 6) Micropropagation of banana, citrus, papaya, sugarcane etc.
- 7) Cell suspension culture from different tissues.
- 8) Embryo culture and embryo rescue of different plant species.
- 9) Effect of various growth hormones on cell divisions and cell proliferation.
- 10) Isolation, purification and culture of protoplast.

- 11) Anther culture, pollen culture and production of haploids.
- 12) Artificial seed preparation.
- 13) Cytological examination of regenerated plants.
- 14) Agrobacterium culture and selection of transformants.
- 15) Selection of salt tolerance, amino acids analogous resistance through cell cultures.
- 16) Hardening of tissue culture raised plants.
- 17) Visit to forest area to study important plant species and preparation of field diary.
- 18) Visit to plant tissue culture laboratories in state & preparation of report.

Semester III

Plant Tissue Culture : Practical-VI (Elective)

PRACTICAL SCHEDULE

Time : 8 Hrs.	Max. Marks: 40
Q.1. Setting and working of one major experiment	12 Marks.
Q.2. Two Minor experiments.	08 Marks.
Q.3 Preparation of any one specific media for tissue culture.	10 Marks.
Q.4 Comment on spots.	05 Marks.
Q.5 Viva voce	05 Marks.

Semester- III

PAPER-XI: BIOINFORMATICS-I (Elective)

- UNIT I:**
- 1.1 Computer system: Overview functions input devices output devices, storage devices, Softwares and Hardwares.
 - 1.2 Main circuits: Chips, Ports, Expansion slots.
 - 1.3 Real time, offline and online processing.
 - 1.4 Operating systems: Concepts, windows 2003/XP, VISTA, UNIX, LINUX.
 - 1.5 Computer Virus: Overview, Transmission and Precautions.
- UNIT II:**
- 2.1 Types of computers- Latest Models.
 - 2.2 Internet: Resources, World Wide Web, Tools associated, terminologies.
 - 2.3 Data communication, links and Data Mining
 - 2.4 LAN, WAN, MAN, Search Engines.
 - 2.5 Data Models: Network and Hierarchical data model and concepts.
- UNIT III:**
- 3.1 Computer application in Bioinformatics.

- 3.2 Databases: Primary, Secondary; Relational and Non relational; Redundant and Non Redundant
- 3.3 Introduction to Oracle and Perl.
- 3.4 Database design and management (DBMS & RDBMS).
- 3.5 Bioinformatics Resources: NCBI, EBI, ExPASy, EMBL and DDBJ.
- UNIT IV:** 4.1 Biological Databanks: PDB, SRS, BRENDA, TREMBL, UniProt, KEGG
- 4.2 Derived, Databases: PROSITE, Pfam, PRINTS, CATH, SCOP, DSSP, FSSP, DALI.
- 4.3 Genomic Databases.
- 4.4 Repositories for high throughput genomic sequences: EST, STS, GSS.
- 4.5 Nuclei Acid databases and Protein databases.
- UNIT V:** 5.1 Sequence Analysis: Overview, Concepts and tools.
- 5.2 Similarity Searches: BLAST, FASTA, PSI-BLAST and PHI-BLAST.
- 5.3 Scoring Matrices: PAM, BLOSSUM and PSSM.
- 5.4 Pairwise Sequence Analysis: Needleman and Wunch; Smith and Waterman.
- 5.5 Dynamic Programming.

Semester-III

PAPER XII : BIOINFORMATICS II (Elective)

- Unit I :** 1.1 Multiple sequence Alignment (MSA); Basic concepts, Progressive and Hierarchical approaches CLUSTAL-W, GENEDOC.
- 1.2 Sequence patterns, profiles and motifs (Profilescan) Prosite type.
- 1.3 Phylogenetic tree: Basic concepts, methods, types of trees, Analysis algorithm UPGMA, NJ, NR, MP and its interpretation.
- 1.4 Comparative genomic: Full genome alignment concepts and applications, Algorithm MUMmer, BLAST-2
- Unit II:** 2.1 Gene Prediction: Gen Scan and Neural Network, HMM concepts and Applications.
- 2.2 Genomic: Genome analysis coding region (CpG Island, GC content, SNPs, ESTs) non-coding regions: LINES, SINES, LTRs, Tandem repeats.
- 2.3 Structural Genomics and Primer designing
- 2.4 Functional genomics: DNA Microarray.
- Unit III:** 3.1 Protein structure Prediction: ab-initio method, GOR, Fold recognition (PHD, PSI- Prediction method)

- 3.2 Protein structure with respect to helix, sheets and coils, Ramchandran Plot.
- 3.3 Protein modelling and simulations: Techniques, MD Monte Carlo, docking strategies.
- 3.4 Protein optimisation techniques.
- 3.5 To study protein characteristics by using peptools.
- Unit IV:** 4.1 Protein Array: Concept tools
- 4.2 Protein -Protein interaction: Molecular design.
- 4.3 Protein Validation/Homology and Resources for virology'
- 4.4 Virtual Lab. concept
- 4.5 Allergic proteins and their studies by using bioinformatic tools.
- Unit V :** 5.1 Biodiversity Informatics: Overview, concept, Databases (Species 2000, tree of life, ATCC, NBTI) and Softwares (delta, Metro IS, AVIS, ICTV)
- 5.2 Bioinformatics in Agriculture for Crop Improvement.
- 5.2 Drug Design: Role of bioinformatics, target identification and Model organisms (*Arabidopsis thaliana*, *C. elegans*, *Drosophila melanogaster*)
- 5.4 Chemo informatics: Concepts and Dynamics of biomolecular drugs.
- 5.1 Emerging areas in bioinformatics: Genechip, Forest informatics, Ontology, Phylogenetic study, Drug target identification.

Suggested Readings:

1. Hanery Korth & Abraham Database system concept Tata McGraw Hill Publication.
2. Martin J.M. Database system roganisation – Prentice Hall.
3. Stephen Misener and Stephen A. Krawetz, 1999 Bioinformatics: Methods and Protocols (Methods in Molecular Biology, Vol 132), Humana Press.
4. Stanley Letovsky, 1999 Bioinformatics: Databases and Systems, Kluwer Academic Publishers.
5. P. Green, 1998, Computational Molecular Biology, Blackwell Science Inc.
6. Introduction to Computational Molecular Biology, Joao Meidanis, Joao C. Setabal, 1997, PWS Pub. Co.
7. Dan Gusfield, 1997 Algorithms on Strings, Trees, and Sequences: Computer Science and Computational Biology, Cambridge University Press.
8. Simon R. Swindell, 1997 Sequence Data Analysis Guidebook, Humana Press.

9. Tieng K. Yap, Ophir Frieder, Robert L. Martino, 1996, High Performance Computational Methods for Biological Sequence Analysis, Kluwer Academic Pub.
10. Russell F. Doolittle, 1996 Computer Methods for Macromolecular Sequence Analysis, Methods in Enzymology, volume 266, Academic Press.
11. Molecular Bioinformatics: Algorithms and Applications, Steffen Schulze-Kremer, 1995, Walter De Gruyter.
12. Michael S. Waterman, 1995, Introduction to Computational Biology – Maps, Sequences and genomes, Chapman & Hall.
13. Annette M. Griffin and Hugh G Griffin, 1994, Human Press. Computer Analysis of Sequence Data,
14. S. G. Gindikin, 1992, Mathematical Methods of Analysis of Biopolymer Sequences (Dimacs Series in, Discrete Mathematics and Theoretical Computer Science; Volume 8), American Mathematical Society.
15. Michael S. Waterman, 1989 Mathematical Methods for DNA Sequences, CRC Press.
16. James D. Tisdall, 2003 Mastering Perl for Bioinformatics, O'Reilly.
17. Cynthia Gibas, Per Jambeck, 2001 Developing Bioinformatics Computer Skills, O'Reilly.
18. Jeffrey D. Ullman, Jennifer D. Widom, 2001, Database Systems: The Complete Book, Hector Garcia-Molina, and Prentice Hall.
19. Eric S. Roberts, 1998, Programming Abstractions in C: A Second Course in Computer Science, Addison-Wesley.
20. Larry Wall, Tom Christiansen, Jon Orwant, 2000 Programming Perl (3rd Edition), O'Reilly.
21. Jerry Peek, Tim O'Reilly, Mike Loukides, 2nd Edition, 1997 UNIX Power Tools, 2nd Edition, O'Reilly.
22. James Callahan, Harriet Pollatsek, Lester Senechal, and 1995 Calculus in Context: The Five College Calculus Project, Freeman.
23. Gilbert Strang, 1998, Introduction to Linear Algebra, Wellesley Cambridge Press.
24. Erwin Kreyszig, 1999, Advanced Engineering Mathematics, John Wiley & Sons.
25. Christian Schlotterer, 1999, The Elements of Statistical Learning: Oxford University Press.
26. Kenneth Lange, 1997, Mathematical and Statistical Methods for Genetic Analysis, Springer Verlag.
27. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Cliff Stein, 2001, Introduction to Algorithms, 2nd Edition, MIT Press.
28. Charles Staben, 2001, Bioinformatics: A Primer, Jones & Bartlett Pub.

29. Arun Jagota, 2000 Data Analysis and Classification for Bioinformatics, AKJ Academics.
30. Stuart M. Brown, 2000, Bioinformatics: A Biologist's Guide to Biocomputing and the Internet, Eaton Pub. Co.
31. Des Higgins, Willie Taylor, 2000, Bioinformatics: Sequence, Structure and Databanks: A Practical Approach (The Practical Approach Series, 236), Oxford Univ. Press.
32. Neural Networks and Genome Informatics, Cathy H. Wu, Jerry W. McLarty, 2000, Elsevier Science.
33. Peter Clote and Rolf Backofen, 2000, Computational Molecular Biology: An Introduction (Wiley Series in Mathematical and Computational Biology), John Wiley & Sons.
34. Christopher L. Nehaniv, 1999, Mathematical and Computational Biology: Computational Morphogenesis, Hierarchical Complexity, and Digital Evolution American Mathematical Society.
35. Jason T.L. Wang, Bruce A. Shapiro, Dennis Elliott Shasha, 1999, Pattern Discovery in Biomolecular Data: Tools, Techniques, and Applications, Oxford Univ. Press.
36. Dan E. Krane, Michael L. Raymer, Michael L. Raymer, Elaine Nicpon Marieb, 2002, Fundamental Concepts of Bioinformatics, Benjamin/Cummings.
37. Tao Jiang, Ying Xu, Michael Zhang, 2002 Current Topics in Computational Molecular Biology (Computational Molecular Biology), MIT Press.
38. Warren Ewens, Gregory Grant, 2001, Statistical Methods in Bioinformatics: An Introduction (Statistics for Biology and Health), Springer Verlag.
39. Pierre Baldi, Soren Brunak, Sren Brunak, 2001, Bioinformatics: The Machine Learning Approach, Second Edition (Adaptive Computation and Machine Learning), MIT Press.
40. Pankhurst (1991): Practical Toxonomic Computing
41. A.R. Leach, Molecular Modelling Principles and Applications
42. Creighton T.E. Protein Folding
43. Creighton T.E. Protein Structure Prediction.
44. Brendam Wren, Nick Dorrell, 2003, Functional Microbial Genomics (Volume 33), Academic Press.
45. John E. Antonopoulos, 2000, Genomics, Xlibris Corporation
46. Sandor Suhai, 2000, Genomics and Proteomics: Functional and Computational Aspects, Plenum Pub Corp.
47. David L Spector, Robert D. Goldman, Leslie A. Leinwand, 1998, Cells: A Laboratory Manual, 3 volumes, Cold Spring Harbor Laboratory Press

48. Bruce Birren, et al., 1997, *Genome Analysis: A Laboratory Manual*, 4 volumes Cold Spring Harbor Laboratory Press.
49. Cecillia Sacone, Graziano Pesole, 2003, *Handbook of Comparative Genomic: Principles and Methodology*, Wiley-Liss
50. David Sankoff and Joseph H Nadeau, 2000, *Comparative Genomics - Empirical and Analytical Approaches to Gene Order Dynamics, Map Alignment and the Evolution of Gene families*, Kluwer Academic Pub
51. Melody Clark (Editor), 2000 *Comparative Genomics*, Kluwer Academic Pub.
52. T. Rabilloud, 2000, *Proteome Research: Two-Dimensional Gel Electrophoresis and Detection Methods (Principles and Practice)*, Springer Verlag.
53. R.M. Kamp, D. Kyriakidis, the Choli-Papadopoulou, 1999, *Proteome and Protein Analysis*, Springer Veriag.
54. M.R. Wilkins, et al. (Editors), 1997, *Proteome Research: New Frontiers in Functional Genomics* Springer Verlag.
55. I.F. Tsigelny, 2002, *Protein Structure Prediction: Bioinformatic Approach*, International University Line.
56. Arthur M. Lesk, 2001, *Introduction to Protein Architecture: The Structural Biology of Proteins*, Oxford University Press.
57. David M. Webster, 2000, *Protein Structure Prediction: Methods and Protocols*, Humana Press.
58. Carilvar Branden, John Tooze, 1999, *Introduction to Protein Structure*, Gariand Publishing.
59. Alan Fersht, 1999, *Structure and Mechanism in Protein Science: A Guide to Enzyme Catalysis and Protein Folding*, Freeman
60. Mark A. Rothstein, 2003, *Pharmacogenomics: Social, Ethical, and Clinical Dimensions*, Wiley-Liss.
61. Meyer, Rachel Tyndale, 2001 *Pharmacogenomics*, Werner Kalow, , Marcel Dekker.
62. Elliot S Vesell, 2000, *Pharmacogenetics and Pharmcogenomics : Recent Conceptual and Technical Advances(Pharmacology, Volume 61, Number 3, 2000)*, S. Karger Publishing.
63. Wendell Weber, 1997, *Pharmacogenetic*, Oxford University Press.
64. Helen C. auston, John Quackenbush, Alvis Brazma, 2003, *Microarray Gene Expression Data Analysis: A Beginner's Guide*, Blackwell Publishers.
65. G Parmigiani, E.S. Garrett, R.A. Irizarry, S. Zeger, Graeme Clark, 2003 *The Analysis of Gene Expression Data (Statistics for Biology and Health)*, Springer Verlag.

66. Daniel P. Berrar, Werner Dubitzky, Martin Granzow, 2002, *A Practical Approach to Microarray Data Analysis*, Kluwer Academic Publishers
67. Pierre Baldi, G Wesley Hatfield, 2002, *DNA Microarrays and Gene Expression: From Experiments to Data Analysis and Modeling*, Cambridge University Press.
68. David Bowtell, Joseph Sambrook, 2002, *DNA Microarrays: A Molecular Cloning Manual*, Cold Spring Harbor Laboratory.
69. Steen Knudsen, 2002, *A Biologist's Guide to Analysis of DNA Microarray Data*, John Wiley & Sons.
70. Bertrand Jordan, 2001, *DNA Microarrays: Gene Expression Applications*, Springer Verlag.
71. Jang B. Rampal, 2001, *DNA Arraysm: Methods and Protocols (Methods in Molecular Biology, Volume 170)*, Humana Press.
72. Elena V, Grigorenko, 2001, *DNA Arrays: Technologies and Experimental Strategies*, CRC Press.
73. Mark Schena, 2000, *Microarray Biochip Technnology*, Eaton Pub.
74. Mark Schjena, 1999, *DNA Microarrays: A practical Approach (Practical Approach Series 205)*, Oxford Univ Press.
75. Eric H. Davidson, 2001, *Genomic Regulatory Systems: development and Evolution*, Academic Press.
76. Erica Golemis, 2001, *Protein-Protein Interactions: A Molecular Cloning Manual*, Cold Spring Harbor Laboratory.
77. Luke Alphey, 1997, *DNA Sequencing: From Experimental Methods to Bioinformatics (Introduction to Biotechniques Series)*, Springer Verlag.
78. Adams M.D. Fields C., Venter J.C.), 1994, *Automated DNA sequencing and analysis*, Academic Press.
79. Marco Salemi, Anne-Mieke Vandamme, 2003 *The Phylogenetic Handbook: A Practical Approach to DNA and Protein Phylogeny*, Cambridge University Press.
80. Barry G. Hall, 2001, *Phylogenetics Trees Made Easy: A How- To Manual for Molecular Biologists*, Sinauer Associates.
81. Masatoshi Nei, Sudhir Kumar, 2000 *Molecular Evolution and Phylogenetics*, Oxford Univ Press.
82. Roderic D.M. Page, Edward C. Holmes, 1998, *Molecular Evolution: A Phylogenetic Approach*, Blackwell Science Inc.
83. R Scott Hawley, Michele Y Walker, 2003, *Advanced Genetic Analysis: Finding Meaning in the Genome*, Blackwell Publishers.
84. Pui-Yan Kwok, Carolyn T. Williford, 2003, *Single Nucleotide Polymorphisms: Methods and Protocols (Methods in Molecular Biology (Clifton, N, J.), V. 212)*, Humana Press.

85. Daniel Sorensen, Dani Gianola, 2002, Likelihood, Bayesian and MCMC Methods in Quantitative Genetics, Springer Verlag.
86. Ali Hajeer, Jane Worthington, Sally John, 2000, Snp and Microsatellite Genotyping: Markers for Genetic Analysis Biotechniques Molecular Laboratory Methods Series Eaton Pub.
87. David B. Goldstein. Microsatellites: Evolution and Applications,

Laboratory Exercises:

1. Hands on experience and Regular Usage: Windows XP, Internet Browsers (I.E. Netscape), Search Engines, E-mail, Web, mail and ftp.
2. Downloading and installing Software/plugs in on Windows XP.
3. Spreadsheet Applications: Database Management (sorting records, Finding, adding, deleting).
4. Creation of Computer Presentations with graphics (P.P.), Slides, Wizards, inserting graphs & charts, build and animated effect.
5. Database search, NCBI, DDBJ, EMBL, BRENDA, KEGG, UniProt.
6. Pair wise Sequence Alignment-FASTA, BLAST.
7. Websites for Bioinformatics.
8. To prepare the inventory of websites.
9. To develop a phylogeny tree of at least 5 plant species.
10. To search allergic fragments of proteins in fruits / pollen grains.
11. To study Protein characteristics by using different bioinformatic tools.
12. Protein database searching GCG package or EMBOSS.
13. 3D Motif recognition.
14. 3D structure viewing tools.
15. Method of gene Annotation.
16. Assembly of full genome from sequenced fragments.
17. Blast analysis of DNA sequence.
18. Blast analysis of Protein sequence.
19. Primer designing using computers.
20. Protein prediction using DNA as template.
21. RNA prediction using DNA as template.
22. Genome analysis (Prokaryotes)
23. Genome analysis (Eukaryotes)
24. Identification of MUMs (Maximum unique matches)
25. Identification of Unique Sequences for organism.
26. DNA extraction from plants.
27. Protein Molecular weight determination by electrophoresis.
28. Effect of PAM on sequence Analysis.
29. Effect of BLOSSUM on sequence Analysis.

30. Effect of PSSM on protein sequence Analysis.
31. Prediction of Function for unknown sequence.
32. CpG Island identification in Genome Sequence.
33. GC content of sequence and validation of Chargaff's rule.
34. Study of types of genome sequencing.
35. Study of sequencing techniques.
36. Phylogenetic analysis multiple sequence by root tree method.
37. Phylogenetic analysis multiple sequence by non-root tree method.
38. Calculation of distances between two sequences.
39. Study of LINES in genomes.
40. Study of SINES in genomes.
41. Study of LTRS in genomes.
42. Study of tandem repeats.
43. Study of telomeres sequences in organisms..

Semester -III
PRACTICAL-VI
ELECTIVE PAPER BIOINFORMATICS

PRACTICAL SCHEDULE

Time: 8 Hrs.	Marks: 40
Q. 1 Setting and Working of one major experiment	12 Marks
Q. 2 Perform two minor experiments	12 Marks
Q. 3 Problem on Matrices	06 Marks
Q. 4 Spotting	05 Marks
Q. 5 Viva voce	05 Marks

Semester -III

**Paper-XI: Angiosperm Taxonomy, Phytochemistry
and Pharmacognosy-I (Elective)**

- UNIT I** : Basic principles of phytochemical techniques – UV-Visible and Infra Red Spectroscopy, Nuclear Magnetic Resonance (NMR); Chromatographic techniques- Paper chromatography, Thin Layer Chromatography (TLC), High Performance Liquid Chromatography (HPLC), Gas Liquid Chromatography (GLC), Gel Electrophoresis.
- UNIT II** : Study of following secondary plant metabolites with respect to their chemistry and biological activity- Flavonoids, Simple Phenolics, Phenolic Glycosides, Tannins, Anthroquinones, Saponins, Steroids, Alkaloids, Pigments (anthocyanin and betacyanin), Resins, Gums and Volatile oils.

- UNIT III** : Basic aims and concepts of taxonomy. Principles of systematics; concept of character. Monophyly and Polyphyly, Parallelism and convergence, Homology and analogy. Taxonomic literature- keys, floras, monographs and icons.
- UNIT IV** : International code of Botanical Nomenclature Type method, valid publication, Rule of priority, Author citation, conservation of names and rejection of names, Time and place of origin of Angiosperms. Probable ancestors of angiosperms (different theories of origin of angiosperms).
- UNIT V** : Pharmacognostic studies of following drug plants: (Nomenclature, Morphology, Anatomy, Chemistry, Uses and Adultrants)
Datura metel, *Solanum surattense*, *Zingiber officinale*, *Ocimum sanctum*, *Swertia chirata*, *Asparagus racemosus*, *Commiphora weightii*, *Citrulus colocynthis*, *Digitalis purpurea*; *Gloriosa superba*, *Withania somnifera*.
 Ethnobotany: Dynamism in ethnobotany.

Semester – III

Paper-XII: Angiosperm Taxonomy, Phytochemistry and Pharmacognosy-II (Elective)

- UNIT I** : History of classification. Brief account of Pre-Darwinian Classification. Post-Darwinian developments in classification. Artificial, Natural, Phylogenetic and Evolutionary classification systems. Study of Modern systems – Takhtajan; Dahlgren and Thorne's system of classification, assorted Phylogenetic systems.
- UNIT II** : Taxonomic evidence: Vegetative and floral anatomy, palynology; embryology, cytology, Phytochemical systematics and molecular systematics. Numerical taxonomy, Biosystematics
- UNIT III** : Living fossils of Angiosperms: Winteraceae, Degeneriaceae, Astrobaleaceae, Ambrorellaceae, Tetracentraceae, Trochodendraceae, Eupomatiaceae. Comparative account of vegetative and floral morphology, inter-relationships; phylogeny and distribution of plant families belonging to following subclasses as per Cronquist's system (As illustrated by following orders and families).
- a) Magnoliidae:** Ranunculaceae, Berberidaceae, Lardizabalaceae, Menispermaceae.
- b) Hamamelideae:** Urticales- Ulmaceae, Moraceae, Cannabaceae, Urticaceae.

- UNIT IV:** **c) Caryophyllidae:** Caryophyllales-Phytolaccaceae, Nyctaginaceae, Didiereaceae, Cactaceae, Aizoaceae, Molluginaceae, Chenopodiaceae, Amaranthaceae.
- d) Dilleniidae-** Malvales- Elaeocarpaceae, Scytopetalaceae, Tiliaceae, Sterculiaceae, Bombacaceae, Malvaceae.
- e) Rosidae:** Geraniales- Oxalidaceae, Geraniaceae, Tropaeolaceae, Balsaminaceae.
- f) Asteridae –** Asterales- Asteraceae.
- UNIT V:** **g) Alismatidae-** Alismatales-Butomaceae, Limnocharitaceae, Alismataceae.
- h) Commelinidae-** Zinziberales- Sterilitziaceae, Lowiaceae, Heliconiaceae, Musaceae, Zingiberaceae, Costaceae, Cannaceae, Marantaceae.
- i) Liliidae-** Liliales- Liliaceae, Amaryllidaceae, Iridaceae, Agavaceae, Dioscoreaceae.

Suggested Readings :

- 1) Comparative Phytochemistry - Swain, T., Academic Press.
- 2) Chemistry in Botanical classification - Nobel symposia medicine and natural science, Benz, G. and J.Santesson, Academic Press.
- 3) Pharmacognosy - Kokate C.K., A.P.Purohit and S.B.Gokhale, Nirali Prakashan.
- 4) Trease and Evan's Pharmacognosy : W.C.Evans, Saunders.
- 5) Plant systematics, a phylogenetic approach - Jude, Campell, Kellog & Stevans, Sionaur Association Inc.USA.
- 6) Biochemical systematics: Alston, R.E. & B.L.Turner, Prentice Hall.
- 7) Origin and Early Evolution of Angiosperms, Breek C.B. (Ed), Columbia University Press.
- 8) The Seeds of Dicotyledons Vols. I & II, Corner, E.J.H., Cambridge University Press.
- 9) Morphology of the Angiosperms, Eames, A.J., MC Graw Hill.
- 10) Plant Chemototaxonomy: Harborne J.B. and B.L.Turner, Academic Press.
- 11) Pollen Morphology & Taxonomy of Angiosperms: Eradtman, G., Almvisst & Wiksei Stockholm.
- 12) Taxonomy of Vascular Plants, Lawrence: H.M., MC Millan.
- 13) Taxonomy of Angiosperms, Naik: V.N., Tata McGraw Hill.
- 14) The families of flowering plants Vol. I & II: Hutchinson, J., Hutchinsu London.
- 15) Principles of Angiosperms Taxonomy : Davis H. & V.H, Heywood, Von Nostrand.

- 16) International Code of Botanical Nomenclature, Voss.E.C.(Ed.), Regnum Vegetable utrecht.
- 17) A Punched card key to the Dicot Families of South India: Saldhana C. & C.K.Rao, Arvind Publishers, Bangalore.
- 18) Phytochemistry and Angiosperm Phylogeny: Young D.J., & Sieglar, Prager.
- 19) An Integrated System of Classification of flowering Plants: Cronquist, A., Columbia University Press.
- 20) Flowering Plants Origin & Dispersal: Takhtajan, A., Oliver & Boyd.
- 21) Evolution and Phylogeny of flowering plants: Hutchinson, J., Academic Press.
- 22) Evolution and Systematics: Solbrig, O.T., McMillan.
- 23) Morphology of Angiosperms: Sporne, K.R., Hutchinson, London.
- 24) Origin and Early Evolution of Angiosperms: Beck, C.G. (Ed.), Columbia University Press.
- 25) Palaeobiology of Angiosperms Origin: Hughes, N.H., Cambridge University Press.
- 26) Chromosome Atlas of the Flowering Plants of the Indian Sub-continent: Kumar, International Book.
- 27) Anatomy of the Dicotyledons, Second edition: Vol. I & II, Metcalfe, C.R. & L.Chalk, Oxford Science Distributors.
- 28) Taxonomy & Ecology: Heywood, V.H.Ed., Academic Press.
- 29) Numerical Taxonomy: Sneath, P.H.A. & R.R.Sokal, W.H.Freeman & Co.San Fransisco.
- 30) Manual of Cultivated Plants: 2nd Ed., Baily, L.H., Macmillan.

Laboratory Exercises :

- 1) Description of locally available dicot and monocot species. Identification upto species level with the help of flora.
- 2) Use of cytological data in Taxonomic studies - Karyotype analysis. Preparation of Karyograms; and Idiograms (to be done with the help of permanent preparation / diagram / photoplate).
- 3) Comparison of different species of a family to calculate similarity coefficient and preparation of dendrograms (numerical taxonomy).
- 4) Study of different taxonomic features like stomatal types, pollen types, trichome types, crystals etc.
- 5) Detection of secondary metabolites in plant material by quick tests. Detection of flavonoids, irridoids; leucoanthogenins, anthroquinones, alkaloids, saponins, differentiating anthocyanins from bactacyanins. Chemically differentiating angiosperm wood from gymnosperms wood.
- 6) Pharmacognostic studies of any 3 of the locally available medicinal plants.

- 7) Frequent field visits to study local flora are expected. One short tour within state and one long tour to other state to study the vegetation and biodiversity of angiosperms. Students should submit atleast 100 herbarium specimens (collectively) prepared according to international norms. Excursion report should be supported by field diary and photographic presentation of the flora.

Semester -III

Elective Practical VI – Angiosperm Taxonomy, Phytochemistry and Pharmacognosy. Practical Schedule

Time : 6 Hrs	Full Marks: 40
Q.1) Systematic description of two angiospermic plants (one from dicotyledons and one from Monocotyledons)	10 Marks.
Q.2) Preparation of artificial key	04 Marks.
Q.3) Karyotype studies	04 Marks.
Q.4) Detection of secondary plant metabolites of given plant material.	03 Marks.
Q.5) Morphological and analytical characterization of given drug plant material	06 Marks.
Q.6) Spotting	08 Marks.
Q.7) Viva voce	05 Marks.

Semester III

ELECTIVE PAPER XI: ADVANCED PLANT PHYSIOLOGY AND BIOCHEMISTRY-I

- UNIT I:**
- 1.1 Membrane transport – Structure and organization of membrane, Glucoconjugates and protein membrane systems; Channels, pumps and carriers of membrane.
 - 1.2 Aquaporines – Structure and functions; Model membranes.
 - 1.3 Mineral nutrition – Deficiency symptoms in plants, Regulation of K⁺ Phosphorus nutrition and transport; Micronutrient acquisition; Plant response to mineral toxicity; Nutritional status of plants.
- UNIT II:**
- 2.1 Plant movements– Overview; phototropism, phototropic signal perception, transduction of signal.
 - 2.2 Gravitropism – signal perception and its mechanism, growth response, Role of calcium in gravitropism.
 - 2.3 Nastic movements – Mechanism of Nyctynasty and Seismonasty.

2.4 Sensory photobiology – Phytochromes and Cryptochromes – Phytochemical and biochemical properties; Photophysiology of light induced responses; molecular mechanism of photomorphogenic receptors; signaling and gene expression.

UNIT III: 3.1 Plastids – Chemical composition, structure and transport functions of plastid membranes.

3.2 Biosynthesis of Chlorophylls, Carotenoids and fatty acids.

3.3 Thylakoid membrane network; protein synthesis, nuclear proteins for photosynthesis.

3.4 Mitochondria – Chemical composition, Transport across the membrane; Proteins synthesis; nuclear proteins for respiration.

UNIT IV: 4.1 Energy Metabolism – Thermodynamic principles in biology. Artificial photosynthesis for energy harvestation; National Hydrogen Programme.

4.2 Primary and Secondary metabolites – Coordinated control of metabolism; Metabolites as important natural products.

4.3 Types, biosynthesis and applications of terpenes, alkaloids, phenolic compounds, lignins, flavonoids, glycosides, coumarins, stilbenes, styrylpyrones and amylopyrones.

UNIT V: 5.1 Spectroscopy – Principles and applications of X-ray diffraction, Fluorescence, UV-visible, IR and NMR Mass spectroscopy.

5.2 Chromatography- Principle and applications of paper, ion exchange, affinity, and thin layer chromatography.

5.3 Flame photometry – Principle and its applications.

Semester III

PAPER XII: ADVANCED PLANT PHYSIOLOGY AND BIOCHEMISTRY-II (ELECTIVE)

UNIT I: 1.1 Carbohydrates- Chemical Structure, Types and functions of carbohydrates. Biosynthesis and degradation of starch and sucrose, Modulation of gene expression by carbohydrates.

1.2 Amino acid- Chemical properties; Overview of amino acid biosynthesis in plants.

1.3 Signal transduction – Overview, receptors and G-proteins, phospholipid signaling, role of cyclic nucleotides, Calcium-Calmodulin cascade, diversity in protein kinases and phosphatases, Specific signaling mechanisms- Two compartment sensor regulator system in bacteria and plants. Sucrose sensing mechanism.

UNIT II: 2.1 Plant defence systems – Overview of plant pathogens and plant diseases; Phytoalexins and their host specificity.

2.2 Molecular basis of phytoalexin elicitation; R- genes; mode of action and its role.

2.3 Post infectional compounds of some economically important plants.

2.4 Control of pathogens by Genetic Engineering.

UNIT III: 3.1 Regulation and mode of secondary metabolites – Bioseparation of compounds, Regulation of metabolite synthesis in plants, Mode of action of target sites; Synergy principle at work in plants, pathogens, insects, herbivores and humans.

3.2 Transgenic production of secondary metabolites.

UNIT IV: 4.1 Senescence and programmed cell death – Types of cell death observed in plants. Overview of senescence, pigment and protein metabolism during senescence.

4.2 Impact of senescence on Photosynthesis and oxidative metabolism.

4.3 Degradation of nucleic acid during senescence.

4.4 Endogenous plant growth regulators and senescence, Environmental influence on senescence.

UNIT V: 5.1 Stress Physiology – Plant responses to biotic and abiotic stress, Mechanism of biotic and abiotic stress tolerance, HR and SAR.

5.2 Water deficit and draught resistance; salinity stress, metal toxicity, freezing and heat stress and oxidative stress.

Suggested Readings:

1. DNA and Protein Sequence Analysis: A Practical Approach (Practical Approach Series, No. 171), 1996, M.J. Bishop and C.J. Rawlings (Editors), 1996, IRL Press.
2. Sequence Analysis Primer, Michael Gribskov and John Devereux (Editors), 1992, Oxford University Press..
3. Approaches to gene Mapping in Complex Human Diseases, Jonathan L. Haines, Margaret A. Pericak-Vance (Editors), 1998, John Wiley & Sons.
4. Essentials of Genomics and Bioinformatics, C.W. Sensen (Editor), 2002, John Wiley and Sons.
5. Hidden Markov Models for Bioinformatics, Timo Koski, Timo Koskinen, 2001, Kluwer Academic Publishers.
6. Albert, B; Bray, D; Lewin, J; Raff, M; Roberts, K; Watson, J.D.; Molecular Biology of the Cell. Garland, New York, 1994.
7. Brachet J. & Mirshy, A.E., ed., The Cell Biochemistry, Physiology, Morphology, Vol.II. Academic Press Inc. London LTD. 1961.

8. Buchanan, B.B.; Gruissem, W.; Jones, R.L.; *Biochemistry & Molecular Biology of Plants*, American Society of Plant Physiologists, Rockville, Maryland, 2000.
9. Charalambous, G., Ed., *Spices, Herbs & Edible Fungi*, Elsevier, New York 1944.
10. Clayton, R.K., *Photosynthesis : Physical mechanism & Chemical patterns*. Cambridge University Press, Cambridge. 1980.
11. Dangi, J.L.; *Bacterial Pathogenesis of Plants & Animals*, Molecular & Cellular Mechanism. Springer-Verlag, Berlin, 1995.
12. Daniel, M. and R.P. Purkayastha Ed., *Handbook of Phytoalexin metabolism & action*, Marcel Dekker, Inc., New York, 1995.
13. Davies, D.D., ed., *The Biochemistry of Plants*, Vol. II, Academic Press, London, 1987.
14. Duke, J.A. *CRC Handbook of Phytochemical Constituents of GRAS Herbs, Foods & other Economic Plants*. CRC Press, Boca Raton, FL, 1992.
15. Epstein, E., *Mineral Nutrition of Plants : Principles & Perspectives*. John Wiley & Sons, New York, 1972.
16. Hopkins, W.G. *Introduction to Plant Physiology*. John Wiley & Sons, Inc., New York, USA, 1995.
17. Jones & Bartlett, *Plant Cell Biology : Structure & Function*, Sudbury, M.A., 1996.
18. Kaufman, P.B.; L.J. Cseke; S. Warber; J.A. Duke & H.L. Briemann. *Natural products from plants*. CRC Press LLC New York, 1999.
19. Llyoid, C.W. ed, *Plant Cell biology : Structure and function*, Academic Press, London, 1982.
20. Llyoid, C.W. ed, *The cytoskeletal Basis of Plant Growth & Form*, Academic Press, London, 1991.
21. Lodish, H.; Berk, A.; Zipursky, S.L.; Matsudaira, P. : Baltimore, D., and Damell, J. *Molecular Cell biology*. 4th ed. W.H. Freeman & Co., New York, USA, 2000.
22. Marchner, H. *Mineral Nutrition of Higher Plants*, 2nd ed. Academic Press,, London, 1995.
23. Moller, T.M.; Gardestom P., Glimelin, K.; Glaser, E. *Plant Mitochondria : From Genes to function*. Backhuys Publishers, 1998.
24. Nishimura, S.; C.d. Vance & N. Doke, Eds. *Molecular determinants of Plant diseases*. Japan Scientific Press, Tokyo / Springer Verlag, Berlin, 1987.
25. Noggle, G.R. & G.J. Fritz. *Introductory Plant Physiology*. 2nd ed. Prentice-Hall, Inc., Englewood cliffs, N.J. U.S.A., 1992.
26. Plummer, D.T. *An Introduction to Practical Biochemistry*, 3rd ed. Tata Mc Graw Hill, Delhi.

27. Rochaix, J.D. Goldschmidt-Cleronont, M., Merchant, S., Kluwer. *The molecular biology of chloroplast & mitochondria in Chlamydomonas*, Academic Publishers, Dordrecht, The Netherlands, 1998.
28. Staples, R.C. Ed. *Plant Disease Control*, John Wiley & Sons, New York, 1981.
29. Taiz, L. & Zeiger, E. *Plant Physiology* 2nd ed. Academic Press, Sandiago, U.S.A. 1998.
30. Tobin, A.K., ed. *Plant Organelles*. Cambridge University Press. Cambridge, UK, 1992.
31. Westhoff, P. *Molecular Plant Development : from Gene to Plant*. Oxford University Press, Oxford, UK, 1998.

Laboratory Exercises :

- 1) The separation of leaf pigments by adsorption chromatography.
- 2) The separation of amino acids by two dimensional chromatography.
- 3) The identification of sugar in Fruit juices by TLC.
- 4) Separation of Lipids by TLC.
- 5) SDS - PAGE for soluble proteins extracted from given plant material.
- 6) Extraction of Essential oils from plant material.
- 7) Separation of esters and peroxidases by native PAGE.
- 8) Determination of Chl- a, Chl-b & total chlorophyll in C3 & C4 plants by spectrophotometry.
- 9) Determination of isoelectric point of legumin.
- 10) The quantitative estimation of amino acids by using the ninhydrin reaction.
- 11) Estimation of total carbohydrates by anthrone reagent.
- 12) The determination of acid value of fats.
- 13) The determination of saponification value of fats.
- 14) The determination of activity of enzyme α - amylase.
- 15) Isolation of Chloroplast from spinach leaves.
- 16) The evaluation of oxygen by isolated chloroplast using Hill Oxidants.
- 17) Preparation of absorption spectrum of chlorophylls & carotenoids.
- 18) Estimation of stress induced amino acids (proline)
- 19) Demonstration of phototropism, geotropism, hydrotropism & seismonasty.
- 20) Determination of water potential by tissue weight change method.
- 21) Estimation of Sodium, Potassium & Calcium in plant material by Flame-photometry.
- 22) Estimation of peroxidase activity.

- 23) Detection of secondary metabolites by TLC (any one)
- 24) Profile study of secondary metabolites by TLC (any one)
- 25) Spectrophotometric estimation of secondary metabolites.
- 26) Estimation of phytoalexins.
- 27) PR- protein (b - 1,3 glucanase, chitinase, PAL) assay.

Semester III

Elective Practical – VI

Advanced Plant Physiology and Biochemistry

PRACTICAL SCHEDULE

Time: 6 Hrs	Full Marks: 40
Q. 1 Setting and working of any one Plant Physiology experiment.	08 Marks
Q. 2 Setting and working of any one biochemistry experiment.	08 Marks
Q. 3 Comment on two experiments based on plant physiology and biochemistry that are set up.	10 Marks
Q. 4 Comment on principle and working of analytical instrument.	04 Marks
Q. 5 Perform phytochemical / biochemical test.	05 Marks
Q. 6 Viva voce	05 Marks

Semester – III

PAPER- XI: MOLECULAR BIOLOGY, BIOTECHNOLOGY AND PLANT BREEDING-I (Elective)

- UNIT I:**
- 1.1 Chemical basis of life- Covalent bonds, Non-covalent bonds, Vander Waal's forces, Acids, Bases and Buffers.
 - 1.2 Protein structure and function – Hierarchical; structure of protein (Primary, Secondary, Tertiary, Quaternary and domain structure).
 - 1.3 Modification and degradation of proteins. Molecular chaperons.
 - 1.4 Membrane proteins-Integral and peripheral membrane proteins and its Interaction.
 - 1.5 Methods of separation of cell proteins – Detergents, Differential and Rate zonal centrifugation, SDS-Polyacrylamide gel electrophoresis and isoelectric focusing.
- UNIT II:**
- 2.1 Nuclear genome organization – Genome size, Kinetics of DNA denaturation and renaturation, the law of DNA constancy and C- value paradox.
 - 2.2 Kinetic classes of DNA – Repetitive and Unique DNA sequences and its significance.

- 2.3 Transcription in prokaryotes – Transcription unit, optimal prokaryotic promoter, Bacterial RNA polymerase, Transcription process.
- 2.4 Transcription in eukaryotes – RNA polymerase, transcription factors, promoters, enhancer, transcription process.
- 2.5 Modification in RNA – 5' Cap formation, Transcription termination, 3' end processing and polyadenylation, Splicing, Editing, nuclear export of mRNA and mRNA stability.

- UNIT III:**
- 3.1 Plant tissue culture- Laboratory structure and requirements, Different types of culture media, Importance of organic, inorganic nutrients in cell differentiations. Role of growth regulators in cell differentiation.
 - 3.2 Anther and pollen culture techniques.
 - 3.3 Protoplast culture and somatic hybridization – Isolation of protoplasts, culture, and fusion methods.
 - 3.4 Techniques of Bacterial culture and selection.
- UNIT IV:**
- 4.1 Cloning techniques for *E.coli*. – Mechanical shearing, Restriction endonucleases, Synthetic linkers and adapters.
 - 4.2 Vector systems – Plasmid, Cosmid, and Bacteriophages.
 - 4.3 Construction of gene libraries – Genomic and c-DNA libraries.
 - 4.4 Gene Technology in plants – Agrobacterium mediated gene transfer.
 - 4.5 Transgenic plants – Production of transgenic plants for herbicide, insect / pest tolerance through recombinant DNA technique. Production of transgenic tomato plants with longer shelf life and better taste.
- UNIT V:**
- 5.1 Plant genetic resources- Centres of origin of food plants, concept of parallel variation, Importance of genetic diversity and conservation.
 - 5.2 Utilization of wild species in crop improvement – Tobacco, Tomato, pearl millet, Brassica.
 - 5.3 Techniques of producing hybrid seeds; Barriers to interspecific hybridization; Cytoplasmic basis of sterility.
 - 5.4 Cytoplasmic and genetic male sterility systems in hybrid seed production – Methods, Sources, Advantages and difficulties and future prospects.

Semester – III

PAPER-XII: MOLECULAR BIOLOGY, BIOTECHNOLOGY AND PLANT BREEDING-II (Elective)

- UNIT I:** 1.1 Chemical structure and functions of Biomolecules- Nucleic acids, Carbohydrates and lipids.
1.2 Principle, working and applications of various techniques.
1.3 Gel-filtration, ion exchange and affinity chromatography.
1.4 Thin layer and gas chromatography.
1.5 High-pressure liquid chromatography.
- UNIT II:** 2.1 Organisation of eukaryotic genes – Features of split genes; Pseudogenes; Exons and Introns.
2.2 Genetic code – Properties of code; Biochemical elucidation of code; suppressor, non-sense, missense and frameshift mutations.
2.3 Translation in prokaryotes and eukaryotes.
2.4 Regulation of gene expression in eukaryotes – Position effect, paramutation, Genetic imprinting.
2.5 Regulation of transcription, Transcriptional and post transcriptional gene silencing.
- UNIT III:** 3.1 Tools in biotechnology – Principle, techniques and application of nucleic acid hybridization; Southern, Northern and Western; Microarray and PCR.
3.2 Genomic stability – Molecular characteristics, properties and significance of eukaryotic mobile genetic elements – Ty elements in Yeast; Copia elements in *Drosophila*, Ac-Ds, Spm – dSpm elements in maize. Role of mobile genetic elements in evolution.
- UNIT IV:** 4.1 Plant viruses as gene vectors – RNA viruses, DNA viruses, Gemini viruses, and caulimovirus.
4.2 Agrobacterium mediated gene transfer – Agroinfection, vectorless gene transfer.
4.3 Directed genetic engineering of plant cells – Role of antisense RNA technology and Ribozyme in inactivation of resistance gene. Role of antisense RNA in AIDS controls.
4.4 Plant as a Bioreactor – Production of High value of protein, new or modified carbohydrates in transgenic plants. Stability of proteins and RNA produced from genes introduced into transgenic plants.
- UNIT V:** 5.1 Molecular plant breeding – Molecular marker systems. Importance of molecular marker assisted breeding. Molecular markers in genome analysis: RFLP and RAPD.
5.2 Radiation biology –Radioactive isotopes, half-life of isotopes, Role of radiations in plant improvement.

5.3 Mutation breeding – Mutagens, treatment methods and its applications in crop Improvement.

5.4 Principle and application of Biometrical genetics in plant Breeding.

Suggested Readings :

- 1) Karp, G. 1999. Cell and Molecular Biology Concepts and Experiments (2nd edition). John Wiley & Sons, Inc. USA.
- 2) Lewin, B. 2000. Gene VII. Oxford University Press, New York, London.
- 3) Lewis, R. 1997. Human Genetics : Concepts and Applications (2nd edition). WCB McGraw Hill U.S.A.
- 4) Malacinski, G.M. and Freifelder, D. 1998. Essential of Molecular Biology (3rd edition). Jones and Bartlet, Publishers, Inc. London.
- 5) Russel P.J. 1998. Genetics (5th Edition). The Benjamin / cummings publishing company Inc. USA.
- 6) Snustad D.P. and Simmons, M.J. 2000. Principles of Genetics (2nd edition) John Wiley & Sons Inc. USA.
- 7) Alberts, B., Bray,D., Lewis,J. Raff,M., Roberts,K., and Watson,J.D., 1999. Molecular Biology of the cell. Garland Publishing, Inc., New York.
- 8) Buchanan, B.B., Gruissem, W., and Jones,R.L., 2000. Biochemistry and Molecular Biology of Plants. American Society of Plant Physiologists, Maryland, USA.
- 9) Lodish, H., Berk,A., Zipursky,S.L., Matsundaira,P, Baltimore,D., and Darnell, J.2000. Molecular Cell Biology (4th Edition). W.H.Freeman and Co., New York., USA.
- 10) Fukuik and Nakayama, S. 1996. Plant Chromosomes. Laboratory Methods, CRC Press. Boca Raton, Florida.
- 11) Sharma, A.K. and Sharma, A. 1999. Plant Chromosomes, Manipulation and Engineering. Harwood Academic Publishers, Australia.
- 12) Brown, T.A. 1999. Genomes, John Wiley & Sons (Asia) Pvt.Ltd.Singapore.
- 13) Old, R.W. and Primrose,S.B. 1989. Principles of Gene Manipulation. Blackwell Scientific Publications, Oxford U.K.
- 14) Primose, S.B. 1995. Principles of Genome Analysis. Blackwell Scientific Publications, Ltd.Oxford, U.K.
- 15) Shantharam, S. and Montgomery, J.F. 1999. Biotechnology, Biosafety and Biodiversity, Oxford & IBH publishing Pvt.Ltd., New Delhi.
- 16) Hall, R.D. (Ed.) 1999. Plant Cell Culture Protocols. Humana Press, Inc.New Jersey U.S.A.

- 17) Butenko, R.G. 2000. Plant Cell Culture. University Press of Pacific.
- 18) Shaw, C.H. (Ed.) 1988. Plant Molecular Biology. A Practical Approach, IRL Press, Oxford.
- 19) Smith, R.H. 2000. Plant Tissue Culture Techniques and Experiments. Academic Press, New York.
- 20) Chopra V.L. 2001. Plant breeding. Theory and Practice. Oxford IBH Pvt.Ltd., New Delhi.
- 21) Chopra V.L. 2001. Plant breeding. Field Crops. Oxford IBH Pvt.Ltd., New Delhi.
- 22) Atherly A.G., Girten, J.R. and McDonald, J.F. 1999. The Science of Genetics, Saunder College Publishing, Fort Worth, USA.
- 23) Plummer, D.T. 1988. An Introduction to practical Biochemistry. Tata McGraw Hill Publishing Co.Ltd. New Delhi.
- 24) Wilson, K. and Goulding, K.H. (Eds), 1992. A Biologist Guide to Principles and Techniques & Practical Biochemistry (3rd Edition). Manas Saikia for Foundation Books, New Delhi.
- 25) Sadasivam, S. and Manickam A., 1996. Biochemical methods (2nd Edition). New Age International Publishers New Delhi.
- 26) Hans-Walter Heldt. 1997. Plant Biochemistry & Molecular Biology. Oxford University Press, New York.
- 27) Sharma, J.R. 1994. Principles and Practice of Plant Breeding. Tata McGraw Hill Publishing Company Ltd. New Delhi.
- 28) Rubenstein, I. Gengenbach, B. Phillips, R.L. and Green C.E. (Eds), 1980. Genetic improvement of crops. University of Minnesota Press. U.S.A.
- 29) Elliott, W.H. and Elliot, D.C. 1997. Biochemistry and Molecular Biology. Oxford University Press. New York.
- 30) Freifelder D. 1995. Molecular Biology (2nd Edition). Narosa Publishing House, New Delhi.
- 31) Satyanarayana, U. 1999. Biochemistry (1st Edition). Arunabha Sen Book & Allied (P) Ltd. Calcutta.
- 32) Madigan, M.T., Martinko, J.M. and Parker, J. 1997. Brock Biology of Microorganisms (8th Edition) Prentice Hall International (UK) Limited, London.
- 33) Gardner, E.J, Simmons, M.J., and Snustad, D.P. 1991. Principles of Genetics (8th Edition). John Wiley & Sons, Inc. New York.
- 34) Chaudhary, R.C. 1986. Introduction to Plant breeding, Oxford & IBH Publishing Co., New Delhi.
- 35) Gupta, S.K. 2000. Plant Breeding. Theory and Techniques. Agrobios (India) Jodhpur.
- 36) Singh, P. 2001. Essentials of Plant Breeding (2nd Edition). Kalyani Publishers, New Delhi.

- 37) Watson, J.D., Hopkins, N.H., Roberts, J.W., Steitz, J.A., and Weiner, A.M. 1987. Molecular Biology of the Gene. (4th Edition). The Benjamin / cummings Publishing Company. Inc. California.
- 38) Chopra, V.L., Malik, V.S. and Bhat, S.R. 1999. Applied Plant Biotechnology. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
- 39) De Robertis, E.D.P. and De Robertis, Jr. E.M.P. 1999. Cell and Molecular Biology (8th Edition) B.I. Publication Pvt. Ltd. New Delhi.
- 40) Jahier, J. (Ed.) 1996. Techniques of Plant cytogenetics. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Laboratory exercises:

1. To extract genomic DNA from leaves and to analyse the extracted DNA by Agarose Gel Electrophoresis.
2. Estimation of protein by Bradford's Method.
3. Western Blotting- Protein profiling.
4. SDS – PAGE.
5. Estimation of amino acids by Thin Layer Chromatography.
6. Estimation of fatty acids by paper chromatography.
7. Restriction Digestion.
8. Mechanical isolation of mesophyll protoplasts.
9. Protoplast fusion using polyethylene glycol solution.
10. DNA Fingerprinting.
11. Plasmid preparation.
12. Isolation of genomic DNA from Bacteria.
13. Establishment of callus culture from carrot cambial explant.
14. Effect of ionizing radiations/chemical mutagen on growth and mitotic Chromosome.
15. Establishment of callus from important medicinal/ ornamental/ oil yielding/ wild and endangered/ vegetatively propagated plants.
16. Detection of anomalies in chromosome pairing and disjunction caused by mutant genes and structural alteration of chromosomes.
17. Preparation of chromosome maps from Three point test cross data.
18. Identification of mutant genotype in Drosophila and Arabidopsis stocks maintained by the department.
19. Field exploration for detection of male sterile plants and estimation of their pollen fertility in locally grown plants (Tomato, Brassica, Linum).
20. Emasculation and bagging of flowers of Brassicaceae, Malvaceae, and Liliaceae, pollinating them manually and estimating fruit and seed set.
21. Lay out of field experiment: Randomised block design, Latin square design.

- 22 Statistics:- Central value: mode median, mean; Dispersion: range, mean deviation, standard deviation; Frequency distribution: frequency curve, frequency histogram.
- 23 Use of different softwares for determination of chromosome length.
- 24 Use of CCD camera for microphotography.
- 25 To study the DNA denaturation and renaturation kinetic study by UV-VIS spectrophotometer.

Semester III

Elective Practical –VI: Molecular Biology, Biotechnology and Plant Breeding

PRACTICAL SCHEDULE

Time : 8 Hrs.	Full Marks : 40
Q. 1. Setting and working of any one major Molecular Biology experiment.	08 Marks
Q. 2. Perform one major Biotechnology experiment.	08 Marks
Q. 3. Perform one Plant breeding experiment.	10 Marks
Q. 4. Comment on principle and working of analytical instrument.	04 Marks
Q. 5. Spotting.	05 Marks
Q. 6. Viva-Voce	05 Marks

Semester-III

PAPER –XI: PALAEOBOTANY

(EVOLUTIONARY BOTANY)-I (Elective)

Unit I : Palaeobotany as Evolutionary Science.

- 1.1 Basic concepts and scope of palaeobotany as evolutionary science.
- 1.2 Emergence of palaeobotany in world and India.
- 1.3 Basic principles of fossilization, fossils as an evidence of past life, methods of preservation, methods for study of different preservation types of plant fossils.
- 1.4 Geological time scale; stratigraphic importance of plant fossils.
- 1.5 Origin of life, Theory of Panspermia.
- 1.6 Classification of fossil plants, nomenclature and reconstruction.

Unit II : Diversification of life forms:

- 2.1 Algal forms like *Animikiea*, *Kakabekia*, *Gunflintia*, *Eostrion* and *Stromatolite*. Dinoflagellate nano-fossils, Cyanobacteria in Archeozoic era.

- 2.2 Fossil fungi.
- 2.3 Fossil Chlorophyta, Chrysophyta, and Phaeophyta.
- 2.4 Non-vascular cyrtogams like *Thallites*, *Marchantiolites*, *Naiadita*, *Sporogonits*, fossil mosses.
- 2.5 Phylogenetic significance of fossil record.

Unit III : Early Vascular land plants:

- 3.1 Evidence of first vascular plant.
- 3.2 Rhyniopsida form Rhynie chart.
- 3.3 *Aldanophyton*, *Cooksonia*, *Baragwanathia*, *Rhynia*, *Psilophyton*, *Asteroxylon*, *Horneophyton*, *Yarravia*, *Lycopods* like *Leclerquia*, *Lopidodendrons*, *Lepidophlois*, *Lepidostrobos*.
- 3.4 Origin of Isoetales, Equisetales, *Azolla*, *Salvinia* with special reference of Indian forms.

Unit IV: Progymnosperms: Structure and Evolution.

- 4.1 Aneurophytales: *Aneurophyton*, *Protopteridium*, *Tetraxylopteris*.
- 4.2 Archaeopteridales: *Archaeopteris*.
- 4.3 Origin of Progymnosperms and inter relationships.

Unit V: Fossil Gymnosperms:

- 5.1 Evolution of early seed.
- 5.2 Calamopityales: *Calamopitys*, *Stenomylon* *Chapelia*.
- 5.3 Callistophytales: *Callistophyton*, *Idanothekion*, *Callospermarion*, *Vesicaspora*.
- 5.4 Evolutionary significance of the order.
- 5.5 Cycadophyta and Coniferophyta: Past distribution and evolutionary significance of different orders.

Semester-III

PAPER –XII: PALAEOBOTANY

(EVOLUTIONARY BOTANY)-II (Elective)

Unit I : Pre-angiosperm fossil forms.

- 1.1 :Pre- Cretaceous angiosperms: i) *Sanmiguelia*, ii) *Fercula*, iii) *Sahanioxylon*, iv) *Acaciaphyllum*, v) *Sahanipupshpam*, vi) *Ficophyllum*, vii) *Proteaphyllum*, viii) *Eucomidites*, ix) *Rogersia*.
- 1.2 :Early evidence of flowers, fruits and seeds with reference to Indian flora.
- 1.3 :Diversification of angiosperms in Cretaceous periods.
- 1.4 :Modern concept of origin of Angiosperms, concept of punctuated equilibrium, cladistics concept.

Unit II : Biodiversity in Geologic past.

- 2.1 :Glossopteris flora; Euramerican flora, Cathyasian flora and Angara flora.
- 2.2 :Indian floras : Glossopteris, flora, Dicroidium flora, Ptilophyllum flora, (Rajmahal flora), Deccan Intertrappean flora.
- 2.3 :Palaeogeographic and palaeoecological significance of floras.
- 2.4 : Modern concepts of Gondwana with reference to its limits and extension, Karewa beds.
- 2.5 :Concept of Archeobotany, Palaeoethno and Taphonomical concepts, Mass extinction

Unit III : Microfossil Evidences:

- 3.1:Definition of spore, pollen, meiospores; prepollen; morphology and dispersal of important pollen types, presentation of pollen, ornamentation of pollen wall.
- 3.2 :Study of pollen kit, ubisch bodies; Role of pollen and spore in stratigraphy; classification of isolated spores and pollen.
- 3.3:Dispersed megaspores; primitive seeds,
- 3.4 :Significance of palynology is coal and oil industry, Role of pollen grains in industrial honey production with reference to Indian work.

Unit - IV : Applied Palaeobotanical aspects :

- 4.1 :Fossil fuels; Biogenesis of coal, (Process of Coalification) conditions of coal formation).
- 4.2 :Microlithotypes found in coal viz : *Vitrinites*, *Resinites* etc.
- 4.3 :Coal as an indicator of palaeoclimate, Resources of coal and its present status.
- 4.4 :Origin of oil forming beds, source material for oil reserves of India, Formation of diatomaceous earth in marine environment, Bombay High, Present status of oil reserves.

Unit - V: Applied Aspects:

- 5.1 :Radiometric dating of rocks, half life period; K-Ar dating, Fission track dating.
- 5.2 :Continental Drift theory, plate tectonic model,
- 5.3 :Palaeogeographical implications, Reconstruction of past vegetation.
- 5.4 :Aero-allergens and its significance.

List of Books and Journals :

1. Andrews, H.N. (1961) Studies in Palaeobotany John Wiley & Sons London.

2. Darrah, W.C. (1960) Principles of Palaeobotany.
3. Delevoryas, T. (1962) Morphology & Evolution of Plants.
4. Sahni, B. (1920) Revision of Indian Fossil Plants, GSI Publication.
5. Meyen S.V. (1987) Fundamentals of Palaeobotany, Chapman & Hall, London.
6. Pant D.D. (2003) Cycas and allied cycadophytes, B.S.I.P., Publication.
7. Sporne, K.R. (1975) The Morphology of Pteridophytes, Hutchinson, London.
8. Sporne, K.R. (1965) Morphology of Gymnosperms, Hutchinson, London.
9. Sporne, K.R. (1974) Morphology of Angiosperms Hutchinson, London.
10. Seward, A.C. (1898) Fossil Plants Vol.-I-IV 1919
11. Stewart, W.N. (1983) Palaeobotany & Evolution of Plants Cambridge University Press.
12. Scott D.N. (1923) Studies in Fossil Botany
13. Taylor, T.N. (1981) Introduction to Palaeobotany; a Fossil Plant Biology McGraw Hill, New York.
14. Wadia, D.N. Geology of India
15. Tappan, H. (1980) The Palaeobiology of Plant protist Freeman, Oxford.
16. Thomas B.A. Spicer, R.A. (1987) The Evolution & Palaeobiology of land Plants. Discordies Press, Fort land U.S.A.
17. Spicer, R.A & Thomas B.A. (1986) Systematic & Taxonomic approaches Association in Palaeobotany Systematic Special Volume - 31.
18. Arnold C.A. (1947) An Introduction to Palaeobotany.
19. Sarjeant, W.A.S. (1974) dinoflagellates. Fossil & living, Academic Press, London.
20. Chaloner, W.G. Mac Donald 1980 Plant Invade the land. Royal Scottish Museum, Edinberg.
21. Chandra, S. & Surange, K.R. 1979 Revision of sps. of Glossopteris, BSIP publication.
22. Brook, J. (1971) "Sporopollenin". Academic Press, London.
23. Bold, H.C. (1980) Morphology of Plants & Fungi. Harper & Raw, New York.
24. Chamberlain, C.J. 1935 Gymnosperms, Structure and Evolution University of .Chicago.
25. Erdtman G. Introduction to Pollen analysis.
26. Erdtman G. Pollen Morphology & Plant Taxonomy
27. Faegri, K. Vander Pijil. 1979 The Principles of Pollination Ecology, Pergamon Press, Oxford

28. Harris, T.M. 1961 The Yorkshire Jurassic Flora; I, Trustees of British Museum
29. Harris, T.M. 1964 The Yorkshire Jurassic Flora; II, Trustees of British Museum
30. Harris, T.M. 1969 The Yorkshire Jurassic Flora; III & IV, Trustees of British Museum
31. Nair, P.K.K. 1969 Essential of Palynology
32. Pianka, E.R. 1978 Evolutionary Ecology Hagers, New York.
33. Cronquist, A., 1968 Evolution and Classification of Flowering plants Houghton Mifflin, Boston.
34. Bierhorst, D.W. 1971 Morphology of Vascular Plants MacMillan, New York.
35. Stanley, R.G. & Linskens, H.F. 1974 Pollen Springer Verlag, New York.
36. Becks, C.B. 1976 Origin and Early Evolution of Angiosperms Columbia University Press.
37. Takhtajan, A.L. 1969 Flowering Plants, Origin & Dispersal. Edinberg, Oliver.
38. Takhtajan, A.L. 1954 Essays on Evolutionary Morphology of Plants Leningrad University, Leningrad.

Journals:

1. The Palaeobotanist : BSIP, Publication, Lucknow
2. Geophytology : The Palaeobotanical Society, Lucknow.
3. Palaeontographica : Stuttgart, Germany.
4. Review of Palaeobotany & Palynology : Elsevier, Publication.
5. Pollen et Spores : Elsevier, Publication.
6. Palaeobiology : Elsevier, Publication.
7. Botanical Review : Elsevier, Publication.

Laboratory Exercises :

1. Study of preservation types.
2. Techniques involved in study of different preservation.
 - i.) Maceration, ii) Ground sections, iii) Acetolysis etc.
3. Study of type specimens of plant fossil; with complete monograph, sketching, etc.
4. Study of Geological time scale.
5. Preparation of slides and study of cuticular characters.
6. Study of palynomorphs, typical of each age.
7. Plant life through the ages. Drawing of representative forms of geological periods.

8. Study of reconstruction of vegetation, floras.
9. Study of peat, lignite and coal samples.
10. Study of marine microfossils, especially of oil and natural gas implications.
 - i) Visit to fossil localities for collection.
 - ii) Visit to National Laboratories.
 - iii) Submission of practical record, micropreparations, collection of fossil specimens
 - iv) Field notebook, geological data.
 - iv) Visit to palaeobotanical museums.

Semester – III

ELECTIVE PRACTICAL-VI: PALAEOBOTANY (EVOLUTIONARY BOTANY)-I PRACTICAL SCHEDULE

Time: 6 hrs.	Max.marks 40
1. Study of fossil specimens	08 Marks
2. Application of technique for isolation.....	08 Marks
3. Identification of specimens & slides	10 Marks
4. Study of Geological time-scale	04 Marks
5. Identification of pre-angiosperm fossil forms with evolutionary Implications	05 Marks
6. Viva-voce	05 Marks

Semester – III

PAPER – XI: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS-I (Elective)

Unit-I	1.1: Means of reproduction in flowering plants, flower structure and development.
	1.2 : Anther structure : Biochemical and Ultrastructural aspects, structure and function of tapetum.
	1.3: Microsporogenesis : Cytoplasmic reorganization, pollen tetrad development and types, pollen wall morphogenesis, biochemical, physiological and genetic events involved in pollen development.
Unit-II :	2.1: Pollen morphology : pollen wall sculpturing, Ultra structure.
	2.2: Pollen apertural types, Techniques for morphological preparations: Acetolysis, NPC.
	2.3: Light and scanning electron microscopic studies of pollen.
Unit-III	3.1: Pollen: Physiological and biochemical aspects, viability, assessment of pollen viability.

3.2: Pollen germination *in-vivo* and *in-vitro*, pollen tube development and nuclear migration.

3.3: Pollen storage, pollen bank, cryopreservation .

Unit-IV:4.1: Pistil : Structure and function of stigma and style.

4.2: Types of stigma, stigma receptivity and its importance, biochemical aspects. Styler tissue.

4.3: Pollen adhesion and germination on stigma, molecular basis, pollen reorganization, Incompatibility and its significance.

Unit-V:5.1: Male sterility : genetic and cytoplasmic male sterility, male sterile lines.

5.2: Male sterility through recombinant DNA technology.

5.3: Sperm dimorphism and hybrid seed production.

Semester – III

PAPER – XII: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS-II (Elective)

Unit-I 1.1: Historic review of pollination studies.

1.2: Pollination : Pollination mechanism and syndromes, pre-pollination events: anther dehiscence and pollen release.

1.3: Biotic and abiotic pollination, agencies concerned in pollination, Floral attractants and rewards, floral biogeny, blossom types.

Unit-II 2.1: Fertilization : Pollen tube development through styler tissue, biochemical events, pollen tube entry in ovule,

2.2: Heterospermy, differential behavior of male gametes, discharge and movement of sperms.

2.3: Syngamy and triple fission, significance of double fertilization and triple fusion.

Unit-III:3.1: Structure and a types of ovule.

3.2: Megasprogenesis, structure and types of embryo sac.

3.3: Ultra structure of zygote, embryo development and classification, polyembryony.

Unit-IV :4.1: Structure, development and types of endosperm.

4.2: Ruminant endosperm, chemical composition of endosperm. Storage proteins.

4.3: Food reserve of endosperm and endosperm culture.

Unit-V 5.1: Anther/pollen culture, pollen embryo genesis, androgenic haploids, biochemical aspects.

5.2: Somatic embryogenesis, biochemical aspects of somatic embryo genesis.

5.3: Aeropalynology : Survey of air borne pollen analysis of aerospore.

5.4: Mellitopalynology : Pollen analysis of honey, role of apiary in crop production.

Suggested readings:

- 1) Pande, A.K. and M.R.Dhaka (2003). Advances in Plant Reproductive Biology. Vol.II Narendra Delhi.
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- 3) Malik, C.P. (1996). Advances in Pollen spore Research : Emerging Strategies. VolXXI Vedamse Book (P) Ltd. New Delhi.
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- 7) Raghavan, V. (2000). Developmental Biology of Flowering Plant. Springer-Verlag.
- 8) Batygina, T.B. (2002) Embryology of Flowering Plants : Terminology and Concepts. Science Publishers, INC (USA)
- 9) Cresti, M., Cai, G., Moscatelli, A. (1999). Fertilization in higher plants : Molecular and cytological Aspects. Springer-Verlag.
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- 12) Dafni, A., Herse, M., Pacini, E. (2000) Pollen and Pollination. Springer-Verlag Heidelberg.
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- 17) Yeo, P.F. (1993) Secondary Pollen Presentation : Form, Function and Evolution Springer-Verlag.
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- 19) Moore, P.D., Webb, J.A. and Collinson, M.E. (1991) Pollen Analysis. 2nd Ed. Blackwell Scientific Publications. Boston.
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- 21) Faegri, K. and Van der Pijl, L. (1979) The Principles of Pollination Ecology. Pergamon Press. Oxford.
- 22) Howell, S.H. (1998) Molecular Genetics of plants Development. Cambridge University Press, Cambridge.
- 23) Scot R.J., and Anthony D. Sted (1994) Molecular and Cellular Aspects of Plant Reproduction, Cambridge Uni. Press.
- 24) Shivanna, K.R. and Rangaswamy, N.S. (1992). Pollen Biology. A Laboratory manual.
- 25) Bhojwani, S.S. and Batnagar, S.P. (2000). The Embryology of Angiosperms (4th revised and enlarged edition). Vikas Publishing House, New Delhi.
- 26) Fahn, A. (1982) Plant Anatomy, (3rd edition). Pergamon Press, Oxford.
- 27) Fosket, D.E. (1994) Plant Growth and Development. A Molecular Approach. Academic Press, San Diego.
- 28) Leins, P., Tucker, S.C. and Endress, P.K. (1988). Aspects of Floral Development. J. Cramer, Germany.
- 29) Lyndon, R.F. (1990). Plant Development. The Cellular Basis. Unwin Hyman, London.
- 30) Murphy, T.M. and Thompson, W.F. (1988). Molecular Plant Development. Prentice Hall, New Jersey.
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- 39) Chailakyan, M.K. and Khrianin, V.N. (1989). Sexuality in plants and its Hormonal Regulation. Springer-Verlag, Berlin.
- 40) Meeuse, B.J.D. (1961). Story of Pollination. Renold Press Company, New York.
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- 42) Bajaj, Y.P.S. (Ed.) (1989). Plant Protoplast and Genetic Engineering-II. Springer-Verlag, Berlin.
- 43) Wilson, M.F. (1983). Plant Reproductive Ecology. John Wiley and Sons, New York.
- 44) Richards, A.J. (1978). Pollination of Flowers by Insects. Academic Press Inc. London.
- 45) Heslop Harrison, J. (1971) Pollen Development and Physiology. Butterworth and Co. London.
- 46) Barth, F.G. (1991). Insects and Flowers. The Biology of Partnership. Princeton Uni. Press.
- 47) Malik, C.P. (1992) Pollen Physiology and Biotechnology. Vedams e Book Pvt. Ltd., New Delhi.
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- 51) Lovett-Doust. Plant Reproductive Ecology : Patterns and strategies. Oxford University Press.
- 52) De Netancourt, D. (1977), Incompatibility in Angiosperms Springer Verlag, New York.
- 53) Shivanna, K.R. (2002), Pollen Biology and Biotechnology Oxford and IBH Publishing Co. Pvt. Ltd.
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- 55) Agashe S.N. (2005) Palynology and its Applications, Oxford and IBH Publ. Co. Pvt. Ltd. New Delhi.
- 56) Bhattacharya, K. S. Mujumdar & Bhattacharya (2006) : A Text Book of Palynology, New Central Book Agency, Kolkata.
- 57) Nair P.K.K. (1970) Pollen Morphology of Angiosperms, Scholar Publi, Lucknow.
- 58) Tilak, S.T. (1982) : Aerobiology, Vaijayanti Prakashan, Aurangabad.

Laboratory Exercises:

1. Estimation of pollen protein concentration.
2. Separation of amino acids by TLC from pollen.
3. Separation of fats and lipids from pollen grains.
4. Study the effect of mutagens on pollen germination.
5. Induction of polyploidy in pollen grain.
6. Isolation of DNA from pollen grains.
7. DNA estimation in Pollen grains.
8. Plant regeneration through anther/pollen culture.
9. Analysis of honey for pollen spectrum.
10. Study of in- vitro pollen germination using different culture media.
11. Studies on databases pertaining to plant reproduction/Pollination/ Pollen studies.
12. Preparation of Power Point Programme on any aspect of plant reproduction.
13. Studies on e-Journals access
14. Visit to Institutes with electron microscope facilities.
15. Study of pollen wall development by preparation of anther sections.
16. Examination of reproductive mode and means.
17. Pollination experiments to demonstrate self and cross-pollination.
18. Field study on different pollination mechanism.
19. Estimation of pollen load carried out by bees / pollinator.
20. Field observations on pollinator visit, diversity and behaviour.
21. Estimation of pollen production and viability and its statistical analysis.
22. Study of in- vivo and in- vitro pollen germination.
23. Pollen preparation by acetolysis method and NPC examinations.
24. SEM studies and visits to Research laboratory having SEM facilities.
25. Observations on types of stigma and its structure.
26. Study of ovules from permanent preparations.
27. The study of microsporogenesis by section cutting.
28. Air monitoring by air sampler to assess pollen aerospora.
29. Chemical nature of allergenic pollen and test for allergy.
30. Regeneration of androgenic haploids.
31. Protoplast isolation
32. Histochemical analysis of pollen tube.
33. Estimation of pollen / ovule ratio in self and cross pollinated plants.
34. Study of protein profile in pollen / pollen tube by Gel - Electrophoresis.
35. Effect of Biochemical inhibitors on pollen tube growth.

36. Estimation of pollen tube length by computer loaded measurement softwares (Sigmascan by Jandel Scientific, Electronic digital pad).

Semester –III**PRACTICAL VI: REPRODUCTIVE BIOLOGY OF ANGIOSPERMS
PRACTICAL SCHEDULE**

Time : 6 hrs.	Max. marks. 40
Q.1 : Perform the major experiment on pollen preparation for morphological studies	08 Marks
Q.2 : Perform the minor experiment on pollen physiology	08 Marks
Q.3 : Perform the minor experiment on pollen release/ Production/ monitoring	05 Marks
Q.4 : Comment on the experiment based on anther/pollen culture..	04 Marks
Q.5 : Spotting (Pollen morphology slide, floral reward, blossom type, pollinator, ovule types)	10 Marks
Q.6 : Viva-Voce	05 Marks

Semester III**PAPER XI: APPLIED MYCOLOGY-I (Elective)****Unit - I: Fungal Symbiosis**

- 1.1: Mycorrhizae Ectotrophic, endotrophic and Ectendotrophic mycorrhizae.
- 1.2: Morphology and structure of Arbuscular mycorrhizal fungi.
- 1.3: Phosphorus uptake of AM fungi.
- 1.4: Role and importance of AM fungi in agriculture.
- 1.5: Rhizosphere and phyllosphere General account and importance of rhizosphere and phyllosphere mycoflora.

Unit II: Medical mycology

- 2.1 : General account of dermatophytic fungi.
- 2.2 : Human diseases caused by dermatophytes viz. *Tinea pedis*, *Tinea capitis*, *Tinea barbae*, *Tinea corporis* and *Tinea manum*.
- 2.3: Birds and Animal dermatophytic fungi and the diseases caused by them.

Unit-III: Industrial mycology

- 3.1: Antibiotics - Penicillium, Cephalosporin & Griseofulvin.
- 3.2 : Industrial production of Penicillin.
- 3.3 : Organic acids - Citric acid, Gluconic acid, Lactic acid.

Unit -IV: Industrial and Nonindustrial fungal metabolites

- 4.1: Enzymes - Amylases, Proteases, Lipases, Pectinases, Cellulases.

- 4.2: Phytoalexins : General account, types and importance.
 4.3: Mycotoxins _ General account, types and importance.
 4.4: Aflatoxins - General account, types & Importance.

Unit V: Fungi in Human Welfare

- 5.1: Role of microorganisms in Biodegradation of organic wastes.
 5.2: Biodeterioration of noncellulosic and cellulosic materials.
 5.3: Fungi in medicine-Mycoproteins & Food processing-Fungus fermented foods, fungi in cheese production.
 5.4: Edible mushrooms and their cultivation practices.

Semester III

PAPER XII: PLANT PATHOLOGY-II (Elective)

Unit - I: Principles and Mechanism of Plant diseases.

- 1.1 :History, Classification and importance of plant pathology.
 1.2 :Host parasite relationship, interaction and mechanism of infection.
 1.3: Defence mechanism in plants - Biochemical defence mechanism of phenolic compounds, enzymes and toxins.
 1.4: Koch's Postulate - Principles and method.

Unit - II: Disease management and Forecasting.

- 2.1: Chemical and Biological management of Plant disease control.
 2.2: Integrated Pest management (IPM)
 2.3: The Forms of epidemic conditions for decline of epidemics.
 2.4: Methods used in disease Forecasting.
 2.5: Forest Pathology and its impact (General account)

Unit-III: Fungal diseases of cereals and oil seed crops.

- 3.1: Diseases of cereals - Rust and smuts of wheat, Blast and blight of rice, smuts and leaf spot of Jowar. Ergot, Green ear and downy mildew of Bajra.
 3.2: Important diseases of oil seed crops -Soyabean, Groundnut, Sunflower, Safflower and Mustard.
 3.3 General knowledge and importance of seed pathology.

Unit - IV: Important fungal diseases of vegetables & Fruits.

- 4.1: Diseases of vegetables - Brinjal, Tomato, Potato, Chilli, Bhindi, Cabbage and cucurbits.
 4.2: Diseases of Fruit crops - Citrus, Papaya, Banana, Mango and grapes.
 4.3: General account of post harvest diseases of vegetables and fruits and its control.

Unit -V: Bacterial and Viral diseases.

- 5.1: Bacterial diseases, Blight of rice, Tundu disease of wheat, Angular leaf spot of cotton, soft rot of fruits and vegetables.
 5.2: Viral diseases - Mosaic and leaf curl of Papaya, Yellow vein mosaic of Bhindi, Viral diseases of Tomato and Potato.
 5.3: Phytoplasmal diseases - little leaf of Brinjal, Grassy shoot of sugarcane, & Sesamum Phyllody.

Suggested readings:

- 1) Agrios, G.N. (1980) Plant Pathology, academic Press, INC, New York.
- 2) Ainsworth, G.C. and A.S.Sussman (eds). The Fungi, An advance Treatise Vol.I, II, III & IV Academic Press, New York.
- 3) Alexopoulos, C.J. (1962). Introductory Mycology John Wiley Eastern Pvt.Ltd.
- 4) Alexopoulos, C.J. and Mims C.W. (1979). Introductory Mycology 3rd Edition, John Wiley and Sons, Inc. Wiley, New York.
- 5) Alexopoulos, C.J., Mims and Black well (1996) 4th ed. John Wiley and Sons, Inc. Wiley, New York.
- 6) Aneja, K.R. (1993) Experimental in Microbiology, Plant Pathology & Tissue Culture, Wiswa Prakashan, New Delhi.
- 7) Bessey, E.A. (1950) Morphology and Taxonomy of Fungi. The Blakiston co. Philadelphia.
- 8) Bharat Rai, D.K.Arora, N.K.Dube and P.D.Sharma (1994) : Fungal Ecology and Biotechnology, Rastogi Publication.
- 9) Bilgrami, K.S. and H.C.Dube (1985) A text Book of Modern Plant Pathology, Vikas Publication House, New Delhi.
- 10) Balkhande L.D. & L.V. Gangawane (2000) Production of auxins Phyllosphere mycoflora and wheat plant resource development, Saraswati Prakashan Aurangabad, P.160-165.
- 11) Barnett, J.H. (1968) Fundamentals of Mycology. The English Language Book Society and Edward Arnold Publication, Limited.
- 12) Butler E.J. and S.J.Jones (1949) Plant Pathology, Macmillan & Co. New York.
- 13) Buckyng Pugh G.J.F. (1971) Auxin productions by phyllosphere fungi Nature Vol. 231 P.332.
- 14) Dickenson and Preece Mycology of aerial plant surfaces, Academic Press, New York,
- 15) Dube, R.C. and D.K.Maheshwari (1999) A.Text Book of microbiology, S.Chand & Co. Ltd.
- 16) Dube, R.C. and D.K.Maheshwari (2000) Practical Microbiology - S.Chand & Co. Ltd.

- 17) Gruen, H.E. (1959) The production of IAA by *Phycomyces blakesleanus* Mycol.57 683-694.
- 18) Gupta, V.K. and M.K.Behl (1994) Indian Plant Viruses and Mycoplasma Kalyani Publishers, 1/1, Rejinder Nagar, Ludhiana.
- 19) Jha, D.K. (1993) A Text Book of Seed Pathology, Vikas Publication House.
- 20) Manibhushan Rao, K. and A.Mahadevan - Recent Development in biocontrol of plant pathogenes. Today and Tomorrow publishers, New Delhi.
- 21) Mehrotra, R.S. and Aneja, K.R. (1990) An Introduction to Mycology, Willey Eastern Private Limited.
- 22) Mehrotra, R.S. (1989) Plant Pathology, Tata McGraw Hill.
- 23) Mehrotra, R.S. and K.R.Aneja (1998) An Introduction to Mycology, New Age Intermediate Press.
- 24) Mukadam, D.S. (1997) The Illustrated Kingdom of fungi, Akshar Ganga Prakashan, Aurangabad.
- 25) Mukadam, D.S. and L.V.Gangawane (1978) Experimental Plant Pathology (edited) Marathwada University Aurangabad.
- 26) Pande, P.B. (1997) Plant Pathology, S.Chand & Co. New Delhi.
- 27) Pelzer, M.J., Jr.Cahn, E.C.S. and N.R.Krieg (1993) Microbiology, Tata McGraw Hill.
- 28) Preece and Dickeson. Ecology of leaf surface microorganism Academic Press, New York.
- 29) Rangaswamy, G. and A.Mahadevan (1999) Diseases of Crop Plant in India, Prentice Hall of India.
- 30) Raychoudhari, S.P. and Nariani, T.K. (1977) Virus and Mycoplasma Diseases of Plant in India, Oxford and IBH Publication Co.
- 31) Reddy, S.M. *et al* (1997) Microbial Biotechnology, Scientific publishers, Jodhpur.
- 32) Schlegel, H.G (1996) General Microbiology, 7th Edition, Cambridge University Press.
- 33) Snowdon, A.L. (1991) A colour Atlas of Post harvest diseases & disorders of fruits & vegetables Vol.I & II Wolfe Scientific, London.
- 34) Sing, R.S. (1994) Plant Pathology, Oxford and IBH Publication Co. New Delhi.
- 35) Sunder Rajan, S. (2001) Tools and Techniques of Microbiology, Anmol Publ.New Delhi.
- 36) Thind, T.S. (1998) Diseases of field crops and their management, National Agricultural Technology, Information Centre, Ludhiana.
- 37) Vaidya, J.G. (1995) Biology of the fungi, Satyajeet Prakashan, Pune.
- 38) Walker, J.G. (1952) Diseases of Vegetables Crops. McGraw Hill, New York.

- 39) Walker, J.C. (1968) Plant Pathology, McGraw Hill, New York.
- 40) Geeta Sumbali (1998) and B.M. Johari, Narosa Publishing House, New Delhi
- 41) Eggins, H.O.W. and Allsop (1975) The Filamentous Fungi Vol. I Industrial Mycology (Biodeterioration and Biodegradation by Fungi) Eds. J.E. Smith and D.R. Berry Edward Arnold, London.
- 42) D.J. Bagyaraj (1992) Vesicular Arbuscular Mycorrhiza application in Agriculture.
- 43) Emmons, C. W., C. H. Bin ford, J.P. Utz and Know Chung (1977) Medical Mycology, Lea and Febigo, Philadelphia.
- 44) Holliday, P. Fungus disease of tropical plants (1980), Cambridge University Press, Cambridge.
- 45) Booth C. (1972) Fusarium (lab guide to identification of major species C.M.I. Kew, Surrey, England
- 46) Spencer D. M. (1972) The Powdery Mildew, Academic Press, London
- 47) Rose, A.H. (1981) Economic Microbiology Microbial biodeterioration Vol.6, Academic press, London and New York.
- 48) Dikison, C.H. and G.J.F. Pugh (1974) Biology of Plant Litter decomposition. Academic Press, London.
- 49) A.C. Gaur (1999) Microbial Technology for composition of Agricultural residues by improved methods, I.C.A.R., New Delhi.

Laboratory Exercises:

1. Principles & working of tools, equipments and other requirements in the Mycology & Plant Pathology laboratory.
2. Micrometry and measurement of organisms.
3. Sterilization Processes viz. moist heat, dry heat, chemical and radiation.
4. Drawing of Camera Lucida diagrams and knowledge of computer-based photomicrography and image processing.
5. Preparation of different cultural media for cultivation of Fungi and Bacteria.
6. Monitoring and analysis of Aeromycoflora.
7. Isolation & identification of Phyllosphere mycoflora.
8. Demonstration of dermatophytic Fungi.
9. Isolation of AM Fungi from rhizosphere 500%.
10. Demonstrate antifungal activities of different antibiotics and leaf, flower and root extract.
11. Study of hydrolytic enzymes of different fungi.
12. Study of toxicity of fungi in relation to seed germination, and seedling abnormality.

13. Cultivation of Mushroom.
14. Demonstration on biodegradation of organic waste.
15. Visit to Mushroom industry, Pharmaceutical industries & Pathological study center.
16. Isolation of Soil fungi by soil plate (War cup) and serial dilution (Walkman) method.
17. Isolation and identification of Rizosphere mycoflora.
18. Isolation of external and internal seed borne mycoflora by blotter and Agar Plate method. Cereals, pulses, oil seeds, fruit seeds.
19. Monographic study of locally available plant diseases caused by fungi (atleast 10).
20. Study of locally available crop plant diseases caused by Bacteria (Five)
21. Study of locally available plant diseases caused by viruses & Phytoplasma (Five)
22. Demonstration of morphological & physiological changes in disease plants.
23. Demonstration of Koch's Postulate.
24. Preparation and presentation of herbarium of pathological specimens available in the region (Atleast 30)
25. Preparation of Fungal spore atlas.
26. Field visit to different localities
27. Visit to Agriculture University, Plant Pathological research centers

Semester – III

ELECTIVE PRACTICAL-VI: APPLIED MYCOLOGY AND PLANT PATHOLOGY

PRACTICAL SCHEDULED

- Time: 06 hrs. Maximum Marks: 40
- Q.1) Identify and describe any two fungal plant diseases.....
08 Marks
- Q.2) Identify and give salient features of two fungi from the mix culture.
08 Marks
- Q.3) Identify, classify and describe any two fungi. from given seed borne mycoflora/soil mycoflora/Rhizosphere mycoflora.....
05 Marks
- Q.4) Demonstrate Koch's postulate/pure culture technique.....
04 Marks
- Q.5) Spotting (Specimen/Slide)
(01 - bacterial disease; 01-viral diseases, 01- Phytoplasmal disease; 01-Fungal disease, 01- Spore slide).....10 Marks
- Q.6) Viva-Voce
05 Marks

M.Sc. PART-II BOTANY

Semester – IV

PAPER - XIII: PLANT ECOLOGY

Unit I : Basic concepts and scope.

- 1.1 Concept, Classification and scope of ecology; Holocoenotic Environment.
- 1.2 Ecological factors: Climatic, Edaphic, Biotic; Law of limiting factors.
- 1.3 El -Nino and global warming.
- 1.4 Ozone layer, Ozone Depletion and its consequences.

Unit II: Population and Community Dynamics

- 2.1 Population characteristics; population dynamics, carrying capacity, various parameters and measurements.
- 2.2 Community concept; characteristic features of communities, analysis of communities (analytical and synthetic characters.)
- 2.3 Community coefficients; Ecotone and edge effects; ecological niche.

Unit III: Vegetation Development

- 3.1 Types and mechanism of ecological succession.
- 3.2 Plant Formation; Association, Consociation and Society.
- 3.3 Evolution of Ecosystem and oxygenic development.

Unit IV: Ecosystem Organization.

- 4.1 Structure and Functions of Ecosystem.
- 4.2 Abiotic and biotic components; decomposers role in ecosystem.
- 4.3 Primary productivity (methods of measurements, global pattern and controlling factors)
- 4.4 Energy Dynamics; Energy flow in Ecosystem, Trophic organization, ecological efficiencies; Ecomodelling.

Unit V: Ecosystem Functional aspects.

- 5.1 Biogeochemical cycles C, N, P, S; mineral cycles (Pathways, processes and budgets)
- 5.2 Ecosystem stability concepts, natural and anthropogenic disturbances.
- 5.3 Major Biomes of the world.
- 5.4 Terrestrial Biodiversity; Vegetation types of world and India, hot spots.

Suggested readings:

- 1) Krebs, C.J. 1989. Ecological Methodology. Harper and Raw, New York, USA.

- 2) Ludwig, J.A. and Reynolds, J.F. 1988. Statistical Ecology, Wiley, New York.
- 3) Magurran, A.E. 1988. Ecological Diversity and Its Measurement, Chapman and Hall, London.
- 4) Pielou, E.C. 1984. The Interpretation of Ecological Data, Wiley, New York.
- 5) Sokal, R.R. and Rohit, F.J. 1995. Biometry, W.H. Freeman & Co. San Francisco.
- 6) Murray P.W. and Chapman, S.B. 1986. Methods in Plant Ecology, Blackwell Scientific Publication.
- 7) Misra, R. 1968. Ecology Work Book, Oxford and IBH New Delhi.
- 8) APHA - Standard Methods for Examination of Water and Waste Water, American Public Health Association, Washington, D.C.
- 9) Smith, R.L. 1996. Ecology and Field Biology. Harper Colins New York.
- 10) Mular - Dombuis, D. and Ellenberg, H. 1974. Aims and Methods of Vegetation Ecology, Wiley, New York.
- 11) Charis Park - Environment - Principles and applications, Routledge - London & New York.
- 12) Smith, R.L. 1996. Ecology and Field biology, Harper Collins, New York.
- 13) Begon, M., Harper, J.L. and Townsend, C.R. 1996. Ecology, Blackwell Science, Cambridge, U.S.A.
- 14) Odum, E.P. 1971. Fundamentals of Ecology. Saunders, Philadelphia.
- 15) Odum, E.P. 1983. Basic Ecology, Saunders, Philadelphia.
- 16) Barbour, M.G, Burk, J.H. and Pitts, W.D. 1987. Terrestrial Plant Ecology. Benjamin / cummings Publication Company, California.
- 17) Kormondy, E.J. 1996. Concepts of Ecology. Prentice Hall of India Pvt.Ltd., New Delhi.
- 18) Chapman, J.L. and Reiss, J.M.J., 1988. Ecology: Principles and Applications. Cambridge University Press. Cambridge, U.K.
- 19) Moldan, B. and Billharz, S. 1997. Sustainability indicators. John Wiley & Sons, New York.
- 20) Treshow, M. 1985. Air Pollution and Plant Life. Wiley Interscience.
- 21) Heywood, V.H. and Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press.
- 22) Brady, N.C. 1990. The Nature and Properties of Soils, MacMillan.
- 23) Chandel, K.P.S., Shukla, G. and Sharma, N. 1996 - Biodiversity in Medicinal and Aromatic Plants in India : Conservation and Utilization. National Bureau of Plant Genetic Resources, New Delhi.

- 24) Walter, K.S. and Gillett H.J., 1998. 1997 IUCN Redlist of Threatened Plants. IUCN, The World Conservation Union, IUCN, Gland, Switzerland and Cambridge, UK.
- 25) Eldon, D. Enger and Bradley F. Smith (1995) Environmental sciences WBC Publishers, Boston.
- 26) K.C. Agrawal; (1993); Environmental Biology, Agro-botanical publishers, Bikaner.
- 27) P.S. Varma and V.K. Agrawal (1995) Environmental Ecology, WBC publishers, Boston

Laboratory exercises:

- 1) To measure rainfall.
- 2) To measure transparency of water.
- 3) To study the light intensity by lux meter.
- 4) To determine pH of water & soil.
- 5) To measure the total dissolved solids in water.
- 6) To evaluate the soil texture.
- 7) To determine the bulk density or apparent density (or value weight) and porosity (or pore space) of soil.
- 8) To determine water holding capacity of soil by rapid spot tests.
- 9) To analyze the chemical properties of soil by rapid spot tests.
- 10) To estimate exchangeable bases (Na, K, Ca) in soil.
- 11) To determine organic matter in soil by Walkley & Black's rapid titration method.
- 12) To assess the trophic status of aquatic habitat through algal count method.
- 13) To study bioindicators of polluted water.
- 14) To study the morphological, anatomical adaptations in Hydrophytes, Xerophytes, Halophytes, Epiphytes.
- 15) To determine the importance value Index (IVI) of grassland species.
- 16) To prove the Biological spectrum of vegetation under study using Raunkia's life forms classification.
- 17) To study indices of similarity & dissimilarity in a community.
- 18) To determine P, S, K, Ca, Na in plants by chemical methods.
- 19) Study of freshwater plant communities.
- 20) Survey of key stone species.
- 21) Determination of minimum size of quadrat by species curve method.
- 22) Determination of minimum number of quadrat by curve methods.
- 23) Determination of quantitative characters of plant community by Random sampling method (Abundance, Density, frequency, basal cover, canopy cover etc) and determination of quantitative characters by belt transect, line transect method and study of biological spectrum.

- 24) Field Survey-** A survey of a part of the town or city should be carried out by the entire class in batches. Individual students will select one avenue / road and locate the tree planted on a graph paper. They will identify the trees, mention their size, canopy shape, blossoming and fruiting period and their status (healthy, diseased, infected, mutilated, misused or dyeing) and report whether or not the conditions in which they are surviving are satisfactory. The individual reports will be combined to prepare a large map of the area, which can be used for subsequent monitoring either by the next batch of students / teachers / local communities / NGO's / or civic authorities.
- 25) The purpose is to make the students aware of the kinds of trees and value in urban ecosystem and ecological services.
 - 26) To prepare ombrothermic diagram for different sites on the basis of given data set and to comment on climate.
 - 27) To find out the relationship between two ecological variables using correlation and regression analysis.
 - 28) To determine minimum size and number of quadrats required for reliable estimate of biomass in grasslands.
 - 29) To find out association between grassland species using Chi-square test.
 - 30) To compare protected and unprotected grassland stands using community coefficient (similarity indices).
 - 31) To analyze plant community using Bra-Curtis ordination method.
 - 32) To determine diversity indices (Shannon, Wiever, concentration of dominance, species richness, equitability and B-diversity) for protected and unprotected grassland stands.
 - 33) To estimate IVI of the species in woodland using a point centered quarter method.
 - 34) To determine grass and net phytoplankton productivity by light and dark bottle method.
 - 35) To determine soil moisture content, porosity and bulk density of soils collected from varying depths at different locations.
 - 36) To determine the water holding capacity of soils collected from different locations.
 - 37) To determine present organic carbon and organic matter in the soil of cropland, grassland and forest.
 - 38) To estimate the dissolved oxygen contained in eutrophic and oligotrophic water samples by azide modification of Winkler's method.
 - 39) To estimate chlorophyll content in SO₂, fumigated and unfumigated plant leaves.

- 40) To estimate rate of carbon dioxide-evolution from different soils using soda lime or alkali absorption method.
- 41) To study environmental impact of a given developmental activity using checklist as a EIA method.
- 42) Visit to different forest areas to study ecosystem, bio diversity and biocomplexity. Visit to Molecular Biology laboratories.

Semester – IV

PAPER –XIV: ENVIRONMENTAL ECOLOGY

Unit I: Basic Concepts

- 1.1 Concept of Environment and its Scope; Lithosphere, Hydrosphere, Biosphere.
- 1.2 Energy resources; (i) Renewable and non-renewable (ii) Forest types in India and Maharashtra.
- 1.3 Environmental impact assessment.
- 1.4 Green House gases; their sources, trend and role.
- 1.5 Consequences of climate change.

Unit II: Environmental pollution

- 2.1 Definition types and sources.
- 2.3 Air pollution; Natural and man made sources of air pollution, primary and secondary pollutants, toxicity and its impact on environment.
- 2.4 Soil Pollution: courses of soil pollution, impacts of soil pollution on quality and soil biota.
- 2.5 Effect of solid waste disposal on soil.

Unit III: Water Pollution.

- 3.1 Distribution of water and water scarcity.
- 3.2 Major water pollutants
- 3.3 Sources of water pollution
- 3.4 Consequences of water pollution
- 3.5 Water pollution indicators.
- 3.6 Bioaccumulation and Biomagnifications of toxic elements in food chain.

Unit IV: Conservation strategies

- 4.1 Principles of conservation; extinction, environmental status of plants based on IUCN.
- 4.2 Strategies for conservation, International efforts and Indian initiation.
- 4.3 Wetlands, Mangrove and coral reefs with respect to conservation of biodiversity.
- 4.4 Disaster management.

Unit V: Sustainable Management.

- 5.1 Concept of sustainable development.
 5.2 Impact of urbanization; Wasteland development.
 5.3 General account of legislative measures for sustainable development and management
 (i) Water Act, Prevention and control 1976. (ii) Environmental Protection Act, 1985
 (iii) Wildlife Protection Act, 1972; WWF.

SUGGESTED READINGS:

1. Eldon D. Enger and Bradley F Smith (1995), Environmental Sciences, WBC publishers Boston.
2. Daniel Botkin and Edward Keller (1997), Environmental Sciences, John Wiley & Sons, New York.
3. R.K. Dixit, (1997), Environment, Forest Ecology and Man, Rastogi Publication.
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5. William P. Cunningham and Masy Ann Cunningham, Principle of Environmental Science. Inquistry and applications, Tata McGraw Hill Pub. Co.Ltd., New Delhi.
6. Charis Park - Environment - Principles and applications, Roulledge - London & New York.
7. Smith, R.L. 1996. Ecology and Field biology, Harper Collins, New York.
8. Muller-Dombois, D., and Ellenberg, H. 1974. Aims and Methods of Vegetation Ecology, Wiley, New York.
9. Begon, M., Harper, J.L. and Townsend, C.R. 1996. Ecology, Blackwell Science, Cambridge, U.S.A.
10. Ludwig, J. and Reynolds, J.F. 198. Statistical Ecology, John Wiley & Sons.
11. Odum, E.P. 1971. Fundamentals of Ecology. Saunders, Philadelphia.
12. Odum, E.P. 1983. Basic Ecology, Saunders, Philadelphia.
13. Barbour, M.G, Burk, J.H. and Pitts, W.D. 1987. Terrestrial Plant Ecology. Benjamin / cummings Publication Company, California.
14. Karmondy, E.J. 1996. Concepts of Ecology. Prentice Hall of India Pvt.Ltd., New Delhi.
15. Chapman, J.L. and Reiss, J.M.J., 1988. Ecology: Principles and Applications. Cambridge University Press. Cambridge, U.K.
16. Moldan, B. and Billharz, S. 1997. Sustainability indicators. John Wiley & Sons, New York.
17. Treshow, M. 1985. Air Pollution and Plant Life. Wiley Interscience.
18. Mason, C.F. 1991. Biology of Freshwater Pollution, Longman.

19. Hill, M.K. 1997. Understanding Environmental Pollution. Cambridge University Press.
20. Brady, N.C. 1990. The Nature and Properties of Soils, MacMillan

Laboratory Exercises:

1. Study of rain gauge and measurement of rainfall
2. To study hygrometer and measurement of relative humidity.
3. Measurement of minimum and maximum temperature.
4. Measurement of Soil temp by dry wet bulb method.
5. To study pH meter and estimation of pH of water and soil.
6. To determine soil moisture content.
7. Study of Phytoplankton from pond water.
8. Study of Zooplankton from pond/river.
9. Study of biomass from grassland ecosystem.
10. Study of species dominance by Quadrat method.
11. Study of plant biodiversity on Hill slopes by line transect method.
12. To study the pH of rainwater during pre monsoon and monsoon season.
13. To determine interaction between grassland species by chi-square test.
14. Comparative study of plant diversity indices.
15. Study of mean, variance, standard deviation, standard error, coefficient of variation and t-test for ecological data.

Semester – IV

PAPER – XV : PLANT BIOTECHNOLOGY

Unit- I : **Biotechnology: Basic concepts, Principle and scope.**

- 1.1 Cellular differentiation and totipotency
- 1.2 Plant Cell and tissue culture, Cell Clones, Callus culture.
- 1.4 Organogenesis and adventitive embryogenesis: Fundamental aspects of morphogenesis, Somatic embryogenesis and its applications.
- 1.4 Androgenesis: Mechanism, techniques and applications.

Unit-II : **Somatic Hybridization:**

- 2.1 Protoplast isolation, Protoplast fusion and protoplast culture limitation , achievement in protoplast research.
- 2.2 Cybrids and Hybrids, Selection of hybrids and regeneration, Somaclones.
- 2.3 Clonal propagation: Techniques and significance of artificial seeds.
- 2.4 Secondary metabolites: Production in tissue/s, enhancing the secondary metabolites by use of elicitors, hairy root cultures and types of elicitors (biotic and abiotic elicitors) .

2.5 Cryopreservation : Germplasm storage, methods, merits and demerits.

Unit-III: Plant transformation technology.

3.1 Mechanism of DNA transfers, role of virulence genes, use of Ti and Ri plasmid as binary vectors, features of Ti and Ri plasmid.

3.2 Vector less DNA transfer - Particle Bombardment, Electroporation, and microinjection.

3.3 Genetically modified organisms in the Environment

Unit-IV: Environmental Biotechnology

4.1 Heavy metals environmental modification, Bioleaching and Microbial leaching.

4.2 Bioremediation- General idea of Xenobiotics, Biodegradation of Xenobiotics and applications.

4.3 Phytoremediation: Needs, Metal and organic phytoremediation.

Unit-V: Applications

5.1. Microbial genetic manipulation.

5.2 Importance and application of microbes in Biotechnology

5.3 Vermicomposting

Suggested Readings:

1. Bhojwani, S.S. and Razdan, M.K. 1996. Plant Tissue Culture: Theory and Practice (a revised edition). Elsevier Science Publishers, New York, USA.
2. Bhojwani, S.S. 1990. Plant Tissue Culture: Applications and Limitations. Elsevier Science Publishers, New York, U.S.A.
3. Collins, H.A. and Edwards, S., 1998. Plant Cell Culture. Bios Scientific Publishers, Oxford, UK.
4. Jain, S.M., Sopory, S.K. and Veilleux, R.E. 1996. *In Vitro* Haploid Production in Higher Plants, Vols. 1-, Fundamental Aspects and Methods. Kluwer Academic Publishers, Dordrecht, The Netherlands.
5. Kartha, K.K. 1985. Cryopreservation of Plant Cells and Organs. CRC Press, Boca Raton, Florida, USA.
6. Old, R.W. and Primrose, S.B. 1989. Principles of Gene Manipulation. Blackwell Scientific Publications, Oxford, U.K.
7. Primrose, S.B. 1995. Principles of Genome Analysis. Blackwell Science Ltd., Oxford, UK.
8. Raghavan, V. 1986. Embryogenesis in Angiosperms: A Developmental and Experimental Study. Cambridge University Press, New York. USA.

9. Raghavan, V. 1997. Molecular Biology of Flowering Plants. Cambridge University Press. New York, USA.
10. Shantharam, S. and Montgomery, J.F. 1999. Biotechnology, Biosafety, and Biodiversity. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
11. Vasil, I.K. and Thorpe, T.A. 1994. Plant Cell and Tissue Culture. Kluwer Academic Publishers. The Netherlands.
12. Butanco, R.G. 2000. Plant Cell Culture, University Press of Pacific.
13. Collin, H.A. and Edward S., 1998. Plant Cell Culture. Bios-Scientific Publishers, Oxford, UK.
14. Dixon, R.A. (Ed.) 1987. Plant Cell Culture: A Practical approach. IRL Press, Oxford.
15. George, E.F. 1993. Plant Propagation by Tissue Culture. Part-I. The Technology, 2nd Edition, Exegetics Ltd., Edington, UK.
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25. Glick, B.R. and Thompson, J.E. 1993. Methods in Plant Molecular Biology and Plant Biotechnology. CRC Press, Boca Raton, Florida.
26. Glover, D.M. and Hames, B.D. (Eds) 1995. DNA
27. Cloning 1: A Practical Approach; Core techniques, 2nd Edition, PAS, IRL Press at Oxford University Press, Oxford.
28. Hackett, P.B., Fuchs, J.A. and Messing, J.W. 1988. An Introduction to recombinant DNA Techniques. Basic Experiment in gene manipulation. The Benjamin / Cummings Publishing Company. Inc Menio Park, California.
29. Hall, R.D. (Ed) 1999. Plant Cell Culture Protocols. Humana Press, Inc. New Jersey, U.S.A.

30. Shaw, C.H. (Ed.) 1998. Plant Molecular Biology: A Practical Approach. IRL Press, Oxford.
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32. Friberg L. 1974 Cadmium in the Environment CRC press, Cleveland, Ohio.
33. Nriagu, J.O. Nickel in the Environment ,John Wiley and Sons , New York.
34. Piver, W.T. 1983 Mobilization of Arsenic in the natural by industrial processes, in Biological and Environmental Effects of Arsenic, Vol.6 Fowler B.A., Elsevier Science Publisher, Amsterdam.
35. Anderson L. 1999 Genetic Engineering, Food and Environment , Bristol: J.W.Arrowsmith Ltd.

Laboratory Exercises:

1. Preparation of stock solution and culture media.
2. Sterilization techniques
3. Preparation of Aseptic plant
4. Measurement of callus growth (fresh and dry)
5. Organogenesis via callus formation in any plant species.
6. Establishment and proliferation of axillary bud from different plant materials.
7. Isolation of protoplasts from various plant tissues.
8. Effect of physical (e.g. temperature) and chemical (e.g. osmoticum) factors on protoplast yield.
9. Demonstration of protoplast fusion employing PEG.
10. To check protoplast viability using Evan's Blue dye, Fluorescent diacetate and phenosafranin
11. Isolation of protoplast from fungi.
12. Organogenesis and somatic embryogenesis using appropriate explants and preparation of artificial seed.
13. Demonstration of androgenesis in any plant species.
14. Electroporation of protoplasts and checking of transient expression of the reporter gene.
15. Co-cultivation of the plant material (e.g. leaf discs) with Agrobacterium and study GUS activity histochemically.
16. Embryogenesis in any plant material.
17. Preparation of artificial seeds.

Semester- IV

PAPER – XVI: GENETIC ENGINEERING

- Unit-I :** 1.1 Structure of Microbes: E.coli, Bacteriophage, Viruses
1.2 Genetic Recombination in Bacteria: Transduction,

Transformation and Conjugation.

- 1.3 Bacterial cultures and maintenance of Cell lines.
 - 1.4 Genetic improvement of industrial microbes and nitrogen fixers.
 - 1.5 Fermentation Technology.
- Unit-II :** 2.1 Methods of gene cloning; selection of markers, reporter genes, expression vectors.
2.2 Isolation of gene.
2.3 Construction of genomic/ cDNA libraries.
2.4 Factors affecting foreign gene expression.
2.5 DNA Synthesis and Automated. Sequencing; PCR
- Unit-III :** 3.1 Aims and strategies for transgenic development.
3.2 Agrobacterium mediated gene transfer.
3.3 T- transposon mediated gene tagging.
3.4 Chloroplast transformation.
3.5 Transgenic- ethical concerns and ecological risk.
- Unit-IV :** 4.1 Enzymes used in Recombinant Technology.
4.2 Types of vectors, their properties, choice of vectors.
4.3 Alien gene transfer: Whole genomic transfer eg. Wheat, Arachis, Brassica
4.4 Transfer of individual chromosome or chromosome segment.
- Unit-V :** 5.1 High throughput sequences and assembly.
5.2 Human Genome Project
5.3 Tools used in genetic Engineering, Blotting techniques, SSR's, VNTR's, STR's.
5.4 Gene Knockout Technologies.
5.5 Gene Therapy - Strategies, gene editing, silencing.

Suggested Reading:

1. Brown, T.A 1999. Genomes. John Wiley & Sons (Asia) Pvt.Ltd., Singapore.
2. Callow, J.A., Ford-Lloyd, B.V. and Newbury, H.J. 1997. Biotechnology and Plant Genetic Resources Conservation and Use. CAB International, Oxon, UK.
3. Chrispeels, M.J. and Sadava, D.E. 1994. Plants, Genes and Agriculture. Jones & Bartlett Publishers, Boston, USA.
4. Glazer, A.N. and Nikaido, H. 1995. Microbial Biotechnology. W.H.Freeman and Company, New York, USA.
5. Gustafson, J.P. 2000. Genomes. Kluwer Academic Plenum Publishers, New York, USA.

6. Henry, R.J. 1997. Practical Applications of Plant Molecular Biology. Chapman & Hall, London, UK.
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17. Shaw, C.H. (Ed.) 1998. Plant Molecular Biology: A Practical Approach. IRL Press, Oxford.

Laboratory Exercises:

1. Preparation of Bacterial Cultivation media
2. Bacterial cultivation and growth characteristics by streak and spread plate method
3. Isolation and estimation of Bacterial genomic DNA
4. Isolation and estimation of Onion DNA.
5. Isolation of Plasmid from E. coli strain DH5-a
6. Restriction enzyme digestion and analysis on Agarose Gel.
7. Isolation and estimation of Plant DNA.
8. Preparation of competent cells for transformation.
9. DNA ligation
10. RAPD Analysis.
11. Electro elution of DNA from Agarose Gels.
12. Test for antibiotics against bacteria.

13. Total proteins detection on Blotting Membranes.
14. Oligonucleotide purification from Metaphor R Agarose gel.
15. Alkaline Gel electrophoresis.
16. Purification of DNA for PCR amplification.
17. DNA fingerprinting of plant genomic DNA.
18. Transfer of Proteins from SDS PAGE to Nitrocellulose Membrane.
19. Detecting DNA with Acridine Orange or methylene Blue.
20. ELISA
21. Immunoassay
22. Antimicrobial sensitivity testing
23. PCR
24. Preparation of insert DNA

SEMESTER-IV

PRACTICAL- VII: PLANT ECOLOGY, ENVIRONMENTAL ECOLOGY, BIOTECHNOLOGY AND GENETIC ENGINEERING.

PRACTICAL SCHEDULE

Time : 8 hrs.	Marks 40
Q.1. Setting and working of any of major plant Ecology Expt.	— 08 Marks
Q.2. Setting and working of major Experiment on Biotechnology	— 08 Marks
Q.3. Working of major experiment on Environmental Ecology	— 07 Marks
Q.4. Major Experiment on Genetic Engineering	— 07 Marks
Q.5. Comment on one minor Experiment on genetic Engineering/ Biotechnology.	— 05 Marks
Q.6. Viva-Voce	— 05 Marks

Important note: -

One long and two short Botanical Excursions and visits to Scientific Laboratories /Institutions /Universities/Botanical Gardens/ Forests within and out of state are compulsory for students of M.Sc. Botany.

PARCTICAL-VIII:

Project to the students will be distributed at the beginning of third Semester with the consent of HOD and shall be examined during the period of practical examination in IV Semester

Project	40 marks
Int. Assessment	10 Marks

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संत गाडगे बाबा अमरावती विद्यापीठ

SANT GADGE BABA AMRAVATI UNIVERSITY

विज्ञान विद्याशाखा
(FACULTY OF SCIENCE)

अभ्यासक्रमिका

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(प्राणिशास्त्र)

PROSPECTUS

OF
MASTER OF SCIENCE IN
ZOOLOGY

Semester -I, Winter 2012
Semester-II, Summer-2013
Semester -III, Winter 2013
Semester-IV, Summer-2014



2012

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Paper- II	Animal Structure and Function (Chordata)
Paper- III	Gamete Biology
Paper- IV	Genes and Differentiation

8. M.Sc. I Semester II

Paper- V	Molecular Cell Biology
Paper- VI	Tools and Techniques in Biology
Paper- VII	Endocrinology
Paper- VIII	Ecology and Environment (Also GIC)

9. M.Sc. II Semester III

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Paper-XV	(Elective paper III) (Animal Physiology-III)
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Paper- XV	(Elective paper III) Fisheries-III Fish Harvest and Post Harvest Technology
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SANT GADGE BABA AMRAVATI UNIVERSITY

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Paper-I XII	(Elective paper II) Fisheries-II Fish Physiology

M.Sc.II Semester IV

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Paper- XIV	(Compulsory) Enzymology and Biostatistics
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Paper- XVI	(Elective paper IV) Fisheries-IV, Fish Reproductive physiology and pathology

Syllabus prescribed for M.Sc.I (Zoology).

Semester I

Paper I

ANIMAL STRUCTURE AND FUNCTION (NON-CHORDATA)

Unit I	:	1.1.	Definition and basic concepts of biosystematics taxonomy and classification, 1.1. 1.History of Classification, 1.1.2. Trends in biosystematics: Chemotaxonomy cytotaxonomy and molecular taxonomy,
		1.2.	Dimensions of speciation and taxonomic characters.
		1.3.	Species concepts: species category, different species concepts, subspecies and other infra-specific categories.
		1.4.	Parsimony method of classification, cladistic method of classification, difference in the application of phenetic and cladistic classification; phylogram and cladogram
Unit II	:	2.1.	Feeding and Digestion: 2.1.1 Nutrition in protozoa –
		2.2.	Types and mode of feeding. 2.2.1 Feeding diversity in insects, 2.2.2 Functional mechanism of Filter feeding in Crustacean and Mollusca-
		2.2.3	Feeding & digestion in Bryozoans and Echinodermata
		2.3.	Movements: 2.3.1 Micro morphology and mechanism of Movements of cilia and flagella 2.3.2 Hydrostatic evasive movements in Ctenophores and hydrostatic selection in annelids. 2.3.3 Insect flight mechanism.

- Unit III** : 3.1. Organs of respiration:
 3.1.1. Body surface,
 3.1.2. Gills,
 3.1.3. Book-lungs
 3.1.4. Tracheal system.
- 3.2. Respiratory pigments in invertebrates.
 3.2.1. Mechanisms of gill respiration in Mollusca
 3.2.2. Tracheal respiration in Arthropoda (Insecta).
- 3.3. Excretory organs and excretion:
 3.3.1. Excretion in Protozoa.
 3.3.2. Excretory structures and functions in Helminthes,
 3.3.3. Excretory structures and functions in Annelids
 3.3.4 Malpighian tubules structure and functions in Insects
- Unit IV** : **4.1.** General organization of Nervous system
 4.1.1. Coelenterata
 4.1.2. Annelida,
 4.1.3. Arthropoda (Crustaceans and Insects),
 4.1.4. Mollusca (Cephalopod)
- 4.1.5. Echinodermata.
- 4.2.** Sense organs:
 4.2.1 Chemical senses & animal orientations in Nonchordates
 4.2.2. Mechanoreceptor in Nonchordates,
 4.2.3 Chemoreception & chemotaxis in insects
 4.2.4 Photoreception and photosensitivity in non chordate forms,
 4.2.5 Functional Morphology of compound eye in Insects
- Unit V** : **5.1.** Reproductive mechanisms in Nonchordates.
 5.1.1. Asexual, Sexual. Parthenogenesis, Hermaphroditism,
- 5.2.** Functional variations of reproductive structures in non-chordate:
 5.2.1. Porifera, Coelenterate. And Echinodermata

- 5.3.** Invertebrate hormones of reproduction:
 5.3.1. Annelids,
 5.3.2. Mollusca,
 5.3.3. Arthropods
- 5.4. Larval forms in Porifera, Coelenterata, helminthes, Annelida, Crustaceans.
- 5.5. Metamorphosis and molting in insects & its hormonal control

M.Sc.I (Zoology) Semester - I

Paper II

ANIMAL STRUCTURE AND FUNCTION (CHORDATA)

- Unit I** : 1.1. Taxonomic Character- Different kinds.
 1.2. Origin of reproductive isolation,
 1.3. Biological mechanism of genetic incompatibility.
 1.4. Taxonomic procedures:
 1.4.1. Taxonomic collections preservation curation,
 1.4.2. Process of identification.
- 1.5. Taxonomic keys, different types of keys, their merits and demerits.
 1.6 International code of Zoological Nomenclature (ICZN):
 1.6.1. Operative principles, interpretation and application of important rules:
 1.7 Formation of Scientific names of various Taxa.
 1.8 Taxonomic categories
- Unit II** : 2.1. Vertebrate integument.
 2.1.1. General structure of mammalian skin.
 2.1.2. Derivatives of skin,
 2.1.3 Functions of skin.
- 2.2. Endoskeleton structures:
 2.2.1. Endoskeleton in Protochordata,
 2.2.2. Visceral skeleton in Fishes.
 2.2.3. Jaw suspensorium in vertebrates,
- 2.3. Structure of tooth and dentition in Mammalia
 2.4. Structural and functional organization of digestive system in Protochordata,

2.5. Structural and functional organization of Alimentary canal and digestive glands in vertebrates, with reference to Mammalian type.

- Unit III :**
- 3.1. Characteristics of Respiratory surface;
 - 3.2. Gills in fishes and mechanisms of gill respiration,
 - 3.3. Accessory respiration organs in fishes,
 - 3.4. Functional organization of Mammalian lungs,
 - 3.4.1. Exchange of gases.
 - 3.4.2. Aerodynamic of lungs,
 - 3.5. Larynx and Vocalization.
 - 3.6. Blood:
 - 3.6.1. Composition and functions,
 - 3.6.2. Haemopoiesis,
 - 3.7. Lymph and lymphatic system:
- Unit IV :**
- 4.1. Excretion:**
- 4.1.1 Excretory products,
 - 4.1.2 General nature of kidneys;
 - 4.1.3 Kidney structure in relation to Osmoregulation;
 - 4.1.4. Archinephros, Pronephros, Mesonephros,
- Metanephros:**
- 4.1.5. External salt excretion,
 - 4.1.6. Osmoregulation in freshwater and marine water fishes;
- 4.2. Functional organization of vertebrate nervous system:
- 4.2.1. Brain and spinal cord
- 4.3. Sense organs:
- 4.3.1. Organs of olfaction and taste.
 - 4.3.2. Organs of hearing and balance.
- Unit V :**
- 5.1. Echolocation;
 - 5.1.1. Morphological adaptation for echolocation
 - 5.1.2. Bat Echolocation
 - 5.2. Lateral line system in fishes.
 - 5.3. Electroreception.
 - 5.4. Flight adaptations in mammals
 - 5.5. Aquatic adaptations in mammals.
 - 5.6. Adaptive radiations in mammals
 - 5.7. Migration in birds, and fishes;

Suggested Reading Material For paper - I and Paper – II-
(All recent editions)

1. Hyman, L.H. The invertebrates. Vol. I. Protozoa through Ctenophora, McGraw Hill Co., New York.
2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson and Sons Ltd., London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
4. Hyman, L.H. The invertebrates. Vol.2. Mc Graw Hill Co., New York.
5. Hyman, L.H. The invertebrates Vol.8. McGraw Hill Co., N.Y. and London.
6. Barnes, R.D. Invertebrate Zoology, III edition. W.B. Saunders Co., Philadelphia.
7. Russel-Hunter, W.D. A biology of higher invertebrates, the Macmillan Co. Ltd., London.
8. Hyman, L.H. The invertebrates smaller coelomate groups, Vol. V. McGraw Hill Co., New York.
9. Read, C.P. Animal Parasitism. Prentice Hall Inc., New Jersey.
10. Sedgwick, A. A. Student text book of Zoology. Vol, I, II and III. Central Book Depot, Allahabad.
11. Parker, T.J. Haswell, W.A. Text Book of Zoology, Macmillan Co., London.
12. Borradaile, L.A. and F.A. Potts: The Invertebrates: Asia Publishing House, Bombay, London
13. Nigam: Biology of non-chordata, S. Nagin Chand.
14. Alexander, R.M. The Chordata. Cambridge University Press, London.
15. Barrington, E.J. W. The Biology of Hemichordata and Protochordata. Oliver and Boyd, Edinburgh.
16. Bourne, G.H. The structure and functions of nervous tissue Academic Press, New York.
17. Carter, G.S. Structure and habit in vertebrate evolution-Sedgwick and Jackson, London.
18. Eccles, J.C. The understanding of the brain. Mc Graw Hill co., New York and London.
19. Kingsley, J.S. Outlines of Comparative Anatomy of Vertebrates. Central Book Depot, Allahabad.
20. Kent, C.G. Comparative Anatomy of Vertebrates.
21. Malcom Jollie, Chordata morphology. East-West Press Pvt. Ltd. New Delhi.

22. Milton Hilderbrand. Analysis of vertebrate structure. IVEd. John Wiley and Sons Inc., New York.
23. Monielli, A.R. The chordates, Cambridge University Press, London.
24. Smith, H.S. Evolution of chordata structure. Hold rinehart and Winstoin Inc., New York.
25. Sedgwick, a.A. Students Text Book of Zoology, Vol.II.
26. Tansley, K. Vision in vertebrate. Chapman and Hall Ltd., London.
27. Torrey, T.W. Morphogenesis of vertebrates. John Wiley and Sons Inc., New York and London.
28. Walters, H.E. and Sayles, L.D. Biology of vertebrates. MacMillan & Co., New York.
29. Wolstenholnf, E.W. and Knight, J.(Ed). Taste and smell in vertebrates, J & A Churchill, London.
30. Romer, A.S., Vertebrate Body, IIIrd Ed. W.B.Saunders co., Philadelphia.
31. Young, J.Z. Life of vertebrates. The Oxford University Press, London.
32. Young, J.Z. Life of mammals, Oxford University Press, London.
33. Colbert, E.H. Evolution of the vertebrates, John Wiley and Sons Inc., New York.
34. Romer, A.S. Vertebrate Paleontology, 3rd Edn. University of Chicago Press, Chicago.
35. Clark, W.E. History of the Primates IV Edn. University of Chicago Press, Chicago.
36. Weichert, C.K. and Presch, W. Elements of chordate anatomy, 4th Edn. McGraw Hill Book Co, New York.
37. Messers, H.M. An introduction of vertebrates anatomy
38. Montagna, W. Comparative anatomy. Hohn. Wiley and Sons Inc.
39. de Deer, S.G. Embryos and Ancestors. Clarendon Press, Oxford.
40. Andrews, S.M. Problems in vertebrate evolution. Academic Press, New York.
41. Waterman. A.J. chordata structure and function. Macmillan co., New York.
42. Bhamrah and Juneja, Chordate Zoology, Anmol Publishers, N.Delhi
43. Bhamarah and Juneja, Invertebrate Zoology, Anmol Publishers, N.Delhi.
44. Barbiur, T. Reptiles and Amphibians: Their habits and adaptations. Hongton Miffin Co., New York.

45. Kingsley Noble, g. The biology of the Amphibia. Dover Publications, New York.
46. Smyth. Amphibia and their ways. The McMillan co., New York.
47. Andrevos, S.M., Miles, r.S. and Walker, A.D. Problems in vertebrate evolution. Academic Press, New York.
48. Boolotian and Stiles: College Zoology (Macmillan)
49. Campbell: Biology (Benjamin)
50. Marshall and Williams: Text Book of Zoology
51. Wolfe: Biology the Foundations (Wadsworth)
52. Wilson. Biodiversity, Academic Press, Washington.
53. G.G. Simpson. Principle of animal taxonomy, Oxford IBH Publishing Company
54. E. Mayer. Elements of Taxonomy.
55. E.O. Wilson. The Diversity of Life (The College Edition), W.W. Northern & Co.
56. Tirpathi, R. S. Biosystematic and taxonomy

Practical - I (Based on paper I and II)

A) Dissections:-

- i) Comparative anatomy of Excretion in Annelid, Insect and Molluscan models.
- ii) Poison gland of Ant/Spider
- iii) Nervous system:- Crab; Sepia/Loligo Squilla/Prawn, Earth worm
- iv) Digestive, Arterial systems and Cranial nerves of Scoliodon/ locally available fish, Internal ear of Scoliodon.)
- v) Digestive, Reproductive, portal Systems and Neck nerves of rat/ mouse

B) Mounting:-

- i) Nephridium, .Ovary and spermatathea of Earthworm.
- ii) Mounting of mouth parts of mosquito-identification of genera & sex,
- iii) Halters in housefly, Trachea of Cockroach,
- iv) Gill-lamella, Osphradium of Pila,
- v) Statocyst of Prawn, spicules of Herdmania, Velum of *Amphioxus*, Ampulla of Lorenzini from Scoliodon, fish scales.

C) **Qualitative and Quantitative** estimation of Zooplankton communities.

D) **Museum Study:-**

Taxonomy of animal specimens/charts available in the laboratory representing different orders of Nonchordata, Protochordata, and vertebrata.

E) **Permanent stained preparations:**

Larval forms : Planula, Redia, Cercaria, Cysticercus, bladder worm, Trochophore, Nauplius, Zoea, Mysis, Phyllosoma, Antilon, Veliger, Bipinnaria, *Ophio* and Echinopluteus, Auricularia, Tornaria.

Mammalian Histology; Skin, bone, regions of alimentary canal, digestive glands, trachea, lung, kidney. Spinal cord, gonads, Endocrine glands.

F) **Comparative Osteology** (Excluding loose bones of skull):

Amphibia, Reptilia; Aves, mammals.

One long study tour, preferably at the sea-shore for study, collection and Observations of selected animals in their natural habitat is compulsory for the students.

Candidates shall be required to produce at the practical examination the Following

1. Practical Record Book duly signed by the teacher in-charge and certified by the Head of the Department as the bonafide work of the candidate.
2. 15 permanent stained micro- preparations prepared by the examinee.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources.

Distribution of Marks for practical - I

1) Major Dissection	20 marks
2) Minor dissection	15 marks
3) Identification and comments on spots (Specimens, slides, bones)	20 marks
4) Stained permanent preparations	10 marks
5) Submission of stained permanent preparations	10 marks
6) Practical record	10 marks
7) <i>Viva voce</i>	15 marks

Total	100 marks
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M.Sc.I (Zoology).

Semester - I

PAPER-III

GAMETEBIOLOGY

Unit I : 1.1 Heterogamy in eukaryotes.

1.2 Leydig cells

1.2.1 Morphology

1.2.2 Differentiation

1.2.3 Functions and its regulation

1.3 Spermatogenesis

1.3.1 Morphological basis and regulation

1.3.2 Gamete specific gene expression

1.4 Biochemistry of Semen

1.4.1 Formation of semen and its composition

1.4.2 Assessment of sperm functions

Unit II : **2.1 Ovarian follicular growth and differentiation**

2.1.1 Morphology

2.1.2 Endocrinology

2.1.3 Molecular Biology

2.2 Oogenesis and vitellogenesis-morphogen gradient

2.3 Ovulation and its regulation

2.4 Fertilization

2.4.1 Cell surface molecules in sperm-egg recognition in animals

2.4.2 Reaction of sperm (Sperm motility, Capacitation, Chemotaxis, acrosome reaction, Fusion of sperm and egg plasmalemma)

2.4.3 Reaction of egg (formation of fertilization cone, Prevention of polyspermy)

2.5 Amphimixis

Unit III : **3.1 Creating multicellularity**

3.1.1 Characteristics of cleavage divisions

3.1.2 Cleavage types

3.1.4 Gastrulation & formation of germ layers in animals

3.1.4 Embryogenesis

3.2. Genomic imprinting

- Unit IV : 4.0 Assisted reproduction techniques**
 4.1 *In vitro* fertilization
 4.2 Multiple ovulation/super ovulations
 4.3 Collection and cryopreservation of gametes
 4.4 *In vitro* gamete maturation
 4.5 Embryo sexing Y specific probes
 4.6 Screening of genetic disorders
 4.7. ICSI and GIFT
 4.8 Cloning of animals by embryo transfer
 4.9 Disadvantages of ART

- Unit V : 5.1 Transgenic animals**
 5.1.1. Procedure
 5.1.2. Applications
5.2. Gene Knockout technology
 5.2.1 Procedure
 5.2.2 Applications
5.3. Gene therapies
 5.3.1 *Ex vivo* gene therapy
 5.3.2 *In vivo* gene therapy
 5.3.3 Antigens and antisense therapy

M.Sc.I (Zoology)

Semester - I

Paper IV

GENES AND DIFFERENTIATION

- Unit I : 1.0 Cell specification and Differentiation**
 1.1 Types of Cell specification
 1.2 Cell commitment and differentiation
 1.3 Characteristics of differentiation
 1.4 Germ cell determination in nematodes, insects and amphibians
 1.5 Germ cell migration in amphibians, reptiles, mammals and birds
 1.6 Organizers and evocators
- Unit II : 2.0 Body axis formation**
 2.1 Axes and pattern formation in *Drosophila*, Amphibia and chick;
 2.2 Establishment of body axes in mammals and birds.

- 2.3 Proximate tissue interactions (instructive and permissive)
 2.4 Homeobox concept in different phylogenetic groups

- Unit-III : 3.1 Environmental cues and effects**
 3.1.1 Malformation and disruption – Teratogenic effects of xenobiotics
 3.1.2 Changing evolution through development modularity
 3.1.3 Developmental constraints.
 3.1.4 Creating new cell types –basic evolutionary mystery
- 3.2 Contraception:**
 3.2.1 Surgical methods
 3.2.2 Hormonal methods
 3.2.3 Physical barriers
 3.2.4 Intrauterine contraceptive devices (IUCDs)
 3.2.5 Immunocontraception: . Gamete specific antigens: Zona pellucida antibody, Sperm antibody

- Unit-IV : 4.1 Biology of sex determination**
 4.1.1 Chromosomal and genetic basis of sex determination in mammals and *Drosophila*
 4.1.2 Differentiation of gonads
 4.1.3 Secondary sex determination in mammals
 4.1.4 Environmental sex determination
- 4.2 Regeneration**
4.3 Connective tissue cell family

- Unit V : 5.0 Stem cells**
 5.1 Properties of Stem Cells
 5.2 The Embryonic Stem Cell
 5.3 The Adult Stem Cell
 5.4 Hematopoietic Stem Cells
 5.5 Cord-blood stem cells and stem cell bank
 5.6 Stem cell markers
 5.7 Stem cell disorders: Aplastic anemia, Fanconi anemia, Paroxysmal nocturnal hemoglobinuria, Congenital cytopenia, Hirschsprung's disease

- 5.8 Stem Cells and Diabetes
- 5.9 Rebuilding the Nervous System with Stem Cells
- 5.10 Use of Genetically Modified Stem Cells in Experimental Gene Therapies
- 5.11 Bone marrow transplantation

Suggested Reading Materials: All recent editions:

1. Long J.A. Evan H.M. 1922 : the oestrous cycle in the Rat and its associated phenomenon.
2. Nalbandou. A.C. – Reproductive physiology
3. Prakash A.S. 1965-66 Marshall's, Physiology Reproduction (3 Vol.)
4. Gilbert, S.F. Developmental Biology , Sinauer Associated Inc. Massachusetts.
5. Ethan Bier, the cold Spring. The cold spring Harbor laboratory Press, New York.
6. Balinsky B.I. Introduction to Embryology sanders, Philadelphia.
7. Berril N.J. and Karp. G. Development Biology. McGraw Hill New York.
8. Davidson, E.H. Gene Activity During Early Development. Academic Press, New York.
9. Wolpert Principles of Development-
10. Slack Essential Developmental Biology- .
11. Principles of Development, 3rd edition (2007), Lewis Wolpert, Publisher- Oxford University Press.
12. An Introduction to Embryology, 5th edition (2004), B. I. Balinsky. Publisher – Thomas Asia Pvt. Ltd
13. Developmental Biology, (2001), R. M. Twyman, Publisher - Bios Scientific Publishers LTD.
14. Concepts of Genetics, 9th edition (2008), William S. Klug, Michael R. Cummings, Charlotte Spencer, and Michael A. Palladino, Publisher-Benjamin Cummings
15. Genes IX, 9th edition (2008), Benjamin Lewin, Publisher-Jones and Barlett Publishers Inc.
16. Principles of Genetics, 4th edition, (2006), Snustad D. Peter and Simmons J. Micheal, Publisher -John Wiley and Sons. Inc.
17. Genetics, (1999), Daniel J. Fairbanks, W. Ralph Andersen Publisher-Brooks/Cole Pub Co.
18. Principles of Genetics, 8th edition (1991), Eldon J. Gardner, D.P. Snustad, M.J. Simmons, and D. Peter Snustad Publisher-John Wiley and Sons. Inc.

19. Microbial Genetics, (1987), David Freifelder, Publisher-Jones & Bartlett
20. General Genetics, (1985), Leon A. Snyder, David Freifelder, Daniel L. Hartl Publisher- Jones and Bartlett.
21. Genetics, 3rd edition, Monroe W. Strickberger, (1968), Publisher - Macmillan Publishing Co.

PRACTICALS- 2, based on Paper - III and - IV

1. Morphology and histology of non-chordate and chordate ovary and testis (Insects, snails, frog and rat)
2. Oogenesis and spermatogenesis through gonad histological preparation
3. Study of different types of eggs on the basis of their yolk content
4. Collection of frog and toad spawn (rearing) embryos and larvae up to metamorphosis in the laboratory, preparation and study of stages of development
5. Study of cleavages in limnea in laboratory.
6. Mounting of parasitic larvae in *Limnea/Bellamia*
7. Study of development of *Amphioxus*, Frog, Chick and pig through slides and whole mounts
8. Effect of anti-fertility drugs on biochemical estimation in various part of reproductive tract
 - a) Ascorbic acid
 - b) Acid/Alkaline phosphatase
9. Morphogenesis and growth study of chick development
10. Sperm count
12. Study of abnormal sperm count
13. Semen analysis
14. Study of different types of cells present in bone marrow
15. Effects of different drugs on pregnant rats.
 - Amoxicillin
 - diclophenac sodium
 - paracetamol
 - Penicillin
 - Ibuprofen
16. Bio-assay of LH by OAAD test
17. Bioassay of estrogen using uterotrophic vaginal response or Analysis of ovarian / adrenal lipids by TLC

18. Protein synthesis as a prerequisite for E2-induced initiation of estrous cycle.
19. Oocyte maturation in fish using germinal vesicle breakdown test by the induction of maturation-inducing steroid
20. Determination of the stages of spermatogenesis in rat testis by PAS Haematoxyline technique. or Cyclic changes in the exfoliate cytology of vaginal Epithelium in rat.
21. Examination and submission of slide testis, ovary, epididymis, prostate and uterus And seminal vesicles

The examinee shall be required to produce at the practical examination the following:

Practical record book duly signed by teacher in charge and certified by the Head of the Department as a bonafide work of the examinees.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Distribution of Marks

The practical shall be of six hours duration & distribution of marks will be as follows:

- | | |
|--|------------|
| 1. Mounting: Chick embryo /any Mollusca or parasitic larvae / Developmental stages/ stages of spermatogenesis. | : 15.marks |
| 2. Identification of spots | : 20marks |
| 3. Estimation / histological preparation/ Bioassay. | : 20marks |
| 4. Sperm/ semen Examination/ slide of bone marrow; | : 20marks |
| 5. Practical record | : 10 marks |
| 6. <i>Viva voce</i> | 15. Marks |

Total	100 marks
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M.Sc. I (Zoology)

Semester – II

PAPER – V

MOLECULAR CELL BIOLOGY

Unit-I : 1.1 Biomembranes:

- 1.1.1 Biochemical Composition of biomembranes
- 1.1.2 Transport across cell membrane & transporters.
- 1.1.3 Membrane potential.
- 1.1.4 Transport across epithelia.

1.2. Extracellular matrix:

- 1.2.1 Basement membrane, basal lamina structural components, cross-linking Components.
- 1.2.2 Collagens & other proteins of extracellular matrix.
- 1.2.3 Cell-cell adhesion molecules.
- 1.2.4 Cell-matrix adhesion.
- 1.2.5 Gap junctions and connexins

Unit- II : 2.0 Cell Surface Receptors.

- 2.1 Modes of cell signaling (autocrine, juxtacrine, paracrine and endocrine)
- 2.2 Signaling molecules.
- 2.3 Properties of cell surface receptors.
- 2.4 G protein-coupled receptors that activate or inhibit adenylyl cyclase.
- 2.5 G protein-coupled receptors that regulate ion channels.
- 2.6 G protein-coupled receptors that activate phospholipase C.
- 2.7 Receptor protein-Tyrosine kinases
- 2.8 Receptor protein-Tyrosine phosphatases
- 2.9 Receptor protein-guanylyl cyclases
- 2.10 Receptor protein-serine/threonine kinase
- 2.11 Cytokine receptors

Unit III : 3.0. Cell Signaling:

- 3.1. Pathways of Intracellular signal transduction:
 - 3.1.1. Features of signal transducing systems,
 - 3.1.2. Second messengers,

- 3.1.3 Ion channels and electrical signaling,
- 3.1.4. Signal transduction by G Protein-coupled receptors,
- 3.1.5. Signal transduction by receptor enzymes,
- 3.1.6. JAK-STAT pathway,
- 3.1.7. Smad pathway, Wnt pathway, Hedgehog pathway,
- 3.1.8. Signal Transduction in vision, Gustation and Olfaction,

Unit IV : 4.1 Cell cycle control

- 4.1.1. Cyclins & cyclin dependent kinases (CDKs), Role of MPF
- 4.1.2. DNA replication block & its removal.
- 4.1.3. Cell cycle checkpoints & feedback control.
- 4.1.4. Regulation of CDK-Cyclin Activity
- 4.1.5. Programmed cell death (Apoptosis) - Definition, mechanism & significance

4.2. Cytoskeleton

- 4.2.1. Microfilaments & microtubules-structure and dynamics
- 4.2.2. Microfilaments membrane binding proteins & their function.
- 4.2.3. Intermediate filaments & their functions
- 4.2.4 Role of microtubules in mitosis.

Unit V : 5.0 Secretory pathways:

- 5.1 Protein synthesis in eukaryotes
- 5.2 Uptake into ER
- 5.3 Co- & Post translational modifications in ER
- 5.4 Protein sorting in Golgi apparatus
- 5.5 Transport of proteins across nuclear membrane
- 5.6 Lysosomal assembly & functions

M.Sc. I (Zoology)

Semester – II

PAPER – VI:

TOOLS AND TECHNIQUES IN BIOLOGY

Unit I : 1.0 Principles and uses of

- 1.1 Colorimeter
- 1.2 Spectrophotometer,
- 1.3 Spectrofluorometer,
- 1.4 Atomic absorption spectrophotometer,
- 1.5 ESR and NMR spectrometers,
- 1.6 XRD
- 1.7 Radioactivity counters

Unit II : 2.1. Microscopes; Principles and application:

- 2.1.1. Light, phase contrast, fluorescence,
- 2.1.2. Scanning and transmission electron microscopy,
- 2.1.3. Atomic Force microscopy

2.2 Microbiological techniques

- 2.2.1. Media preparation and sterilization.
- 2.2.2. Inoculation and growth monitoring.
- 2.2.3. Use of fermenters.
- 2.2.4. Biochemical mutants and their use.
- 2.2.5. Microbial assays.

Unit III : 3.1. Organelle separation by centrifugation

- 3.1.1 Cell separation by density gradient centrifugation,
- 3.1.2. Cell separation by Unit gravity centrifugation,
- 3.1.3. Cell separation by Affinity adsorption,
- 3.1.4. Cell separation by anchorage based techniques
- 3.2. Design and functioning of tissue culture laboratory.
- 3.3. Cell culture techniques- Monolayer and Polylyer
- 3.4. Cell proliferation measurements.
- 3.5. Cell viability testing.
- 3.6. Culture media preparation and cell harvesting methods.
- 3.7. Tissue engineering

- Unit IV** : 4.1. Cryotechniques;
 4.1.1 Cryopreservation for cells, tissue, organisms.
 4.1.2. Cryotechniques for microscopy.
 4.1.3. Freeze-drying for physiologically active substances.
- 4.2. **Separation techniques in biology.**
 4.2.1. Molecular separation by thin layer chromatography,
 4.2.2. Molecular separation by gas chromatography,
 4.2.3. Molecular separation by high pressure liquid chromatography,
 4.2.4. Molecular separation by ion exchange and affinity chromatography,
 4.2. 5.Molecular separation by electrophoresis

- Unit V** : **5.0 Radioisotope and mass isotope techniques in biology.**
 5.1 Sample preparation for radioactive counting.
 5.2 Autoradiography.
 5.3 Metabolic labeling.
 5.4 Magnetic Resonance Imaging.
 5.5 Liquid scintillation spectrophotometry
 5.6 Radiation dosimetry
 5.7 Radioactive isotopes and half life of isotopes
 5.8 Cerenkov radiation
 5.9 Immunological techniques based on antigen-antibody interactions.

Selected Reading Material. (All recent editions)

1. Molecular cell Biology, J. Darnell , H. Lodish & D. Baltimore , Scientific American Book , Inc. USA.
2. Molecular cell Biology of the cell , B Alberts , D Bray , J. Lewis , M. Raff , K. Roberts and J. D. Watson . Garland Publishing Inc. New York.
3. The cell a molecular approach: Cooper
4. Molecular cell biology: Gerald Karp
5. Animal Cell Culture – A practical approach, Ed. John R.W.Masters. IRL Press.
6. Introduction to instrumental analysis, Robert Braun. McGraw Hill International Editions.

7. A Biologists Guide to Principles and Techniques of Practical Biochemistry. K. Wilson & K.H. Goulding, ELBS Edn.
8. Foundation in microbiology : Talaro
9. Microbiology: Pelczar
10. Biology of micro- organisms : Madigan, Martinko and Parker.
11. Biophysical chemistry- Principles and technique: Upadhyay, Nath

Practical-3 based on papers V and VI

1. Organelle separation by centrifugation
2. Electrophoretic separation of proteins
3. Light microscopic demonstration of Plasma membrane. (Oil red O, Sudan black B)
4. Demonstration of mitochondria by vital staining.
5. Histochemical demonstration of extracellular matrix. (glycoproteins- Alcian blue pH 1,2,5, PAS)
6. Histochemical demonstration of Lysosomes by demonstrating acid phosphatase activity.
7. Histochemical demonstration of DNA & RNA by Feulgen & MGPY technique
8. Study of metaphase chromosomes in rat bone marrow / tadpole tail tip.
9. Culturing of protozoans (Paramecium, Amoeba and Volvox)
10. Preparation of different cell types.
11. Comparison of RBC & WBC in different groups of vertebrates.
11. Media preparation for prokaryotic cell culture.
13. Different methods of sterilization (Dry, wet and UV sterilization)
14. *E.coli* culturing.
15. Gram staining of micro-organisms
16. Cell viability testing.
17. Design of tissue culture lab by modeling
18. Preparation of tissue sections & light microscopic examination.
19. Uses of different microscopes.
20. Absorption spectrum of any colored solution of a substance.
22. Sub cellular fractionation of rat liver.
23. Determination of molecular weights of proteins by SDS-PAGE and densitometric scanning.

Candidates shall be required to produce at the practical examination, the following-

Practical Record Book duly signed by the teacher in-charge and certified by the Head of the Department as the bonafide work of the candidate.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Distribution of Marks for Practical – III

The practical shall be of duration of 6 hours and distribution of marks will be done as below-

- | | |
|---|-------------|
| 1. Histochemical Cytological /demonstration. | : 25marks |
| 2. Experiment – I organelles Separation/
Microbiological Preparation | : 25marks |
| 3. Experiment –II (Chromatography/ electrophoresis) | : 25 marks |
| 4. Class record | : 10. marks |
| 5. <i>Viva voce</i> | : 15.marks |

Total : 100 marks

MSc. I-Zoology

Semester-II

PAPER VII – ENDOCRINOLOGY

- Unit-I :**
- 1.1 Histology of vertebrate endocrine glands: Pituitary gland, Thyroid gland, Parathyroid gland, Adrenal gland, Pineal and Thymus gland
 - 1.2 Melatonin function: Jet-lag and sleep disturbances. Melatonin as an anti-oxidant. Melatonin and cancer. Melatonin and depressive disorders. Melatonin and endocrine disorders. Adverse effects of Melatonin.
 - 1.3 Histophysiology of endocrine placenta, testis and ovary in vertebrates
 - 1.4 Structure and functions of Islets of Langerhans
 - 1.5 Histophysiology of Urophypophysis and Corpuscles of Staninus in fishes
- Unit - II :**
- 2.1 Classification of Hormones (Peptides, Steroids and amino acid derived)
 - 2.2 Hormone action at cellular level

- 2.3 Hormone action at genetic level
- 2.4 Hormones in biological clock
- 2.5 Role of hormones in digestion
- 2.6 Hormonal regulation of carbohydrate, Lipid and Protein metabolism
- 2.7 Hormonal regulation of Growth and Reproduction

- Unit-III :**
- 3.1 Synthesis, transport (release) and metabolism of steroid hormones
 - 3.2 Synthesis, transport and metabolism of T3, T4 and epinephrine
 - 3.3 Synthesis transport and metabolism of insulin
 - 3.4 Prostaglandins
 - 3.5 Ectohormones in insects and mammals

- Unit-IV :**
- 4.1 Thyroid hormones and disorders
 - 4.2 Parathyroid hormones and disorders
 - 4.3 Pituitary hormones and major Disorders
 - 4.4 Adrenal Gland hormones and Disorders
 - 4.5 Diabetes: Diabetes Type I, Diabetes Type II, Diabetic Kidney Problems, Diabetes And Pregnancy, Diabetic Nerve Problems, Autoimmune diabetes
 - 4.6. Comparative study of steroid and non-steroid hormones in reproduction

- Unit-V :**
- 5.1 Hormone replacement therapy
 - 5.2 Risks and benefits of Hormone replacement therapy
 - 5.3 Other hormones: Rennin, angiotensin, cytokines, ANF, Erythropoietin
 - 5.4 Evolution of hormones
 - 5.5 Neuroendocrine mechanism in insects and crustacean metamorphosis
 - 5.6 Neuroendocrine mechanism in Amphibian metamorphosis

ENVIRONMENT AND ECOLOGY

- Unit-I** :
- 1.1. The Environment:
 - 1.1.1 Physical environment;
 - 1.1.2 Biotic environment;
 - 1.1.3 Biotic and abiotic interactions.
 - 1.2. Habitat and niche:
 - 1.2.1 Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement.
 - 1.3. Population ecology: Characteristics of a population; population growth curves; population regulation; life history strategies (r and k selection); concept of metapopulation, demes and dispersal, interdemec extinctions, age structured populations, Diversity Index: Simpson's index, Shannon's index
 - 1.4. Species interactions: Types of interactions, interspecific competition, herbivore, carnivores, pollination, symbiosis.
- Unit II** :
- 2.1. Community ecology:
 - 2.1.1 Nature of communities; community structure and attributes;
 - 2.1.2 Levels of species diversity and its measurements;
 - 2.1.3 Edges and ecotones.
 - 2.2. Ecological succession: Types; mechanisms; changes involved in succession; concept of climax.
 - 2.3. Ecosystem:
 - 2.3.1 Structure and function; energy flow and mineral cycling (CNP);
 - 2.3.2. Primary production and decomposition;
 - 2.3.3. Structure and function of some Indian ecosystems;
 - 2.3.3.1. Terrestrial (forest, grassland) .
 - 2.3.3.2. Aquatic (fresh water, marine, estuarine).

- 2.4. Biogeography:
- 2.4.1. Major terrestrial biomes;
 - 2.4.2. Theory of island biogeography;
 - 2.4.3. Elementary idea of, biogeographical zones of India.
- Unit III** :
- 3.1. Environmental Pollution-
 - 3.1.1. Sources nature and effects of air pollutants
 - 3.1.2. Sources nature and effects of Water pollution
 - 3.1.3 Biodegradation and bioremediation
 - 3.1.4 Biotechnological methods for Management of pollution
 - 3.2. Global climate change; Global warming, Global dimming,
 - 3.3 Biodiversity-statuses;
 - 3.3.1. Monitoring and documentation;
 - 3.3.2. Major drivers of biodiversity change;
 - 3.3.3. Biodiversity management approaches,
 - 3.3.4. Economics of Biodiversity
- Unit-IV** : **4.1 Conservation biology:**
- 4.1.1. Principles of conservation; major approaches to management, Indian case studies on conservation/management strategy:
 - 4.1.2. Sanctuaries and National Parks,
 - 4.1.3. Project Tiger,
 - 4.1.4. Biosphere reserves.
- 4.2 Toxicology**
- 4.2.1. Metabolism & effects of Organochlorine, organophosphate and carbamate pesticides
 - 4.2.2 Metabolism & effects of alkaloids, barbiturates, alcohol & cyanides.
 - 4.2.3. Metabolism & effects of heavy metal salts.
 - 4.2.4. Formation & effects of free radicals.
 - 4.2.5. Biochemistry of Detoxification – Phase I & phase II reactions.

- Unit-V** : 5.1 Environmental Monitoring:
- 5.1.1- IGPC (Inter Government Policy/ Protocol for Climate change)
 - 5.1.2- EPA (Environmental Protection Agency)
 - 5.1.3- Laws, legislation pertaining to environment
 - 5.1.4- Control, monitoring & surveillance of environment.
 - 5.1.5- IPR (Intellectual Property Rights) ; Patents need how to obtain in India & abroad, patent offices in India.
- 5.2. Environmental Impact Assessment Processes:
- 5.2.1. EIA of reservoirs and Coal mines, thermal Power stations

Suggested reading materials: (All recent editions)

1. Toxicology - A Sood , Sarup & Sons, New Delhi.
2. Biodegradation of pesticides - G. N. Vankhede , Bajaj Publication
3. Environmental biodegradation, Ramkumar, Sarup & Sons , New Delhi
4. Toxicology by Parikh.
5. Poisoning by drugs & chemicals - Cooper
6. Animal Physiology, mechanism & Adaptation - Eckert, Marshall
7. Animal Physiology, Principal & Adaptation- Garden M. S.
8. Human Physiology- C. C. Chatterji Vol. I and II
9. Analytical toxicology of inorganic poisons - Jacob M.B
10. Environmental management of toxic and hazardous chemical - Madhuraj
11. Environmental Biology - J. L. Blish
12. Fundamental Ecology - Odum
13. Environmental Physiology - Philips G.
14. Toxicology mechanism & analytical methods - Stewarts & Stratman
15. Environmental Impact Assessment: G.N.Vankhede Biotech Publishers, Delhi
16. Ecology and Biogeography of India, Mani, M.S. : 1974. Junk. Publ. The Hague.
17. Comparative Vertebrate Endocrinology, Bentley: Cambridge University Press, 1998
18. Fundamentals of Comparative Endocrinology, Chester-Jones et al.: Plenum Press,

19. New York, London, 1987.
20. Comparative Endocrinology, Gorbman et al.: John Wiley & Sons, New York, 1983
21. Vertebrate Endocrinology, Norris: (2nd ed.), Lea & Febiger, 1997.
22. Vertebrate Endocrinology Schreiber & Pang: Vol. I-IV, Fundamentals & Biomedical Implications, Academic Press, 1985 & onwards
23. Endocrinology, Hadley: Prentice hall. International Edition. 2000
24. Essentials of Endocrinology, Brooks and Marshall Blackwell Science. 1995
25. General Endocrinology, Turner and Bagnara: W. B. Saunders Company Philadelphia. 1984
26. Text Book of Endocrinology, 10th edition Larson: Williams. W. B. Saunders Company, Philadelphia. 2002.
27. William's text book of Endocrinology. (XI edition) H. M. Kronenberg, S. Melmed,
28. K.S. Polonsky and P. R. Larsen. Publisher - Saunders, Elsevier Inc. (2009).

Practical -4 Based on paper VII and VIII:

1. To study the rate of oxygen consumption by aquatic animals under various Environmental stress.
2. Anatomy and Histology of various vertebrates endocrine glands and insects neuroendocrine structures.
3. Effect of toxicants on histoarchitecture of various endocrine glands
4. To study changes of blood glucose level under various environmental stress
5. Determination of respiratory quotient of an air breathing animal at different Temperatures.
6. Study of toxicity of given chemical to analyze its activity histologically
7. Study of toxicity of given chemical on various blood and tissue biochemical.
8. To estimate total hardness of different samples of water.
9. To estimate nitrate contents of different samples of water.
10. Diversity indices from soil and aquatic fauna.
11. Determination of LC50 / LD50 and 95% Confidence limit of any Toxicant to a selected aquatic/ terrestrial organism.
12. Effects of toxicants on blood parameters of fish.

13. Sensitivity test during early life (embryonic) stages.
14. Instrumentation AAS/ HPLC for residue analyses of toxicant
15. Biodiversity Inventories/Surveys. and Field Techniques.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Candidates shall be required to produce at the practical examination, the Following-

Practical Record Book duly signed by the teacher in-charge and certified By the Head of the Department as the bonafide work of the candidate

Distribution of Marks Total Marks:

The practical shall be six hours duration and distribution of Marks will be as follows:

1. Histological preparation	25 marks
2. Experiment I (estimation).....	25 marks
3. Experiment II (Toxicology) ...	25 marks
4. Class record	10. Marks
5. <i>viva voce</i>	15 marks

Total	100 marks
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M.Sc. II(ZOOLOGY) SEMESTER III

Paper – IX

MOLECULAR CYTOGENETICS-I

Unit-I : 1.0 Mutation:

- 1.1 Basic features of mutation
- 1.2 Adaptation versus mutation
- 1.3 Phenotypic Effects of mutation
- 1.4 **Molecular basis of gene mutation:**
 - 1.4.1 Mutations induced by chemicals, radiation .
 - 1.4.2 Mutations caused by the DNA replication machinery

- 1.4.3 Hot spots of mutation
- 1.4.4 Detection of mutagens -The Ames Test
- 1.4.5 DNA repair mechanisms
- 1.4.6 Diseases resulting from defects in DNA repair mechanisms

Unit-II : 2.1 Somatic Cell Genetics:

- 2.1.1 Agents and mechanism of cell fusion
- 2.1.2 Heterokaryon – selection of hybrids and chromosome segregation
- 2.1.3 Radiation hybrid panels and gene mapping

2.2 Epigenetics:

- 2.2.1 Mechanisms of DNA Methylation
- 2.2.2 Methyl-CpG Recognition
- 2.2.3 Demethylation in Mammals
- 2.2.4 Mechanisms of Histone modifications
- 2.2.5 Prions and Epigenetic Inheritance
- 2.2.6 Polycomb Mechanisms and Epigenetic Control of Gene Activity

Unit-III : 3.0 Genome Organization:

- 3.1 Hierarchy in genome organization
- 3.2 Mobile DNA

3.2 Genetics of Cancer:

- 3.2.1 Properties of cancer cells
- 3.2.2 Benign and malignant tumors
- 3.2.3 Metastasis
- 3.2.4 Relationship of cell cycle to cancer
- 3.2.5 Oncogenes
- 3.2.6 Tumor suppressor genes

Unit-IV : 4.1 Human Cytogenetic:

- 4.1.1 Human karyotypes - banding - nomenclature
- 4.1.2 Dosage compensation
- 4.1.3 Numerical abnormalities of human chromosomes and related syndromes:**
Nondisjunction, Aneuploidy, Patau syndrome, Edwards syndrome, Down syndrome, Turner syndrome, Klinefelter syndrome

4.2. Structural abnormalities of human chromosomes and related syndromes:

Deletion, Robertsonian translocation, Cri-du-chat syndrome, Prader -Willi syndrome, Williams syndrome, Wolf-Hirschhorn syndrome

4.3 Human metabolic disorders:

Phenylketonuria, Lesch-Nyhan syndrome, Tay-Sachs disease, Alkaptonuria, Albinism, Congenital adrenal hyperplasia, Emphysema, Glucose-6-phosphate Dehydrogenase deficiency, Achondroplasia

4.4 Other Genetic Diseases: Sickle cell anemia, Hemophilia, Thalassemia, Cystic Fibrosis, Huntington disease, Alzheimer's disease, Parkinson's disease

Unit-V : 5.1 Mitochondrial DNA and human diseases:

- 5.1.1. Structure of mitochondrial DNA,
- 5.1.2. Leber's Hereditary Optic Neuropathy (LHON),
- 5.1.3. Myoclonic Epilepsy and Ragged Red Fiber Disease (MERRF),
- 5.1.4. Pearson Marrow-Pancreas Syndrome (PMPS),
- 5.1.5. Kearns-Sayre Syndrome,
- 5.1.6. Mitochondrial Neurogastrointestinal Encephalomyopathy (MNGIE),
- 5.1.7. Sensorineural Hearing Loss

5.2 Genetic Counseling:

- 5.2.1. Carrier detection,
- 5.2.2. Fetal analysis (amniocentesis and chorionic villus sampling),
- 5.2.3. Pedigree analysis

MSc. II. (Zoology) Semester III

Paper – X

MOLECULAR CYTOGENETICS- II

Unit-I : 1.1 Microbial genetics:

- 1.1.1. Bacterial chromosome,
- 1.1.2. Bacterial transformation, and conjugation,

- 1.1.3. Generalized transduction and specialized transduction.

1.2 Bacteriophages:

- 1.2.1. Types of bacteriophages,
- 1.2.2. Structure of T4 phage and morphogenesis

1.3. Extra chromosomal inheritance:

- 1.3.1. Inheritance of mitochondrial genes,
- 1.3.2. Maternal inheritance of kappa particles in *Paramecium* and shell coiling in *Limnaea*.

Unit-III': 1.1 Drosophila Genetics:

- 1.1.1. Introduction to *Drosophila* genetics, advantages of *Drosophila* as a model organism for genetic studies

1.2 Polytene chromosomes:

- 1.2.1. Polytenisation process, significance, bands, interbands, puffs, regulation of puffing activity, ecdysone puffs, induction of puffs by stress.

1.3. Behavioral traits.

- 1.3.1. Mutants, tools and Methodologies for genetic analysis,
- 1.3.2. Genetic and molecular basis of behavioral traits in *Drosophila*

Unit-III : 3.1. Molecular Cytogenetic Techniques:

- 3.1.1. DNA fingerprinting: Principle, procedure and applications
- 3.1.2. Flow cytometry
- 3.1.3. Chromosome painting
- 3.1.4. DNA sequencing: Sanger's dideoxy method, Automated DNA sequencing, Maxam and Gilbert's chemical degradation method.
- 3.1.5. Polymerase chain reaction (PCR)
- 3.1.6. Fluorescence *in situ* hybridization (FISH)

3.2. Genome Analysis :

- 3.2.1. Detailed account of genome models of lambda phage, *E. coli*, *C. elegans*, *Drosophila* and human.

3.3. Functional genomics

Unit-IV : 4.1 Population Genetics:

- 4.1.1 Genetic variation in natural populations, phenotypic variation, Polymorphism of Chromosome structure, Variation at molecular level
- 4.1.2 Hardy-Weinberg principle of genetic equilibrium, Genetic drift, Gene pool
- 4.1.3 Ecological significance of molecular variations

4.2. Genetics of quantitative traits in populations:

- 4.2.1 Molecular analysis of quantitative traits
- 4.2.2 Genotype-environmental interactions
- 4.2.3 Inbreeding depression and heterosis

Unit-V : 5.0 Molecular Phylogenetic:

- 5.1 Methods of phylogenetic tree reconstruction
- 5.2 Nucleic acid phylogeny: DNA-DNA hybridization, Restriction enzyme sites, Nucleotide sequence comparisons and homologies
- 5.3 Protein phylogeny
- 5.4 Molecular clocks
- 5.5 Mitochondrial DNA and evolution.

Practical-5 for Paper – IX and X (Molecular Cytogenetic)

- 1) Demonstration of Barr bodies in leucocytes of human female
- 2) Demonstration of salivary gland chromosomes from *Chironomous /Drosophila* Larvae
- 3) Study of mitosis in cleaving eggs of Frog / any invertebrate
- 4) Study of meiosis from Grasshopper / Rat testes using smear method
- 5) Histological demonstration of meiosis in Rat testis
- 6) Preparation of human karyotypes by using photograph/picture
- 7) Culture of *Drosophila* and study of life cycle and sexual polymorphism
- 8) Identification of wing and eye mutants in *Drosophila*
- 9) Extraction of DNA
- 10) Estimation of DNA (spectrophotometric)
- 11) Extraction of RNA

- 12) Estimation of RNA (spectrophotometric)
- 13) Problems on Genetics based on dihybrid crosses, sex-linked inheritance and blood Groups
- 14) Study of various human genetic traits. Genetic disorders,
- 15) Study of mtDNA disorders through Photographic slides

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

The examinee shall be required to produce at the practical examination the Following:

1. Practical record book duly signed by teacher in charge and certified by the Head of the Department as a bona fide work of the examinees.

Distribution of Marks:

The practical shall be of six hours duration & distribution of Marks will be as follows:

1. Estimation / Experiment	: 30 marks
2. Cytological Preparation	: 25 marks
3. Problems on Genetics (any two)	: 20 marks
Total	: 100 marks
4. Class Record	: 10 marks
5. <i>Viva Voce</i>	: 15 marks

Total : 100 marks

Suggested Readings:- (All recent editions)

1. Atherly, A.G, J.R. Girton and J.F. McDonald. The Science of Genetics. Saunders College Publishing, Harcourt Brace College Publishers, NY.
2. Brooker, R.J. Genetics: Analysis and Principles, Benjamin Cummings, Longman
3. Fairbanks, D.J. and W.R. Anderson. Genetics – The continuity of Life. Brooks/Cole Publishing Company ITP, NY, Toronto.
4. Gardner, E.J., M.J. Simmons and D.P. Snustad. Principles of Genetics. John Wiley and Sons, Inc. NY.
5. Griffiths, A.J.F., J.H. Miller, D.T. Suzuki, R.C. Lewontin and W.M. Gelbart. An Introduction to genetic analysis. W.H. Freeman and Company, New York.

6. Lewin, B. Genes. VI. Oxford University Press, Oxford, New York, Tokyo.
7. Snustad, D.P. and M.J. Simmons. Principles of Genetics. John Wiley & Sons.
8. Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steiz and A.M. Weiner, Molecular Biology of Genes. The Benjamin/Cummings Pub. Co. Inc. Tokyo
9. Mange E.J. and A.P. Mange. Basic Human Genetics 2nd edn. Sinauer Associates
10. Russel P. J. Genetics 5th edn. The Benjamin/Cummings Pub. Co.
11. Vogel, F. and A.G. Motulsky. Human Genetics . 2nd edn. Springer-Verlog, NY
12. Hartl. D.L. and E. W. Jones: Genetics-Principles and analysis. 4th edn. Jones & Bartlett Pub. Boston
13. Weaver R.F. & P.W. Hedrick : Genetics 3rd edn. Wm.C. Brown Pub. London
14. Tollefsbol T. Handbook of Epigenetics : The New Molecular and Medical Genetics. Academic Press.

MSc. II (Zoology) Semester III:

Paper-XI (Elective paper-I)

MOLECULAR BIOLOGY – I

- Unit-I** :
- 1.1 Scope of Molecular Biology
 - 1.2. DNA replication:
 - 1.2.1 Prokaryotic DNA replication
 - 1.2.2 Eukaryotic DNA replication
 - 1.3 Prokaryotic and Eukaryotic transcription:
 - 1.3.1 RNA polymerases - structure and function
 - 1.3.2 General and specific transcription factors
 - 1.3.3 Regulatory elements
 - 1.3.4 Mechanism of prokaryotic transcription
 - 1.3.5 Mechanism of eukaryotic transcription
 - 1.3.6 Transcription regulation in eukaryotes
 - 1.3.7 Transcription regulation in prokaryotes: Lac, Trp, Gal and Ara operons
 - 1.3.8 Transcriptional and post-transcriptional gene silencing.

- Unit-II** :
- 2.1 Co- and Post-transcriptional modifications in mRNA
 - 2.1.1 5'-cap formation
 - 2.1.2 Transcription termination
 - 2.1.3 3'- end processing and polyadenylation
 - 2.1.4 Splicing
 - 2.1.5 Editing
 - 2.1.6 Nuclear export of mRNA
 - 2.1.7 mRNA stability
 - 2.2 Translation:
 - 2.2.1 Genetic code.
 - 2.2.2 Prokaryotic and eukaryotic translation.
 - 2.2.3 Polyribosome formation.
 - 2.2.4 Regulation of translation.
- Unit-III** :
- 3.1 Antisense and Ribozyme Technology:
 - 3.1.1 Molecular mechanisms of antisense molecules.
 - 3.1.2 Inhibition of splicing, polyadenylation and translation.
 - 3.1.3 Disruption of RNA structure and capping.
 - 3.1.4 Biochemistry of ribozyme: hammerhead, hairpin and other Ribozymes.
 - 3.1.5 Strategies for designing ribozymes.
 - 3.1.6 Applications of antisense and ribozyme technologies.
 - 3.2 Fluorescent proteins:
 - 3.2.1 General properties,
 - 3.2.2 Properties and Modifications of *Aequorea victoria* Green Fluorescent Protein Green Fluorescent Proteins, Yellow Fluorescent Proteins, Blue and Cyan Fluorescent Proteins, Red Fluorescent Proteins
 - 3.2.3 Fluorescent Protein Vectors and Gene Transfer
 - 3.2.4 Mutations that improve Fluorescent proteins as imaging probes,
 - 3.2.5 Applications of Fluorescent proteins

- Unit-IV** : 4.0 Protein engineering
 4.1 Rational of protein engineering
 4.2 Basic assumptions of protein engineering
 4.3 Steps involved in protein engineering
 4.4 Methods for protein engineering
 4.5 Chemical modifications of enzymes
 4.2 Protein Biochips:
 4.2.1 Technological Aspects: Protein Immobilization and Surface Chemistry, Transfer and Detection of Proteins, Chip Content
 4.2.2 Applications of Protein Biochips
- Unit-V** : 5.0 Drug designing
 5.1 Target Discovery: Disease Mechanism, Disease Genes, Target Type and 'Drugability', Functional Genomics
 5.2 Target Validation: Pathways, Clinical Data, Antisense DNA/RNA and RNAi, Chemical Knock-out and Chemical Biology
 5.3 Assay Development: *In vitro*/Cell-based *In vivo*/Animal Models, HTS
 5.4 Screening & Hits to Lead : Compound Libraries, *in silico*/CADD and SBDD, Synthesis and Combinatorial Chemistry, Primary Screen, Potency and Dose-response, Counterscreens and Selectivity, Mechanism of Action (MOA)
 5.5 Lead optimization: Medicinal Chemistry, Animal PK/PD/ADME, Toxicity, Formulation and Delivery
 5.6 Development: Pre-clinical Data Package, Process Development/CMC/API, IND Application
 5.7 Clinical Trials: Phase I, Phase II and Phase III

M.Sc.II.(Zoology), Semester III:

Paper- XII (Elective paper-II)

MOLECULAR BIOLOGY – II

- Unit I** : **1.0 Molecular mapping of genome:**
 1.1 Genetic and physical maps
 1.2 Physical mapping and map-based cloning
 1.3 Choice of mapping population, simple sequence repeat loci

- 1.4 Southern and fluorescence *in situ* hybridization for genome Analysis
 1.5 Chromosome microdissection and microcloning
- Unit II** : 2.0 Molecular markers in genome analysis: RFLP, RAPD and AFLP analysis
 2.1 Molecular markers linked to disease resistance genes
 2.2 Application of RFLP in forensic, disease prognosis, genetic counseling, pedigree analysis
 2.3 Animal trafficking and poaching, germplasm maintenance and taxonomy
- Unit III** : **3.0 Recombinant DNA Technology:**
 3.1 Restriction endonucleases and other enzymes used in RDT.
 3.2 Vectors: Plasmids, Bacteriophages, Cosmids, Phagemids, m13, YAC's, BACs, MACs, shuttle vectors, expression vectors.
 3.3 Cloning: Transformation, Transfection and Transgenesis
 3.4 Genomic and cDNA library, oligonucleotide probe
- Unit IV** : 4.1 Selection of transformants using antibiotic resistant genes,
 4.2 genetic markers, and hybridization,
 4.3 probe preparation-radioactive and nonradioactive probes,
 4.4 strategies used in hybridization-colony, plaque, northern and western blots, dot blot and slot blot hybridization, Eastern blotting, South-western blotting.
- Unit V** : 5.1 RNA interference:
 5.1.1 Cellular mechanisms: dsRNA cleavage, MicroRNA, RISC activation and catalysis, Transcriptional silencing, Crosstalk with RNA editing
 5.1.2 Significance of interfering RNA: Protection against viral infections, genome stability, immune defence, regulation of the development of organisms, chromatin condensation and suppression of transcription, gene therapy.

5.2 Applications of genetic engineering in agriculture, Pharmacy, medicine, gene therapy, industries, environmental pollution.

5.3 PCR - Principles, methodology, modifications, applications.

Suggested Reading Materials: (All recent editions)

1. Kourilsky, P. "*Genetics - the thread of life*". Wiley Eastern Ltd. New Delhi
2. Newton, C. R. & A. Graham. *PCR 2/ed*. Bios Scientific Publishers
3. Fanning, E., R. Knippers & E.L. Winnacker. "*DNA Replication and The Cell Cycle*". Springer – Verlag, New York
4. Resnekov, O. & A.V. Gabain (Editors) "*Post – Transcriptional Control of Gene Expression*" Springer – Verlag, New York
5. Singer, M. & P. Berg (editors) "*Exploring Genetic Mechanisms*". University Science Books, California
5. Williamson, R. (editor). "*Genetic Engineering - 2*", Academic Press, Inc. London.
6. Lodish *et al. Molecular Cell Biology*
7. Powar C..B. *Genetics Vol.I & Vol. II, Himalaya Publication*
8. Benjamin Lewin. *Gene VIII, Oxford Press*
9. McWright & Yamamoto. *Transcriptional regulation, Cold Spring Harbor Pub.*
10. Molecular Biology of the Gene. James D. Watson, Michael Levine, Richard Losick, Bell, Baker Latest edition / Pub. Date: December 2003 Publisher: Benjamin Cummings.
11. Molecular Biotechnology: Principles and Applications of Recombinant DNA. Bernard R. R. Glick, Jack J. Pasternak. Latest edition / Pub. Date: July 2002. Publisher: ASM Press.
12. Genes VIII. Benjamin Lewin. Latest edition / Pub. Date: December 2003. Publisher: Prentice Hall.
13. DNA Microarrays: A Molecular Cloning Manual. David Bowtell (Editor), Joseph Sambrook (Editor). Latest edition / Pub. Date: September 2002. Publisher: Cold Spring Harbor Laboratory Press.

Practical -6. Based on Paper XI and XII (Molecular Biology – I & II)

Practical -III

1. DNA fingerprinting.
2. Extraction of DNA from bacteria.
3. Extraction of DNA from yeast.

4. Extraction of DNA from animal tissue.
5. Extraction of DNA from whole blood.
6. Determination of molecular size of DNA.
7. Restriction digestion and determination of molecular weights of different DNA fragments by running a standard marker.
8. Demonstration of plasmids in the gel by gel electrophoresis.
9. Isolation and cleaning the DNA fragment of interest from the agarose gel.
10. DNA transformation into bacterial cells.
11. Separation of immunological proteins (alpha, beta, gamma) by paper or gel Electrophoresis.
12. Screening of antigen and antibody (screening test in antibody production (Ouchterlony Double Diffusion).
13. Estimation of antigen and antibody content in the samples by quantitative Precipitation assay.
14. Estimation of antigen and antibody content in the samples by Radial Immunodiffusion.
15. Counter - current immunoelectrophoresis.
16. Dot ELISA.
17. Separation of immunological proteins (alpha, beta, gamma) by paper or gel electrophoresis.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

The examinee shall be required to produce at the practical examination the following :

Practical record book duly signed by teacher in charge and certified by the Head of the Department as a bona fide work of the examinees.

The practical shall be of six hours duration & distribution of marks will be as follows.

Distribution of Marks

1. DNA Electrophoresis based experiment	: 25 marks
2. DNA Extraction based experiment	: 25 marks
3. Immunology based Experiment	: 25 marks
4. Certified Practical record book	: 10 marks
5. <i>Viva voce</i>	: 15 marks

Total : 100 marks

Syllabus prescribed for M.Sc. II (Zoology) Semester IV**Paper – XI****(Elective paper: Entomology -I)****INSECT CLASSIFICATION AND MORPHOLOGY**

- UNIT I** : 1. Major Classification of Class Insect
- 1.1 Distinguishing Characters, general biology, habits and habitats of Insect Orders and economically important families contained in them.
- 1.1.1 Apterygota,
- 1.1.2 Pterygota,
- 1.1.2.1 Division Palaeoptera –
- 1.1.2.2 Division: Neoptera: Subdivision: Orthopteroid and Blattoid Orders: Subdivision: Hemipteroid Orders (=Paraneoptera):
- UNIT II** : 2. Distinguishing characters, general biology, habits and habitats of Insect Orders and economically important families contained in them (Continued).
- 2.1 Subdivision Endopterygota,
- 2.1.1 Section Neuropteroid- Coleopteroid Orders; ,
- 2.1.2 Section Panorpid Orders and Section Hymenopteroid Orders
- UNIT III** : 3.1 Principles, utility and relevance: insect body wall structure,
- 3.2 Special integumentary structures in insects.
- 3.3 Head- Origin, structure and modification;
- 3.4 Types of mouthparts and antennae,
- 3.5 Tentorium and neck sclerites.
- UNIT IV** : 4.1 Thorax-
- 4.1.1 Areas and sutures of tergum, sternum and pleuron, pterothorax;
- 4.2 Wings:
- 4.2.1 Structure and modifications, venation, wing coupling apparatus .
- 4.2.2 Mechanism of flight; Legs: structure and modifications.

- UNIT V** : 5.1 Abdomen- Segmentation and appendages;
- 5.2 Genitalia and their modifications;
- 5.3 Morphology of Insect sense organs (mechano-, photo- and chemoreceptor).

M.Sc. II (Zoology) Semester IV Paper – XII**(Elective paper: Entomology -II****INSECT ANATOMY AND PHYSIOLOGY**

- UNIT I** : 1.1 Structure, modification and physiology of digestive systems.
- 1.2 Structure, modification and physiology of, Circulatory systems
- UNIT II** : 2.1 Structure, modification and physiology of respiratory systems-,
- 2.2 Structure, modification and physiology of excretory systems;
- 2.3 Osmoregulation, water Conservation mechanisms
- UNIT III** : 3.1 Structure, modification and physiology of nervous systems-
- 3.2 Transmission of nerve impulses, neurotransmitters and modulators.
- 3.3 Physiology of sensory systems
- 3.4 Production of receptor potentials in different types of sensilla
- UNIT IV** : 4.1 Structure, modification and physiology of reproductive systems-,
- 4.2 Structure, modification and physiology of endocrine and exocrine glands.
- UNIT V** : 5.1 Physiology of insect growth and development-
- 5.2 Metamorphosis, polyphenism and diapause.
- 5.3 Physiology and biochemistry of insect cuticle and moulting process.

Practical -6 based on elective (Entomology) papers XI and XII:

1. Study of Orders of insects and their identification using taxonomic keys.
2. Keying out families of insects of different major Orders: Odonata, Orthoptera, Blattodea, Mantodea, Isoptera, Hemiptera, Thysanoptera, Phthiraptera, Neuroptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera.
3. Field visits to collect insects of different orders.
4. Study of insect segmentation, various tagmata and their appendages;
5. Preparation of permanent mounts of different body parts and their appendages of taxonomic importance including male and female genitalia.
6. Sense organs.
7. Dissection of different insects to study comparative anatomical details of
8. different systems;
9. Preparation of permanent mounts of internal systems;
10. Chromatographic analysis of free amino acids of haemolymph;
11. Determination of chitin in insect cuticle;
12. Examination and counting of insect haemocytes;
13. Determination of respiratory quotient;
14. Preparation and evaluation of various diets;
15. Consumption, utilization and digestion of natural and artificial diets.
 - Qualitative survey of digestive enzymes in salivary glands.
 - Qualitative survey of digestive enzymes in gut.
 - Estimation of total proteins/carbohydrates/lipids in haemolymph/tissues.
 - Detection of uric acid as end product of excretion in terrestrial insects.
 - Separation of haemolymph proteins by electrophoresis.
 - Estimation of Na⁺ & K⁺ in haemolymph by flame photometer.
 - Estimation of DNA and RNA in Haemocytes/tissues.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Suggested Reading Materials: (All recent editions)

1. Chapman RF. 1998. *The Insects: Structure and Function*. Cambridge Univ. Press, Cambridge.
2. David BV & Ananthkrishnan TN. 2004. *General and Applied Entomology*.
3. Tata-McGraw Hill, New Delhi.
4. Duntson PA. 2004. *The Insects: Structure, Function and Biodiversity*. Kalyani Publ., New Delhi.
5. Evans JW. 2004. *Outlines of Agricultural Entomology*. Asiatic Publ., New Delhi.
6. Richards OW & Davies RG. 1977. *Imm's General Text Book of Entomology*. 10th Ed. Chapman & Hall, London.
7. Saxena RC & Srivastava RC. 2007. *Entomology: At a Glance*. Agrotech Publ. Academy, Jodhpur.
8. Snodgrass RE. 1993. *Principles of Insect Morphology*. Cornell Univ. Press, Ithaca.
9. Duntson PA. 2004. *The Insects: Structure, Function and Biodiversity*. Kalyani Publ., New Delhi.
10. Kerkut GA & Gilbert LI. 1985. *Comprehensive Insect Physiology, Biochemistry and Pharmacology*. Vols. I-XIII. Pergamon Press, New York.
11. Patnaik BD. 2002. *Physiology of Insects*. Dominant, New Delhi.
12. Richards OW & Davies RG. 1977. *Imm's General Text Book of Entomology*. 10th Ed. Vol. 1. *Structure, Physiology and Development*. Chapman & Hall, New York.
13. Saxena RC & Srivastava RC. 2007. *Entomology at a Glance*. Agrotech Publ. Academy, Jodhpur.
14. Wigglesworth VB. 1984. *Insect Physiology*. 8th Ed. Chapman & Hall, New York.
15. Kerkut GA & Gilbert LI. 1985. *Insect Physiology, Biochemistry and Pharmacology*. Vols. I-XIII. Pergamon Press, Oxford, New York.
16. Muraleedharan K. 1997. *Recent Advances in Insect Endocrinology*. Assoc. for Advancement of Entomology, Trivandrum, Kerala.
17. CSIRO 1990. *The Insects of Australia: A Text Book for Students and Researchers*. 2nd Ed. Vols. I & II, CSIRO. Cornell Univ. Press, Ithaca.
18. Freeman S & Herron JC. 1998. *Evolutionary Analysis*. Prentice Hall, New Delhi.
19. Richards OW & Davies RG. 1977. *Imm's General Text Book of Entomology*. 10th Ed. Chapman & Hall, London.

20. Ross HH.1974. *Biological Systematics*. Addison Wesley Publ. Co.
 21. Triplehorn CA & Johnson NF. 1998. *Borror and DeLong's Introduction to the Study of Insects*. 7th Ed. Thomson/ Brooks/ Cole, USA/Australia.

Note: Student should collect local insects and submit at the time of examination, 10 morphological and 10 histological slide preparations should also be submitted.

The practical shall be of six hours duration & distribution of marks will be as follows.

Distribution of Marks Full Marks: 100

1.	Dissection	
	a. Major.....	15
	b. Minor.....	10
2.	Physiological experiment.....	20
3.	Permanent stained preparation.....	10
4.	Identification of Morphological & Histological spots. (ten)	20
5.	Practical Record and Insect Collection	10
6.	Viva Voce	15
Total ...		100

M. Sc.II Zoology Semester- III

Paper - XI

Elective Paper - Animal Physiology -I

Unit-I : Muscle Physiology

- 1.1. Ultra structure of skeletal muscle
- 1.2. Sarcotubular system
- 1.3. Ion distribution
- 1.4. Types of contraction-Summation, Trappe, isotonic and isometric contraction.
- 1.5. Muscle proteins
- 1.6. Physical and Chemical Properties skeletal muscles
- 1.7. Chemical changes during muscular contraction Liberation of energy, Break down of ATP, Resynthesis of ATP

- 1.8. Sliding filament theory of muscle contraction and Molecular basis of muscle contraction
- 1.9. Role of Ca⁺⁺, Calcium receptors, Calmodulin and calcium pump.

- Unit-II :**
- 2.1. Ultra Structure of neuromuscular junction (motor end plate) Synthesis and Release of acetylcholine, Events at the neuromuscular junction (chemical and Electrical) Presynaptic Events during muscle contraction. Action of acetylcholine on the end plate membrane, Destruction of the released acetylcholine
 - 2.2. Myasthenia gravis.
 - 2.3. Neuromuscular transmission influenced by toxins, drugs.
 - 2.4. Muscular disorders: Hypo tonicity, Hypertonicity, Fibrillation and Denervation Hypersensitivity.
 - 2.5. Red and White fibers and muscle function.

Unit-III : Nerve Physiology

- 3.1. Ultra structure of neuron
- 3.2. Electrical properties of nerve: Conductivity, Summation, Inflatigability, All or none law
- 3.3. Ionic concentration in the cytoplasm (Donnan equilibrium system)
- 3.4. Action potential, Resting potential, Depolarization and Repolarization
- 3.5. Local circuit theory and Saltatory conduction
- 3.6. Ionic theory and nerve conduction

Unit IV :

- 4.1. Ultra structure of synapse
- 4.2. Biosynthesis, storage and release of acetylcholine
- 4.3. Electrical events in post synaptic neurons
- 4.4. Excitatory post synaptic potential
- 4.5. Inhibitory post synaptic potential
- 4.6. Synaptic delay
- 4.7. Acetylcholine receptor and role of acetylcholine esterase
- 4.9. Role of calcium, sodium and potassium channels
- 4.10. Types of neurotransmitters, their synthesis and storage (Epinephrine, nor epinephrine, serotonin and GABA)

- Unit V :**
- 5.1 Neurotrophins and Growth factor
 - 5.2 Factors affecting neuronal growth (Brain derived neurotrophic factor, neurotrophin-3 and neurotrophin 4/5)
 - 5.3 Physiology of imprinting
 - 5.4 Physiology of Emotions
 - 5.5 Parkinsons' disease
 - 5.6 Duchenne's muscular dystrophy

M. Sc. II (Zoology) Semester - III

Paper - XII

Elective Paper - Animal Physiology -II

Unit-I : Receptor Physiology & Pathways

- 1.1. Mechano receptors
- 1.2 Photo receptors
- 1.3 Thermo receptors
- 1.4 Chemo receptors
- 1.5 Electro receptors
- 1.6 Magneto receptors
- 1.7 Equilibrium receptors

Unit-II : Physiology of High altitude

- 2.1 Effects of acute exposure to high altitude
 - 2.2 Acclimatization to high altitude
 - 2.3 Respiratory changes
 - 2.4 Exercise at high altitude
- Physiology of Exercise**
- 2.5 Cardiovascular response to exercise
 - 2.6 Skeletal muscle blood flow
 - 2.7 Local factors, neural factors, humoral factors
 - 2.8 Blood pressure during exercise
 - 2.9 Respiratory response during exercise
 - 2.10 Endocrine response to exercise
 - 2.11 Metabolic adjustments in exercise
 - 2.12 Fatigue-biochemical and Physiological changes.

Unit-III : Physiology of Excretion

- 3.1 Histophysiology of excretion
- 3.2 Urine formation, Ultra filtration, Reabsorption, and Secretion, Significance of Henley's loop in production of hyper osmotic urine
- 3.3 Function of aldosterone, antidiuretic hormone and renninangiotensin system in renal physiology
- 3.4 Role of kidney in pH regulation and water salt regulation

Unit-IV :

- 4.1 Structure and mechanism of action of Hypothermic hormones (TRH, GnRH)
- 4.2 Control of Pituitary hormones by hypothalamus
- 4.3 Hormonal function of male
- 4.4 Hormonal function of female
- 4.5 Foetal Physiology
- 4.6 Neonatal Physiology

Unit V :

- 5.1 Introduction to Sociophysiology
- 5.2 Honey and lac productions in insects
- 5.3 Pheromones in insects
- 5.4 Pheromones in mammals
- 5.5 Physiology underlying fear and anxiety in animals
- 5.6 Physiology underlying parental care in Primates

Practical 6 based on Elective Paper - Animal Physiology I and II

1. Simple muscle curve Effects of temperature and calcium.
2. Estimation of serum creatinine.
3. Estimation of serum urea.
4. Qualitative analysis of urea
5. Quantities estimation of calcium, phosphorus sodium and potassium.
6. Separation and identification of amino acids by paper and thin layer chromatography- ground and two dimensional chromatography
8. Separation of proteins by paper or PAG electrophoresis.
9. Experiments on Blood.
 - 9.1 Determination of Erythrocyte sedimentation rate (E.S.R.)
 - 9.2 Determination of pack cell volume (P.C.V).
 - 9.3 Determination of mean corpuscular volume (M.V.C.)
 - 9.4 Detection of blood by hemin crystals test.
 - 9.5 Estimation of protein in blood.

- 9.6 Estimation of glucose in given sample.
 9.7 Estimation of cholesterol in blood.
10. Cardio dynamics; kymograph record of heart beat in site effects of Drugs on heart action.
 11. Simple muscle curve-effect of temperature on calcium
 12. Study of estrus cycle using vaginal smear in female rat.
 13. Estimation of genomic DNA in fish, reptiles, birds and mammals
 14. Agarose gel electrophoresis of DNA
 15. 3-D viewing of Acetylcholine, ion channel proteins using RasMol/ Deepview softwares.
 16. Molecule docking using freeware Argust lab software.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

The practical shall be of 6 hours duration and distribution of marks will be as follows-

Distribution of marks for practical physiology

	Marks
1 Major physiology experiments.....	30
2 Minor physiology experiments.....	20
3 Experiment on blood.....	25
4 Class record.....	10
5 <i>Viva voce</i>	15
Total :	100 Marks

Suggested Reading Materials: (All recent editions): Provided with Papers XV and XVI

Paper- XI (Elective paper)

Fisheries-I

Fish Nutrition, Capture and Culture Fishery,

UNIT I : The Inland Capture Fishery resources of India (Freshwater)

1.1 Riverine fisheries

1.1.1 Different river System

- 1.1.2 Riverine fisheries resources
- 1.1.3 Regulation and exploitation
- 1.1.4 Improvement of fish stocks
- 1.1.5 River pollution
- 1.1.6 Dams and their effect on fish migration and remedial measures
- 1.2 Cold water fishery
 - 1.2.1 Cold water fisheries resources
 - 1.2.2 Fisheries management and Development in cold water.
- 1.3 Lacustrine fisheries resources
- 1.4 Estuarine fisheries
 - 1.4.1 Estuarine fisheries resources
 - 1.4.2 Problems confronting brackish-water capture fisheries.
- 2 Marine fishery
- 3 Marine fishery resources of India.

UNIT II : 2.1 Chemical composition and nutritional value of fish

2.1. Nutrition:

- 2.1.1 Physiological roles of nutrients
- 2.1.2 Food and feeding habits of freshwater fishes, prawn, mussel and oysters
- 2.1.3. Nutritional bio-energetics
- 2.1.4. Nutrient requirement (proteins, lipids, carbohydrates, minerals and vitamins) for various growth stages of freshwater carp, prawn and mussel
- 2.1.5 Conventional and non conventional feed sources
- 2.1.6 Presence of anti nutritional factors and their removal procedures.

2.2 Supplementary feed:

- 2.2.1 Kind of supplementary feeds
- 2.2.2 Composition and nutrient source
- 2.2.3 Feeding frequency
- 2.2.4 Formulation and processing of feeds

- 2.2.6 Storage and quality control of feeds
- 2.2.7 Feed dispensing methods
- 2.3 Live feed culture.

UNIT III : 1. Fish culture systems

1.1 Ponds

- 1.1.1 Fish farm : Construction and lay out of different types of ponds
- 1.1.2 Pond management: Nursery pond, Rearing Pond and Stocking pond
 - 1.1.2.1 Physico-chemical properties of pond water and soil and their maintenance
 - 1.1.2.2 Manuring (organic and inorganic) and liming
 - 1.1.2.3. Pond stocking and productivity
 - 1.1.2.4. Composite fish farming : Exotic fishes and their role in fish farming
 - 1.1.2.5 . Predatory and weed fishes and their eradication
 - 1.1.2.6. Aquatic insects and their control
 - 1.1.2.7. Aquatic vegetation and its control
 - 1.1.2.8. Biological means of increasing production

UNIT IV : 1.2 Cage

- 1.3 Rafts
- 1.4 Pens
- 1.5 Raceways
- 1.6 Recirculating water system
- 1.7 Sewage-fed fisheries
- 1.8. Fish culture in paddy fields
- 1.9. Culture of Larvicidal fishes- Guppy)
- 1.10.Types of hatcheries and their operation and management
- 2. Age and Growth
 - 2.1. Methods of age determination- scale reading, otolith and vertebrae reading
 - 2.1 Growth rate and aging
 - 2.2 Length weight relationship
 - 2.3 Gonadosomatic index

Unit V : 5. 1 Non-fin fisheries

- 5.1.1 Prawn fishery
- 5.1.2 Crab fishery
- 5.1.3 Lobster fishery
- 5.1.4 Molluscan fishery
- 5.1.5. Oyester fishery

5.2 Maintenance of Aquarium

- 5.2.1 Aquarium tools and accessories
- 5.2.2 Aquarium fish feed
- 5.2.3 Ornamental fishes

Paper- XII (Elective paper)**Fisheries-II****Fish Physiology****UNIT I : 1. Integument**

1.1 Epidermis

- 1.1.1 Mucogenic
- 1.1.2 Keratinized epidermis

1.2 Dermis

- 1.2.1 General organization
- 1.2.2 Scales
- 1.2.3 Chromatophores

2. Respiration

2.1 Aquatic respiration

- 2.1.1 Gills
- 2.1.2. Mechanisms of respiration
 - 2.1.2.1 Counter current principle
 - 2.1.2.2 Water flow across the gills
 - 2.1.2.3 Respiratory pump
 - 2.1.2.4 Pump musculature and skeleton
 - 2.1.2.5 Gas exchange

2.2 Air-breathing

- 2.2.1 Accessory respiratory organs and respiratory epithelium
- 2.2.2 Physiological adaptation in air-breathing fishes

- 2.3 Transport of respiratory gases
 - 2.3.1 Transport of oxygen
 - 2.3.2 Transport of carbon dioxide

UNIT II : 2.1 Digestion

- 2.1.1. Alimentary canal and its modifications in relation to food and feeding habits
- 2.1.2. Digestive fluids and enzymes.
- 2.1.3. Digestion and absorption of lipid, protein and carbohydrate
- 2.1.4. Gastrointestinal motility control 1
- 2.2. General organization , structure and Functions of swim bladder

UNIT III : Circulation

- 5.1 Heart and aortic arches
- 5.2 Regulation of cardiac activity
- 5.3 Hemodynamics
- 5.4 Cardiac output
- 5.5 Circulation time
- 5.6 Blood pressure
- 5.7 Composition of blood, Fish haemoglobins and polymorphism.

UNIT IV:

- 1. Nervous system
 - 1.1 Brain and Cranial nerves
 - 1.2.1 Eye
 - 1.2.1.1 Structure
 - 1.2.1.2 Photoreceptive functions
 - 1.2.1.5 Functional adaptations
 - 1.2.2 Acoustico-lateralis system
 - 1.2.3 Chemoreceptors, . Gustatory receptors, Olfactory receptors
 - 1.2.4 Electroreceptors

UNIT V : 2. Excretion and osmoregulation

- 2.1 Glomerular and aglomerular kidneys
- 2.2 Excretion of nitrogenous wastes, water and ion balance
 - 2.2.1 Urea cycle
 - 2.2.2 Stenohaline teleosts
 - 2.2.3 Euryhaline teleosts
 - 2.2.4 Migratory teleosts

Practicals based on Paper- XI (Elective paper) Fisheries-I Fish Nutrition, Capture and Culture Fishery, Fisheries Paper- XII (Elective paper) Fisheries-II Fish Physiology

1. Experiments on Water Analysis

Estimation of Dissolved gases, Dissolved Oxygen, Free Carbon dioxide, Estimation of Dissolved Solids, Chlorides, Carbonate, Bicarbonate, Total Alkalinity, Total hardness, Nitrites, Nitrates, Ammonia, Phosphates, Estimation of Biological Oxygen Demand, Estimation of Chemical Oxygen Demand, Estimation of Primary productivity of any local pond, river, lake or reservoir.

2. Plankton Analysis

Collection, preservation and estimation of planktons, Quantitative analysis- Enumeration of Zooplanktons by i) drop count method ii) Sedgwick Rafter Cell method/ Preparation of Diversity indices, Population density, Determination of dominance of the species.

3. Collection, identification and classification of Locally available fishes, prawns, lobsters and mollusks of economic importance.
4. Collection and Identification of common aquatic insects/ aquatic weeds
5. Permanent micro preparation of different kinds of scales in fishes.
6. Dissection of locally available fishes: Accessory respiratory organs in *Clarias* and *Heteropneustes*, Digestive, Reproductive Nervous system Brain, Cranial nerves Pituitary, in carps, Nervous system in Prawn, Lobster, Crab.
7. Formulation and processing of feeds,
8. Collection and Identification of carp spawn and fry,
9. Construction and Maintenance of Aquarium
10. Preparation of models and designing of cages and pens Visit to Fish farm.
11. Fish pathology- Study of fish parasites and diseases, pathological experiments
12. Fish physiology experiments- Digestive enzymes, biochemical composition

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Candidates shall be required to produce at the practical examination the Following :

1. Practical Record Book duly signed by the teacher in-charge and certified by the Head of the Department as the bonafide work of the candidate.
2. Permanent stained micro- preparations prepared by the examinee.
3. Collection of the specimens
4. Study tour diary.

Distribution of Marks for practical - I

1)	Dissection:	
	a .Major....	15 marks
	b. Minor	10 marks
2)	Experiment based on, water analysis/Fish pathology	10 marks
3)	Identification and comments on spots (05) (Fishes, Crustaceans, Aquatic Insects, Aquatic weeds, Zooplanktons)	20 marks
4)	Permanent micro preparation	10 marks
5)	Submission of Permanent slides and specimen collected	10 marks
6)	Practical record	10 marks
7)	Submission of study tour report 05 marks	
8)	<i>Viva voce</i>	10 marks
Total :		100 marks

M.Sc. II (Zoology) Semester IV

Paper - XIII - Biochemistry (Compulsory)

- Unit - I :** 1.0. **Biomolecules**
- 1.1. pH, pK, acids, bases, buffers, isomerization
 - 1.2. Physicochemical properties of water
 - 1.3. Van-der-Waals electrostatics, Hydrogen bonding and Hydrophobic interactions
 - 1.4 Bonds and forces stabilizing biomolecules.
 - 1.5 Monosaccharides and polysaccharides of biological importance.

- 1.6 Glycoconjugates (Proteoglycans, glycoproteins glycolipids).
- 1.7 Muscle proteins
- 1.8 Respiratory proteins

Unit – II : 2.0. **Amino acids and Proteins**

- 2.1 Structure and chemistry of amino acids.
- 2.2 Essential and non-essential amino acids
- 2.3 Biosynthesis of nutritionally non-essential amino acids.
- 2.4 Transamination and deamination.
- 2.5 Ornithine cycle
- 2.6 Protein structure & folding, Ramchandran plot
- 2.7 Conjugated proteins: structure and function
- 2.8 Protein-protein interactions

Unit–III : 3.0 **Nucleic Acids**

- 3.1 Structure of DNA
- 3.2 Triplex and quadruplex DNA.
- 3.3 Structural polymorphism of DNA
- 3.4 Circular DNA and super coiling.
- 3.5 Structure, types and functions of RNAs
- 3.6 Nucleic acid-protein interactions
- 3.7 *De novo* and salvage pathways of nucleotide biosynthesis
- 3.8 Degradation of nucleotides

Unit – IV : 4.0. **Carbohydrate metabolism**

- 4.1 Glycolysis, regulation & energetics
- 4.2 TCA cycle & regulation.
- 4.3 Electron transport chain & oxidative phosphorylation
- 4.4 Gluconeogenesis
- 4.5 Glycogenesis & glycogenolysis , regulation
- 4.6 Pentose phosphate pathway and its significance.

Unit – V : 5.0. **Lipid Metabolism**

- 5.1 Chemistry, biosynthesis and functions of triglycerides, phospholipids, sphingolipids, prostaglandins and cholesterol.

- 5.2 Mitochondrial and peroxisomal systems of fatty acid oxidation
- 5.3 α -oxidation of fatty acids
- 5.4 β - and ω -oxidation of fatty acids.
- 5.5 Energetic of fatty acid oxidation
- 5.6 Role of carnitine shuttle
- 5.7 Ketone bodies – Structure, biosynthesis and functions

M.Sc.II (Zoology) Semester IV

PAPER XIV (COMPALSORY)

ENZYMOLGY AND BIOSTATISTICS

- Unit I : 1.0 Enzyme: Structure, Classification & kinetics**
- 1.1 Origin of enzymes: RNA as first enzyme of life
 - 1.2 Classification and nomenclature of enzymes
 - 1.3 Structure of enzyme, e.g., Chymotrypsin
 - 1.4 Active site, Mechanism of action of – Chymotrypsin, Enolase and Hexokinase
 - 1.5 Kinetics of single substrate and bisubstrate enzyme catalyzed reactions, cooperativity
- Unit II : 2.0 Enzyme: Categories & Functions**
- 2.1 Enzymes involved in energy production
 - 2.2 Enzymes involved in biodegradation.
 - 2.3 Activators and inhibitors of enzymes
 - 2.4 Isozymes, ribozymes and abzymes
 - 2.5 Allosteric enzymes
 - 2.6 Zymogen activation & covalent modification
- Unit-III : 3.0 Enzyme: Functional diversity & applications**
- 3.1 Coenzymes, mechanism of action
 - 3.2 Immobilized enzymes and their applications
 - 3.3 Enzymes involved in protein synthesis
 - 3.4 Enzymes involved in free radical formation
 - 3.5 Enzymes involved in cell signaling
 - 3.6 Enzymes involved in nucleic acid metabolism

- Unit-IV : 4.0 Biostatistics:**
- 4.1 Diagrammatic representation of data (Line graph, Bar diagram, Pie diagram)
 - 4.2 Graphic representation of data (histogram, frequency polygon, frequency curve cumulative frequency)
 - 4.3 Confidence Intervals (CI)
 - 4.4 Standard deviation,
 - 4.5 Standard error,
 - 4.6 Significance test (student 't' test)- paired and unpaired
- Unit-V : 5.0. Biostatistics (continued)**
- 5.1 chi square test as a test for goodness of fit
 - 5.2 Analysis of variance (ANOVA)
 - 5.3 correlation analysis, correlation types and methods to study correlation, significance test of correlation coefficient
 - 5.4 Regression analysis, kinds of regression analysis (regression line, regression equations)
 - 5.5 Estimation of allele frequency (dominant and co-dominant cases)
 - 5.6 Examples on Hardy-Weinberg equilibrium

Suggested Reading Material (All latest editions)

1. Animal Cell Culture – A practical approach, Ed. John R.W.Masters.IRL Press.
2. Introduction to instrumental analysis, Robert Braun. McGraw Hill International Editions.
3. A Biologists Guide to Principles and Techniques of Practical Biochemistry. K. Wilson & K.H. Goulding, ELBS Edn.
4. Molecular Cell Biology, J. Darnell, H.Lodish and D. Baltimore Scientific American Book, Inc. USA.
5. Molecular Biology of the Cell, B.Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts and J. D. Watson. Garland Publishing Inc., New York
6. Samuel Delvin, Enzymes, Sarup & Sons, N.Delhi
7. Practical biochemistry edited by Walker
8. The cell, a molecular approach: Cooper
9. Molecular cell biology: Gerald Karp
10. Foundation in microbiology: Talaro

11. Microbiology: Pelczar
12. Biology of micro- organisms: Madigan, Martinko and Parker.
13. Biophysical chemistry- Principles and technique: Upadhyay, Nath
14. Statistical techniques in Bioassay Z.Govindarajulu (2000): Pub. S.Kargar
15. Statistical method in Bioassay Pub D.J.Finney (1971): Griffin
16. Laboratory manual for Biochemistry and Molecular biology, Shivnery Publishers R.N. Vankhede & S. N. Niwane
17. Probit analysis D.J.Finney (1971) :, 3rd edition Pub. Griffin

Practical -7

Based on papers XIII and XIV and elective paper XV and XVI (mentioned in the concern syllabi)

- 1) Determination of isoelectric pH of protein and amino acids.
- 2) Isolation of casein from milk
- 3) Study effect of pH and temperature on enzyme activity. Ex. Salivary amylase.
- 4) To study the effect of inhibitors on enzyme activity.
- 5) Determination of acid value of fat.
- 6) Determination of saponification value of fat.
- 7) Colorimetric estimation of some respiratory enzymes.
- 8) Estimation of plasma / serum glucose
- 9) Estimation of glycogen from tissue.
- 10) Estimation of serum cholesterol
- 11) Estimation of phospholipids
- 12) Estimation of lactate dehydrogenase
- 13) Estimation of plasma proteins
- 14) Estimation of Na ions.
- 15) Estimation of K ions.
- 16) Estimation of calcium
- 17) Colorimetric estimation of some respiratory enzymes
- 18) Estimation of lactate dehydrogenase
- 19) Estimation of ATPase
- 20) Estimation of SGOT / SGPT
- 21) Estimation of Acetylcholinesterase
- 22) Estimation of acid alkaline phosphatase
- 23) Estimation of catalases

- 24) Examples from Biostatistics as per theory
- 25) Preparation of PowerPoint program on a given topic
- 26) Drawing graphs and tables on computer.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Candidates shall be required to produce at the practical examination, the following-

Practical Record Book duly signed by the teacher in-charge and certified by the Head of the Department as the bonafide work of the candidate.

The practical shall be of six hours duration and distribution of marks will be as follows:

Distribution of Marks: Based on papers XIII and XIV and elective groups paper XV and XVI

1)	Estimation /experiment:	30	
2)	From elective paper (Estimation / experiment / Dissection) :	20	
3)	Example / Experiment /slide / computer based practical :	25	
4)	Class Record, collection, slides (as per syllabus) :	10	
5)	Viva-Voce :	15	
Total :		100	=====
			=====

M.Sc. II.(Zoology) Semester IV

Paper – XV

(Elective paper: MOLECULAR BIOLOGY-III)

(Molecular Immunology –1)

Unit-I : 1.1 The immune system

- 1.1.1 Innate and Acquired immunity, Interrelationship between Innate and Acquired Immunity
- 1.1.2 Organization and structure of lymphoid organs
- 1.1.3 Cells of the immune system and their differentiation and functions
- 1.1.4 Lymphocyte traffic

1.2. Nature of antigens and immunogens

- 1.2.1 Antigenicity and immunogenicity
- 1.2.2 Requirements for Immunogenicity: Foreignness, High Molecular Weight, Chemical Complexity, Degradability
- 1.2.3 Epitopes, Haptens, Adjuvants
- 1.2.4 Superantigens

Unit-II : 2.0 Structure and Functions of antibodies:

- 2.1 Classes and subclasses
- 2.2 Structural Features of IgG: Structure of Light and Heavy Chains, Domains, Hinge Region, Variable Region, Immunoglobulin Variants, Isotypes, Allotypes, Idiotypes,
- 2.3 Biologic Properties of IgG
- 2.4 Structural Features of IgM, Biologic Properties of IgM
- 2.5 Structural Features of IgA, Biologic Properties of IgA
- 2.6 Structural Features of IgD, Biologic Properties of IgD
- 2.7 Structural Features of IgE, Biologic Properties of IgE
- 2.8 Antibody mediated effector functions
- 2.9 **Complement system:** Alternate, Classical and Lectin pathways, Late steps of complement activation, Structure and functions of MAC, Receptors for complement proteins, Regulation of complement activation, Functions of Complement system

Unit-III : 3.1 Biology of T - lymphocytes:

- 3.1 Isolation, molecular components and structure
 - 3.1.2 T-cell generation, maturation, activation, proliferation and differentiation
 - 3.1.3 T cell Receptor Complex
 - 3.1.4 T cell Co receptors
 - 3.1.5 Other Important Molecules expressed on the T cell Surface
- 3.1.6 Generation of T cell Receptor Diversity
- 3.1.7 T Cell death and T-cell population
- 3.1.8 Cell mediated effector functions
- 3.1.9 Signal Transduction by the TCR Complex

- 3.2.1 Intracellular signaling events during T cell activation
- 3.2.2 MAP kinase signaling pathways in T lymphocytes
- 3.2.3 Calcium and PKC-mediated signaling pathways in T lymphocytes
- 3.2.4 Activation of transcription factors that regulate T cell gene expression

Unit-IV : 4.1 Biology of B - lymphocytes:

- 4.1.1 B-cell generation, maturation, activation, proliferation and differentiation
- 4.1.2 B-cell receptors
- 4.1.3 Selection of immature self-reactive B-cells
- 4.1.4 T-B cell interactions
- 4.1.5 Humoral immune response
- 4.1.6 Signal Transduction by the BCR Complex
- 4.1.7 Role of complement in B cell activation
- 4.1.8. 0 Mechanisms of action of CTL and NK cells

4.2.0 Immunological memory**4.3 Immunologic tolerance****Unit-V : 5.1 Cytokines:**

- 5.1.1 General Properties of Cytokines
- 5.1.2 Cytokines that mediate and regulate innate immunity
- 5.1.3 Cytokines that mediate and regulate adaptive immunity
- 5.1.4 Cytokines that Stimulate Hematopoiesis,
- 5.1.5 Cytokine receptors and Cytokine Receptor-Mediated Signal Transduction
- 5.1.6 Role of Cytokines and Cytokine Receptors in Diseases

5.2 Major Histocompatibility Complex in mouse and HLA system in human:

- 5.2.1 MHC haplotypes
- 5.2.2 Structure of Class I and Class II molecules
- 5.2.3 Peptide binding
- 5.2.4 Genomic organization of the MHC
- 5.2.5 Expression and diversity
- 5.2.6 Disease susceptibility and MHC/HLA

M.Sc.II (Zoology) Semester IV
Paper – XVI
(Elective paper: MOLECULAR BIOLOGY-IV)
.(MOLECULAR IMMUNOLOGY –II)

- Unit-I** : 1.1 *in vitro* Antigen-Antibody interactions
- 1.1.1 Characteristics of Antigen-antibody reactions
 - 1.1.2 Agglutination reactions
 - 1.1.3 Precipitation reactions: Fluid and Gel
 - 1.1.4 ELISA
 - 1.1.5 RIA
- 1.2. Hybridoma technology: Immunization of animals, Isolation of stimulated spleen cells, Myeloma cell line used as fusion partners, Fusion methods, detection and applications of monoclonal antibodies.
- Unit-II** : 2.1 Principles of Immunization
- 2.1.1 Active Immunization:
 - 2.1.2 Basic Mechanisms of Protection, Significance of the Primary and Secondary Responses, Age and Timings of Immunizations, Precautions, Site of Administration of Antigen, Hazards
 - 2.1.3 Vaccines:
 - Vaccines Produced by Recombinant DNA Technology, Conjugated Polysaccharide vaccines, Synthetic Peptide Vaccines, Anti-Idiotypic Vaccines, Virus-vector Vaccines, Bacterium-vector Vaccines, DNA Vaccines, Toxoids as vaccines, Edible vaccines, Immunorobot and nubot.
- 2.2. Passive Immunization:
- Passive Immunization through Placental Antibody Transfer, Passive Immunization via Colostrum, Passive Antibody Therapy and Serum Therapy, Preparation and Properties of Human Immune Serum Globulins
- 2.3 Autoimmunity and Diseases:
- 2.3.1 Antibody mediated autoimmune diseases
 - 2.3.2 T Cell mediated autoimmune diseases

- 2.1.3 Immune complex mediated autoimmune diseases
- 2.1.4 HLA linked immunological diseases
- 2.1.5 Pathogenesis of autoimmunity

- Unit-III** : 3.1 Hypersensitivity Reactions:
- 3.1.1 Hypersensitivity and immune response to infectious agents especially intracellular parasites
 - 3.1.2 Antibody Mediated (Type-I) Reactions: General characteristics of Allergic Reactions, Sensitization Phase: IgE Antibody Production, Activation Phase, Effector Phase, Preformed Mediators, Newly Synthesized Mediators, Late Phase Reaction, The Protective Role of IgE.
 - 3.1.3 Antibody Mediated (Type-II) Cytotoxic Reactions: Type II Hypersensitivity, Complement-Mediated Reactions, Antibody-Dependent Cell-Mediated Cytotoxicity, Antibody-Mediated Cellular Dysfunction, Examples of Cytotoxic Hypersensitivity Reactions, Transfusion Reactions, Drug-Induced Reactions, Rhesus-Incompatibility Reactions.
 - 3.1.4 Type III Hypersensitivity: Systemic Immune Complex Diseases, Localized Immune Complex Diseases.
 - 3.1.5 Cell-Mediated (Type- IV) Delayed-Type Hypersensitivity:
 - General Characteristics and Pathophysiology of DTH, Mechanisms of DTH, Consequences of DTH, Examples of DTH, Contact Sensitivity, Granulomatous Hypersensitivity, Tuberculin-Type Hypersensitivity, Allograft Rejection
- Unit-IV** : 4.1 Immunodeficiency:
- 4.1.1 Immunodeficiency disorders : Acquired immunodeficiency syndrome - Origin of AIDS virus, Structure of HIV, Mechanism of infection, HIV-I genome, T_H cell specificity for HIV infection, Mechanism of destruction of T cells, Functional abnormalities of different cell types in AIDS patient, Development of AIDS vaccine.

- 4.2 Transplantation Immunology:
- 4.3 Immune Responses to Allografts: Recognition of Alloantigens, Activation of Alloreactive Lymphocytes
- 4.4 Effector Mechanisms of Allograft Rejection: Hyperacute Rejection, Acute Rejection, Graft Vasculopathy and Chronic Rejection
- 4.5 Xenogeneic Transplantation
- 4.6 Blood Transfusion
- 4.7 Bone Marrow Transplantation: Graft-Versus-Host Disease, Immunodeficiency after Bone Marrow Transplantation

Unit-V : 5.1 Tumor immunology:

- 5.1.1 Tumor Antigens:
 - Products of Mutated Genes, Abnormally Expressed Cellular Proteins, Antigens of Oncogenic Viruses, Oncofetal Antigens, Altered Glycolipid and Glycoprotein Antigens, Tissue-Specific Differentiation Antigens,
- 5.1.2 Immune Responses to Tumors: Innate Immune Responses to Tumors, Adaptive Immune Responses to Tumors
- 5.1.3 Evasion of Immune Responses by Tumors
- 5.1.4 Immunotherapy for Tumors: Stimulation of Active Host Immune Responses to Tumors, Passive Immunotherapy for Tumors with T Cells and Antibodies
- 5.1.5 The Role of the Immune System in Promoting Tumor Growth
- 5.2 Animal Cell Culture:
 - 5.2.1 Importance of Animal Cell Culture Technology
 - 5.2.1 Serum and Serum Free Culture Media
 - 5.2.3 Culturing and Sub-Culturing of Animal Cells, Monolayer culture techniques, Primary culture
 - 5.2.4 *In Vitro* Transformation of Animal Cells
 - 5.2.5 Measurement of growth and viability of cells in culture
 - 5.2.5 Cell Line Preservation
 - 5.2.6 Cell Line Characterization.

Practical to be carried out in practical No. 7

1. Identification of blood groups - A, B, AB, O and Rh
2. Estimation of total proteins.
3. Estimation of histone proteins.

Along with also carried out necessary experiments relevant to the syllabi depending on resources, and availability.

Suggested reading materials (All latest editions):

1. Basic Immunology: Abul K. Abbas, Andrew H. Lichtman. Latest edition, Publisher: Elsevier Health Sciences.
2. Immunology. David A. Goldsby, Janis Kubly, Thomas J. Kindt, Barbara A. Osborne Latest edition, Publisher: W. H. Freeman Company.
3. Immunology. Ivan Roitt, Jonathan Brostoff, David Male, David K. Male (Editor). Latest edition, Publisher: Elsevier Health Sciences.
4. Cellular Interactions and Immunobiology (Biotol S.) Latest edition. Publisher: ButterworthHeinemann.
5. Defence Mechanisms, Biotol Series, Butterworth/Heinemann, Oxford, UK.
6. HighYield Immunology. Arthur G. Johnson . Latest edition / Pub. Publisher: Lippincott Williams & Wilkins.
7. B Alberts *et al*, Essential Cell Biology: An Introduction to the Molecular Biology of the Cell. 2/e, 2003. ISBN 0-8153-3480-X (with CD-ROM). A short version of the Alberts book listed above.

M.Sc.II. (Zoology) Semester IV

Paper – XV

(Elective paper: Entomology -III)

DEVELOPMENTAL AND COMMERCIAL ENTOMOLOGY

- UNIT I** : 1.1 Types of immature stages in insect orders, morphology of egg, nymph/larva And pupa.
- 1.2 Types of metamorphosis.
- 1.3 Comparative study of life history strategies in hemimetabola and holometabola, immature stages.
- 1.4 Significance of immature stages for pest management.
- UNIT II** : 2. Bee keeping-
- 2.1 General colony management during different seasons. Seasonal management.

- 2.2 Managing colonies for honey production and pollination.
- 2.3 Artificial queen rearing.
- 2.4 Pests and diseases of honey bees.
- 2.5 Bee poisoning.
- 2.6 Production and marketing of quality honey and value added honey products.
- 2.7 Establishment and maintenance of apiaries.

UNIT III : Mulberry sericulture:

- 3.1 Cultivation of food plants.
- 3.2 Bioecology of mulberry silkworms.
- 3.3 Rearing of silkworms.
- 3.4 Harvesting and processing of cocoons
- 3.5 Reeling appliances
- 3.6 Diseases of *Bombyx mori*
- 3.7 Predators and parasitoids of silkworm and their management

UNIT IV : 4. Non-Mulberry sericulture:

- 4.1 Tasar sericulture: Cultivation of food plants , Bioecology and rearing of tasar silkworms Pupation and cocoon formation. Stifling and reeling of cocoons
- 4.2 Muga sericulture; Cultivation of food plants Bioecology and rearing of Muga silkworms Pupation and cocoon formation Grainage technology Stifling and reeling of cocoons
- 4.3 Eri sericulture: Cultivation of food plants, Bioecology and rearing of tasar silkworms, Pupation and cocoon formation Stifling and reeling of cocoons

UNIT V : 5.1 Lac culture:

- 5.1.1 Lac insect and its life history ,
- 5.1.2 Host plant management
- 5.1.3 Strains of lac insects, Propagation of lac insects, Lac crop management,
- 5.1.5 Natural enemies of lac insects and their management
- 5.1.6 Lac extraction,

- 5.2 Economic and public health importance of insect pests in human habitation and habitats: biology, damage and control of, mosquitoes, houseflies head and body lice, , cloth moths, crickets, wasps, house dust mites,
- 5.3 Insect pests of cattle, poultry, pet animals and their management.

M.Sc. II (Zoology) Semester IV

Paper – XVI

(Elective paper: Entomology -IV

INSECT PESTS AND PEST CONTROL

- UNIT I :** 1. Nature and extent of damage, seasonal abundance of followings:
- 1.1 Insect pests of cereals and millets
 - 1.2 Major Insect pests of pulses, tobacco, oilseeds..
 - 1.3 Major Insect pests of fiber crops, forages, sugarcane.
- UNIT II :** 2. Nature and extent of damage, seasonal abundance of followings:
- 2.1 Major pests of fruits crop:
 - 2.2 Major Insect pests of Fruit Crops-, mango, guava, banana citrus
 - 2.3 Major Insect pests of Vegetable crops- tomato,, brinjal, okra, all gourds, leafy vegetables etc.
 - 2.4 Major Insect pests of stored grain,
- UNIT III :** 3. Biological control.
- 3.1 History, principles and scope of biological control; important groups of Parasitoids, predators and pathogens;
 - 3.2 Principles of classical biological Control- importation, augmentation and conservation. Biology, adaptation, host seeking behaviour of predatory and parasitic Groups of insects.
 - 3.3 Role of insect pathogenic nematodes, viruses, bacteria, Fungi, protozoa etc., their mode of action.

- UNITIV :** 4.1 Modern trends in pest control: use of chemosterilants, radiation, hormones and pheromones.
- 4.2 Integrated pest management: Principle, modeling and application. Political, social and legal implications of IPM;
- 4.3 Pest risk analysis; pesticide risk analysis; case studies of successful IPM programmes.
- 4.4 Principles and methods of pest management in residential places and public Buildings,
- UNITV :** 5.1 Tools of pest management and their integration- legislative, cultural, physical and mechanical methods;
- 5.2 Classification of insecticides based on mode of entry, mode of action and chemical nature.
- 5.3 Structure and mode of action of Organochlorine, organophosphates, carbamates, pyrethroid, tertiary amines, neonicotinoids, oxadiazines, phenyl pyrozoles, insect growth regulators, microbial, botanicals, new promising compounds, etc.

List of Practical: To be carried with the practical 7

1. Types of immature stages; their collection, rearing and preservation.
2. Identification of immature insects to orders and families, in endopterygote orders viz., Diptera, Lepidoptera, Hymenoptera and Coleoptera using key.
3. Identification of honey bee species, bee castes and special adaptations,
4. Identification and handling of bee-keeping equipments.
5. Dissections of honey bees/silk worm
6. Visit to bee nursery and commercial apiaries.
7. Silkworm rearing and management.
8. Dissections of larval and adult silk moths.
9. Lac host and crop management technology and processing of lac. Products and bye-products of lac.
10. Collection and identification of important pests and their natural Enemies; detection and estimation of infestation and losses in different crops; study of life history of important insect pests.

11. Assessing pest status in dwellings (labs, canteen or hostel), implementation of pest control against flies, mosquitoes, bed bugs, cockroaches.
12. control of silverfishes in the library.
13. Visit to poultry units and assessing pest status in poultries..
14. Laboratory and field evaluation of bioefficacy of insecticides; Bioassay techniques; porbit analysis; evaluation of insecticide toxicity and joint action.
15. Identification of common natural enemies of crop pests (parasitoids, predators, microbes) and weed killers.
16. Visits (only where logistically feasible) to bio-control laboratories to learn rearing and mass production of egg, egg-larval, larval, larval-pupal and pupal parasitoids, common predators, microbes and their laboratory hosts, phytophagous natural enemies of weeds.
17. Field collection of parasitoids and predators.
18. Hands-on training in culturing, identification of common insect pathogens.

Note: Besides these any other additional experiment relevant to the syllabi depending on resources

Suggested reading materials (All latest editions):

1. Atwal AS. 2006. *The World of the Honey Bee*. Kalyani Publ., New Delhi.
2. Ganga G. 2003. *Comprehensive Sericulture*. Vol. II. *Silkworm Rearing and Silk Reeling*. Oxford & IBH, New Delhi.
3. Partiban S & David BV. 2007. *Management of Household Pests and Public Health Pests*. Namratha Publ., Chennai.
4. Singh S. 1975. *Beekeeping in India*. ICAR, New Delhi.
5. Aruga H. 1994. *Principles of Sericulture*. Oxford & IBH, New Delhi.
6. Dhaliwal GS & Arora R. 2003. *Integrated Pest Management – Concepts and Approaches*. Kalyani Publ., New Delhi.
7. Dhaliwal GS, Singh R & Chhillar BS. 2006. *Essentials of Agricultural Entomology*. Kalyani Publ., New Delhi.
8. Flint MC & Bosch RV. 1981. *Introduction to Integrated Pest Management*. 1st Ed., Springer, New York.
9. Partiban S & David BV. 2007. *Management of Household Pests and Public Health Pests*. Namratha Publ., Chennai.
10. Atwal AS, Dhaliwal GS & David BV. 2001. *Elements of Economic Entomology*. Popular Book Depot, Chennai.

11. Dunston AP. 2007. *The Insects: Beneficial and Harmful Aspects*. Kalyani Publ., New Delhi
12. Evans JW. 2005. *Insect Pests and their Control*. Asiatic Publ., New Delhi.
13. Nair MRGK. 1986. *Insect and Mites of Crops in India*. ICAR, New Delhi.
14. Prakash I & Mathur RP. 1987. *Management of Rodent Pests*. ICAR, New Delhi.
15. Saxena RC & Srivastava RC. 2007. *Entomology at a Glance*. Agrotech Publ. Academy, Jodhpur.

M. Sc.II (Zoology) Semester - IV

Paper - XV

Elective Paper - Animal Physiology –III

- Unit-I** :
- 1.0 Physiology Nervous System
 - 1.1 Functional compartmentalization of brain: a) Fore brain, b) Mid brain, c) Hind brain
 - 1.2 Reflex arc and types of reflexes
 - 1.3 Physiology and pharmacology of ANS
 - 1.4 Physiology of sleep: slow wave, Rapid eye movement physiological changes during sleep, sleep and ECG. Neurotransmitters involve in sleep. Wake fullness, sleep producing substances mechanism of sleep.
- Unit-II** :
- 2.1 Physiology of learning
 - 2.2 Mimicry: Cryptic mimicry Concealing mimicry Depressive mimicry
 - 2.3 Audio signals, Echo-location: Organs and physiology
 - 2.4 Bioluminescence: Mechanism of Bioluminescence. Significance of Bioluminescence.
 - 2.5 Bioelectricity
- Unit-III** :
- Homeostasis Physiology
 - 3.1 Water contents and distribution
 - 3.2 Composition of ECF (Extra cellular fluid) and ICF (Intracellular fluid)
 - 3.3 Abnormal water and electrolyte metabolism and water intoxication

- 3.4 Maintenance of pH.
- 3.5 Components of Homeostatic Control system. Reflexes, Local Homeostatic Responses
- 3.6 Intercellular chemical messengers - Paracrine and Autocrine agents. Process related to Homeostasis.

- Unit-IV** :
- 4.1 Adaptation and Acclimatization. Biological Rhythms.
 - 4.2 Balance in the Homeo stasis of chemicals.
 - 4.3 Homeostatic control systems - feed back.
 - 4.4 Basic thermoregulatory mechanism in poikilotherms and Endotherms. Ectothermic adaptations to extreme temperatures. Mechanism of heat production of lors. Endothermic Adaptations to extreme temperature. Control of body temperature in endotherme
 - 4.5 Basic osmoregulatory mechanism in stenohaline and euryhaline species. Fresh water Marine water Terrestrial environment.

- Unit - V** :
- 5.1 Patterns of Nitrogen excretion among different animal Groups.
 - 5.2 Mechanism of calcium and phosphate Homeostasis.
 - 5.3 Liver is important in the storage and Homeostasis of Iron.
 - 5.4 Factors destabilizing homeostasis mechanism fever, Diabetes mellitus and diarrhea.
 - 5.5 Homeostatic mechanism of minerals.
 - 5.6 Homeostasis and ant diuretic hormone.

M. Sc. II (Zoology) Semester - IV

Paper - XVI

Elective Paper - Animal Physiology -IV

- Unit-I** :
- 1.1. Digestion, Absorption, Utilization of Protein, Carbohydrate and Lipid
 - 1.2 Histophysiology of gastric gland
 - 1.3 Secretory Functions of the Alimentary Tract
 - 1.4 Gastrointestinal Function—Motility, Nervous Control

- 1.5. Gastrointestinal peptides
- 1.6 Gastrointestinal disorders (Achalasia, gastritis, pancreatitis and colitis,)
- 1.7 Evolution and role of leptin

Unit-II : Physiology of Respiration

- 2.1 Anatomical and physiological organization of respiratory system.
- 2.2 Mechanism of respiration breathing movements and the exchange of respiration, Respiratory gases at pulmonary surface.
- 2.3 Transport of gases by blood.
- 2.4 Vital capacity and partial pressure of gases, Oxygen dissociation curve, Co₂ dissociation curve.
- 2.5 Respiratory center and Neuro Hormonal and Chemical regulation of respiration.
- 2.6 Carbonic anhydrase, Chloride shift.
- 2.7 Infectious respiratory diseases (SARS, Avian Flu and Swine flu)
- 2.8 Oxygen therapy

Unit-III : Physiology of Circulation

- 3.1. Anaemia and polycythemia, platelets and Blood substitute.
- 3.2 Regulation of heart beat and blood pressure
- 3.3 Circulatory and respiratory responses to extreme conditions
- 3.4 Blood pigments: Role in oxygen transport, Oxygen dissociation curves and their physiological significances, Transport of CO₂.
- 3.5 Origin and conduction of cardiac impulse
- 3.6 Myocardial infarction and cardio myopathy.

- Unit-IV :**
- 4.1 Anatomy and histology of mammalian heart
 - 4.2 Structure & function of Myogenic and neurogenic heart
 - 4.3 Cardiac out put
 - 4.4 Cardiac cycle, Cardiac sound
 - 4.5 Pace Maker system specialized conducting fibers

- Unit - V :**
- 5.1 Blood pressure and its regulation, Factors that affects blood pressures.
 - 5.2 Electro cardiograph, and interpretations of ECG.
 - 5.3 Lymph- composition, Formation
 - 5.4 Functions of lymph
 - 5.5 Structure and functions of lymph nodes.

Practical To be carried with the practical 7: Based on Animal Physiology XV and XVI

1. Properties of saliva. Isolation and identification of rumen micro organisms.
2. Estimation of rumen ammonia and blood urea under various physiological conditions.
3. Normal and abnormal constituents of urine.
4. Microscopic examination of urine.
5. Prepararion and examination of blood smear to study blood cells.
6. Differential leucocytes count.
7. Histochemical demonstration of-
 - Carbohydrates,
 - Proteins,
 - Lipids.
 - Nucleic acids,
 - Acid and alkaline phosphatase.
8. Seperation of protiens by paper and gel electrophores
9. Qualitative analysis of urea, ketone bodies and salts

Note: Besides these any other additional experiment relevant. to the syllabi depending on resources

Suggested Reading Materials(All latest editions)

- 1 Baileys:Text book of Histology
- 2 Bell Davidson: Text book of physiology and Biochemistry
- 3 Bolander F.F.: Molecular endocrinology
- 4 Clerk E.E .C. Isolation and identification of Drugs in pharmaceutical of body fluid and post martical Vol.ISII.
- 5 Cole S. W.: The practical physiological chemistry.
- 6 Cooper: Poisoning by drugs and chemicals.
- 7 Eckert, Marsall: Animal physiology mechanism and Adaptations &

- 8 Eckert & Ranadak: Animal physiology (CBS)2nd ED (1978)
- 9 Garden M.S.: Animal physiology principal and Adaptations.
- 10 Hara & Oserburg; An introduction to crimminalistie.
- 11 Hill R.W.: Comparative physiology of animals
- 12 HoarW.S.: General and comparative physiology.
- 13 Houssa: Human physiology (McGraw Hill Books Compny)
- 14 Hunter& Bornford: Hutchisons Clinical methods
- 15 Hynes: The Biology of polluted water.
- 16 Jacobs M. B.: The analytic toxicology of inorganic poison
- 17 Keil J.B.,Samson Wrightsa, : Applied Physiology
- 18 Heil E. Joets N.: Physiology (Oxford Uni press) (1982)
- 19 Klein L: River pollution, causes& effects
- 20 Madhu Raj: Environmental Management of toxic and hazardous chemicals
- 21 Mill peter J.: Comparative neurobiology (EdHrbord London)
- 22 Modi N.J.: Text Book of toxicology
- 23 Mitchell P.H.: Text Book of General physiology.
- 24 NormanA. W.: Hormones.
- 25 Odum: Fundamental of ecology.
- 26 Osterbong: The crime laboratory
- 27 Philips G: Environmental physiology.
- 28 ProsserC.L.: Comparative animal physiology.
- 29 Ramkumar: Environmental Biodegradation.
- 30 Ramkumar: Environmental Chemical hazards.
- 31 Robert & Cosselin:First & emergency treatment and clinical toxicology of commercial product.
- 32 Seinfeld J.J.: Air pollution(A,P.)
- 33 Smith ptterson: Text Book of physiology (ELBS) Read & Scratched (1988) llth Ed..
- 34 Sern A.C.: Air pollution (A.P.)
- 35 Stewart& stratman: Toxicology mechanism and analytical methods
- 36 Theils: Clinical Toxicology.
- 37 Tomb: An introduction to invertebrate endocrinology (Academic press)
- 38 West Best &Taylor,s: Physiological Basis of medical practice.
- 39 White R. Steions.: Pesticides in environment Vol.1

- 40 Wilsom J. A.: Principles of animal physiology.
- 41 Wod Densus W.: Principles of animal physiology.(Ed.Arbod Lond

M. Sc. II (Zoology) Semester - IV

Paper- XV (Elective paper)

Fisheries-III Fish

Harvest and Post Harvest Technology

UNIT I : National fishery Policy of India

1. Inland fishing gears and fishing methods
 - 1.1 Biological factors in fishing
 - 1.2 Classification of fishing gears
 - 1.3 Natural and synthetic fibers and preparation of fishing nets
 - 1.4 Maintenance of nets
 - 1.5 Fishing crafts- Mechanised and non-mechanised boats
 - 1.6 Unconventional fishing methods- Electrofishing, light fishing , Echosounder and sonar

UNITII : 2.1 Biochemical composition and nutritional value of fish.

2. 2.1 Freshness of fish
- 2.2 Fish decomposition- Post mortem changes and rigormortis, Causes of spoilage.
- 2.3 Methods of fish preservation
 - 1.1 Refrigeration and freezing
 - 1.2 Drying
 - 3 Salting
 - 1.4 Smoking
 - 1.5 Canning,
 - 1.6 Pickling, pasting and spicing
 - 1.7 Fermentation
 - 1.8 Marinating

UNIT-III : 3.0 Fishery by-products, their production and utilization

- 3.1 Liver oils
 - 3.2 Body oils
 - 3.3 Fish meal
 - 3.4 Fish flour
 - 3.5 Fish silage
 - 3.6 Fish solubles
 - 3.7 Fish protein
 - 3.8 Fish guano
 - 3.9 Shark fins and fin rays.
 - 3.10 Fish roes
 - 3.11 Fish glue
 - 3.12 Isinglass
 - 3.13 Fish skin
 - 3.14 Chitin
 - 3.15 Chitosan
 - 3.17 Surgical suture from fish gut
 - 3.18 Pearl
 - 3.19 Fish manure
- UNITIV :**
- 4.1 Fisheries economics and marketing.
 - 4.1.1 Fish Marketing – definition and scope, functions of fish marketing, Markets and market structure,
 - 4.1.2 Types of market: wholesale, terminal, retail, and fairs. Functions: Selling, transportation, storage, gradation, money transaction.
 - 4.1.3 Marketing system: Use flows, physical flows and channel flows. Procedures: Sale proceed at- markets, production centre, head quarters, marketing (intradistrict and interstate).
 - 4.1.4 Strategy for fish market development. Price determination
- UNITV :**
- 5.1 Fisheries managements and extension.
 - 5.2 Government and Fishermen's Co-operative Societies, integration, marketing efficiency, marketing cost and price spread, marketing planning,
 - 5.3 Survey of Fishery Resources.
 - 5.4 Concept of Exclusive Economic Zone (EEZ), Maximum Sustainable Yield (MSY), Maximum

- Economic Yield (MEY), Optimum Sustainable yield (OSY), Fish Farmers Developmental Agencies.
- 5.5 Institutional Support to fisheries, Crop Insurance

M. Sc. II (Zoology) Semester - IV

Paper- XVI (Elective paper)

Fisheries-IV

Fish Reproductive physiology and pathology

- UNIT I :**
- 1.1 Functional morphology of gonads of teleost.
 - 1.1.1 Gametogenesis
 - 1.1.2 Gonadal steroidgenesis and its control
 - 1.2. Reproductive behaviour and pheromones
 - 1.3. Types and mode of reproduction
 - 1.4 Secondary sexual characters
 - 1.5 Sexuality ,Intersex ,Bisexuality, Hermaphroditism
 - 1.6 Parental care.
- UNITII :**
- 2.1 Cryo-preservation of gametes and embryo (gene banking)
 - 2.2 Fecundity, Survival and Mortality in fishes
 - 2.3 Induced breeding
 - 2.4 Factors affecting spawning
 - 2.5 Hypophysation
 - 2.6 Use of different synthetic and natural hormones, their formulation and Mechanism of action
 - 2.7 Bundh Breeding
- UNITIII :**
- 3.1. In vitro fertilization and incubation
 - 3.2. Fish seed collection from natural resources
 - 3.3. Identification and differentiation of eggs and hatchlings of
 - 3.4 Indian Major carps & common cat fish.
 - 3.5 Development of fish up to hatchlings Fish and Fish seed transport,
 - 3.6 Fundamentals of fish genetics
 - 3.7 Fish Biotechnology.
 - 3.8 Gynogenesis Androgenesis Polyploidy Production of monosex population Hybridization
 - 3.9 Transgenic fishes

- UNITIV :** 4. Endocrinology
- 4.1 Hypothalamo-hypophyseal system
 - 4.2 Functional morphology of pituitary
 - 4.3 Hypothalamic control of pituitary
 - 4.4.7 Structure and functions of the Pineal
 - 4.4.1 Structure and functions of the Thyroid, Ultimobranchials, Pancreas
 - 4.4.4 Structure and functions of the Adrenal Corpuscles of Stannius Urophysis

- UNITV :** 5.0 Fish Pathology, prophylaxis and therapy
- 5.1 Protozoan diseases of fish
 - 5.2 Helminth diseases of fish
 - 5.3 Crustacean parasites of fish
 - 5.4 Fungal diseases of fish
 - 5.5 Bacterial diseases of fish
 - 5.6 Viral diseases of fish
 - 5.7 Nonparasitic diseases

Practicals to be carried out along with practical VII, Based on – Paper- XV (Elective paper) Fisheries-III Fish Harvest and Post Harvest Technology Paper- XVI (Elective paper) Fisheries-IV Fish Reproductive physiology and pathology

1. Study of gonadal development in carps and other cultivable finfishes
2. Induced breeding of fishes through various inducing agents
3. Evaluation of carp milt and egg.
4. Collection and Identification of carp spawn and fry
5. Determination of age of fish by scale reading.
6. Study of length weight relationship in fish.
7. Morphometric study of given fish.
8. Exercises on Hardy-Weinberg equation.
9. Isolation of DNA from fish blood
10. Collection, identification and isolation of live food organisms using various techniques
11. Preparation of various culture media
12. Mass culture of cladocerans, copepods and rotifers.

Books Recommended

1. Bentley, P. J., Comparative Vertebrate Endocrinology, Cambridge University Press, 2000.
2. Bond, C.E., Biology of Fishes, Saunders College Publishing Philadelphia, 1979.
3. Brown, M.E., The Physiology of Fishes Vol. I, II. Academic Press, 1953 & 1957
4. C.I.F.R.I., Prawn Fisheries Bulletin No. 10, 1977.
5. Chakroff, M., Freshwater Fish Pond Culture and Management, Scientific Publishers, 1987.
6. Datta-Munshi, J.S. & Hughes G. M., Air-breathing fishes of India, Oxford and IBH Publ. Co. New Delhi, 1992.
7. Davis, H. S., Culture and Diseases of Game Fishes, University of California Press, 1956
8. Duijn, C. V., Diseases of Fishes, London Iliffe Books Ltd, 1967.
9. Evans, D.H., The Physiology of Fishes, CRC Press, 1998
10. Gopakumar, K., Singh, B.N. and Chitranshi, V.R. Fifty Years of Fisheries Research in India, Fisheries Division Indian Council of Agricultural Research, New Delhi, 2000.
11. Gorbman et al: Comparative Endocrinology, John Wiley & Sons, New York, Chichester, Brisbane
12. Hadley, M. E., Endocrinology, Prentice Hall, International Editions, 2000.
13. Hall, C. B., Ponds and Fish Culture, Agro Botanical Publishers, 1994
14. Hoar W.S. & Randall, D. J., Fish Physiology, Series Vol. I - XIV, Academic Press
15. Hora, S. L. and Pillay, T.V. R., Handbook on Fish Culture in the Indo-Pacific Region, Fisheries Division, Biology Branch, FAO, 1962.
16. Howard & Churchill, Canning technology. London
17. Huet, M., Textbook of Fish Culture, Breeding and Cultivation of Fish, Fishing News (Books) Ltd., 1989.
18. Hughes, G. M. Comparative Physiology of Vertebrate Respiration, Heinemann Educational Books Ltd., 1967
19. Jhingran, V.G. Fish and Fisheries of India. Hindustan Publishing Corporation, New Delhi. 1985.
20. Khanna S. S. and H. R. Singh. A textbook of Fish Biology and Fisheries, Narendra Publishing House, 2003
21. Kreuzer, R., Fishery products, FAO, Fishing News (Books) Ltd., England. 1974.

22. Kurian and Sebastian. Prawns and Prawn Fisheries of India. Hindustan Publ. Co., 1976.
23. Lagler, K. F. Studies in fresh water fishery biology 1950
24. Lagler, K. F., Bardach J.E., Miller R.R. and May Passino, D.R. Ichthyology, John Wiley, 2003.
25. Nilsson, S. & Holmgren, S., Fish Physiology Recent Advances, Croom Helm, London, 1986.
26. Norman, J. R. and Greenwood P. H. A History of Fishes, Third Ed., Ernest Benn Limited, London. 1975.
27. Norris, D. O., Vertebrate Endocrinology (2nd ed.), Academic Press, 1997.
28. Proceedings of International Symposium on Reproductive Physiology of fishes. 1982, 1987, 1991, 1995, 1999 (68) Piska R. S., Fisheries and Aquaculture, Lahari Publications Hyderabad
29. Ribelin, W. E. & Migaki, G., The Pathology of Fishes, The Univ. of Wisconsin Press, 1975.
Rick Parker, Aquaculture Science, 2nd Edition, Delmar Thomson Learning
30. Rounsfell, G.A. and Everhart, W. H., Fishery Science: It's Methods and Applications, John Wiley & Sons, Indian Reprint International Books and Periodicals Supply Service, New Delhi 1985.
31. Santhanam, R. Fisheries Science, Daya Publishing House, 1990.
32. Singh, B. R. Advances in Fish Research, Vol. I and II Narendra Publishing House, Delhi 1993 and 1997.
33. Srivastava, C.B.L. A Textbook of Fishery Science and Indian Fisheries, Kitab Mahal. 1985
34. The Wealth of India, Raw Materials Vol. IV, Fish and Fisheries, CSIR, 1962.

M.SC.IIZOOLOGY

SEMESTER-IV

Project Work:

The subject of the project will be given to a student independently on any topic belonging to Life sciences. The examinee shall be required to produce three typed copies of project signed by teacher in-charge and certified by the department as bonafide work of him/her. Oral presentation is necessary to explain details there of the project. Therefore, he/she is required to prepare transparencies for O.H. P. or slides for slide projector, or power point program for L. C. D. projector if available. The *viva voce* on the project shall be the part of interaction among the examiner and the student presenting his/her project. Valuation and marks will be submitted to the university.

Distribution of marks –

1.	Project submission	80
2	Viva)	20
Total :		100 marks

NOTIFICATION

No. 49/2018

Date : 7th June, 2018

Subject : Implementation of Syllabi of Various Courses / Subjects as per Semester and Credit & Grade System in the Faculty of Humanites. from the session 2018-2019 and Onwards.

It is notified for general information of all concerned that, the authorities of the University has accepted Semester Credit & Grade System syllabi of various Courses/ Subjects of M.A. Part-II Semester-III & Semester – IV mentioned in column No.2 and which is to be implemented stagewise from the session 2018-2019 and onwards, with appendices as shown in column No.3 of the following table.

TABLE

Sr.No.	Course / Subjects	Appendices of the New Syllabi
1	2	3.

M.A.Part-II Semester – III & IV

1. English
The Syllabi prescribed for the Course M.A.Part-II (English) which is appended herewith as **Appendix-A**
2. Marathi
The Syllabi prescribed for the Course M.A.Part-II (Marathi) which is appended herewith as **Appendix-B**
3. Hindi
The Syllabi prescribed for the Course M.A. Part-II (Hindi), which is appended herewith as **Appendix-C**
4. Translation Hindi
The Syllabi prescribed for the Course M.A. Part-II (Translation Hindi), which is appended herewith as **Appendix-D**
5. Sanskrit
The Syllabi prescribed for the Course M.A. Part-II (Sanskrit) which is appended herewith as **Appendix-E**
6. Urdu
The Syllabi prescribed for the Course M.A.Part-II (Urdu), which is appended herewith as **Appendix-F**
7. Pali & Prakrit
The Syllabi prescribed for the Course M.A.Part-II (Pali & Prakrit), which is appended herewith as **Appendix-G**
8. Music
The Syllabi prescribed for the Course M.A.Part-II (Music), which is appended herewith as **Appendix-H**

Sd/-
Registrar
Sant Gadge Baba Amravati University.

Appendix-A

M.A.II ENGLISH

Semester- III

Compulsory/ Core Papers

- 3.1 Indian Writing in English
- 3.2 Critical Theory

Elective Papers (Any Two)

- 3.3 American Literature -I
- 3.4 African, Afro-American, and Latin American Literature
- 3.5 Classical Literature
- 3.6 Pragmatics, Stylistics and Sociolinguistics
- 3.7 Literature and Gender
- 3.8 Shakespearean Studies
- 3.9 Non-Fiction

M.A.II ENGLISH

Semester- IV

Compulsory/ Core Papers

- 4.1 Indian Writing in English
- 4.2 Critical Theory

Elective Papers (Any Two)

- 4.3 American Literature -II
- 4.4 Colonial and Post-Colonial Studies
- 4.5 World Literature in English
- 4.6 English Language Teaching
- 4.7 Cultural Studies
- 4.8 Translation Studies
- 4.9 Alternative Literature

Internal structure of the Question Paper:

Compulsory/ Core Paper-I: Indian Writing in English (Semester-III &IV)

- 1) There shall be in all Five Compulsory questions.
- 2) The First question in each compulsory/Core paper will be for 'Reference to the Context' on the texts prescribed. There shall be 06 passages/paras/stanzas for explanation/analysis out of which FOUR have to be attempted each carrying 04 marks
- 3) The Second question will have A and B Sections. Section-A comprises Short Notes. Three Short Notes will have to be attempted out of five each carrying 04 marks
Section-B will be an objective type question to test student's acquaintance with the authors and their works. This Section will carry 07 marks. (Total No. of MCQs 07 x 01=07 Marks)
- 4) The Third question will be Long Answer Question (LAQ) with an Internal choice. The students will have to attempt any One question out of two on Unit 1 carrying 15 marks.
- 5) The Fourth question will be a Long Answer Question on Unit-II. Students will have to attempt any One question out of two carrying 15 marks.
- 6) The Fifth question will also be a Long Answer Question on Unit-III. Students will have to attempt any One question out of two carrying 15 marks.

Abstract

1 st question Reference to the Context 4 out of 06 = 04 marks each	Total 16 Marks
2 nd question A section Short Notes 03 out of 05 = 04 marks each	Total 12 Marks
B section Objective type questions 01 marks each	07 Marks
	Total 35 Marks

3rd question LAQ Unit 1 One out of Two carrying 15 marks

4th question LAQ Unit-II One out of Two carrying 15 marks

5th question LAQ Unit-III One out of Two carrying 15 marks

+ Total 45 Marks

=Total 80 Marks

Compulsory/ Core Paper-II: Critical Theory (Semester-III &IV)

- 1 There shall be in all SIX Compulsory questions.
- 2 The first question in this paper will be on critical analysis /contextual explanation on the texts prescribed. There shall be 06 passages / paras/ significant statements for explanation/analysis out of which FOUR have to be attempted each carrying 04 marks.
- 3 The Second question will have A and B Sections. Section- A comprises of Short notes. Two Short notes will have to be attempted out of four each carrying 04 marks
Section-B will be an objective type question to test student's acquaintance with the authors and their works. This Section will carry 06 marks. (Total No. of MCQs 06 x 01=06 Marks)

- 4 The Third question will be Long Answer Question (LAQ) with an internal Choice. The students will have to attempt any One question out of two on Unit 1 carrying 15 marks.
- 5 The Fourth question will be a Long Answer Question on Unit-II. Students will have to attempt any One question out of two carrying 15 marks.
- 6 The Fifth question will also be a Long Answer Question on Unit-III. Students will have to attempt any One question out of two carrying 15 marks.
- 7 The Sixth question will have Two Unseen (1 Poetic and 1 Prosaic) Passages for critical analysis. Students will have to attempt any One question carrying 05 marks.

Abstract

1 st Question on Close Reading of the critical texts 4 out of 06 = 04 marks each	Total 16 Marks
2 nd Question A section Short Notes 02 out of 04 = 04 marks each	Total 08 Marks
B section 06 Objective type questions =06(01 marks each)	06 Marks
	Total - 30 Marks
3 rd Question LAQ Unit I One out of Two carrying 15 marks	
4 th Question LAQ Unit-II One out of Two carrying 15 marks	
5 th Question LAQ Unit-III One out of Two carrying 15 marks	
6 th Question Two Unseen Poetic and Prosaic Passages 01 out of 02 carrying 05 marks	

Total 50 Marks
Total = 80 Marks

Distribution of Marks for the Internal Assessment

Maximum Marks	Assignment	Seminar with PPT /Viva-Voce /Study Tour with Report Submission
20	10	10

Elective Papers: [For all Elective papers except 4.8 Translation Studies]

1. There shall be in all Five Compulsory questions.
2. The first question will have two sections: Section A and Section B.
 - a. Section-A comprises of Short Notes. A candidate will have to attempt any Three Short Notes out of six, each carrying 05 marks.
 - b. Section B will be of Multiple Choice Question each carrying 01 mark.
3. The Second question in the question paper will be a Long Answer Question (LAQ) based on Unit I with an Internal Choice it will carry 15 Marks
4. The Third LAQ (Long Answer Question) will be based on Unit 2 with an Internal choice, carrying 15 marks.
5. The Fourth Long Answer Question (LAQ) will be based on Unit-3 with an Internal choice, carrying 15 marks.
6. The Fifth Long Answer Question (LAQ) will be based on Unit-4 with an Internal choice, carrying 15 marks

Abstract

1 st question on Section A short Notes 03 out of 06 carrying 05 marks each	15 Marks
Section B Multiple Choice questions	05 marks
Total 05 carrying 01 mark each	Total – 20 Marks
2 nd question Unit I LAQ with an Internal choice carrying 15 Marks	15 Marks
3 rd question Unit II LAQ with an Internal choice carrying 15 Marks	15 Marks
4 th question Unit III LAQ with an Internal choice carrying 15 Marks	15 Mark
5 th question Unit IV LAQ with an Internal choice carrying 15 Marks	15 Mark

Maximum Marks	Assignment	Seminar with PPT /Viva-Voce /Study Tour with Report Submission
20	10	10

For Elective Paper - 4.8 Translation Studies

- 1) There shall be in all Five Compulsory questions.
- 2) The first question will have two sections, Section A and Section B.

Section A comprises of Short Notes . A candidate will have to attempt any three Short Notes out of six each carrying 05 marks.

Section B will be of Multiple Choice Question each carrying 01 mark.

- 3) The Second question in the question paper will be a Long Answer Question (LAQ) based on Unit 1 with an Internal Choice it will carry 15 Marks
- 4) The third LAQ (Long Answer Question) will be based on Unit 2 with an Internal Choice, carrying 15 marks.
- 5) The Fourth Long Answer Question (LAQ) will be based on Unit-3 with an Internal Choice, carrying 15 marks.
- 6) The Fifth Long Answer Question (LAQ) will be based on the *translation* of a Literary Text (unseen prose/Poetry/official document/News article) from Marathi/Hindi to English or English to Marathi/Hindi with an Internal choice, carrying 15 marks

Abstract

1st question on Section A short Notes 03 out of 06 carrying 05 marks each 15 Marks

Section B Multiple Choice questions 05 marks

Total 05 carrying 01 mark each Total – 20 Marks

2nd question Unit 1 LAQ with an Internal Choice carrying 15 Marks 15 Marks

3rd question Unit 2 LAQ with Internal Choice carrying 15 Marks 15 Marks

4th question Unit 3 LAQ with an Internal Choice carrying 15 Marks 15 Mark

5th question Unit 4 LAQ with an Internal Choice carrying 15 Marks 15 Mark

Maximum Marks	Assignment	Seminar with PPT /Viva-Voce /Study Tour with Report Submission
20	10	10

M.A.II

3rd Semester

Compulsory/ Core Papers

3.1. Indian Writing in English – Paper I

Semester-III

Unit I: Historical Background/Prose/Poetics

- a) The Winds of Change: 1857 to 1920, Independence and After: Poetry, Prose and Drama (from M.K. Naik, *A History of Indian English Literature*, Sahitya Academy, 1982, reprint 2009)
- b) The Gandhian Whirlwind: 1920 to 1947, Independence and After: Fiction, Short Story (from M. K. Naik, *A History of Indian English Literature*, Sahitya Academy, 1982, reprint 2009)
- c) Jawaharlal Nehru – From *Discovery of India*, “The Epics, History, Tradition and Myth”, “The Mahabharat”, The Bhagwat Gita”, “The Old Indian Theatre”
- d) Rabindranath Tagore: *What is Art?*

Unit II: Poetry-I

- a) Henry Derozio: 1) The Harp of India, 2) India-My Country 3) To the Pupils of the Hindu College
- b) Toru Dutt: 1) Lakshman 2) The Lotus 3) Our Casuarina Tree 4) Sita
- c) Tagore: Gitanjali (Poem no.1 to 11, 35, 69, 73, 103)
- d) Sri Aurobindo: 1) The Pilgrim of the Night 2) The Stone Goddess 3) Surreal Science (*An Anthology of Commonwealth Poetry*) edited by C D Narasimhaiah, Macmillan, 1990)
- e) Dom Moraes: 1) Letter to my Mother 2) Future Plans

Unit III: Novel

- a) Raja Rao: *Kanthapura*
- b) Khuswant Singh: *Train to Pakistan*
- c) Arundhati Roy: *The God of Small Things*
- d) Amitav Ghosh: *The Shadow Lines*

Prescribed Texts: For Unit -I

- M. K., Naik. A History of Indian English Literature. New Delhi: SahityaAkademi, New Delhi, 2009.
- G. N., Devy. *Indian Literary Criticism: Theory and Interpretation*. New Delhi:Orient BlackSwan, 2010

Suggested Readings:

Mehrotra, A. K. An Illustrated History of Indian Literature in English. New Delhi: Permanent Black, 2003.

Mukherjee, Meenakshi. Twice born fiction. Arnold-Heinemann Publishers (India), 1974.

Ramakrishnan, E. V. ed. Narrating India: The Novel in Search of the Nation. New Delhi: SahityaAkademi, 2005.

Ranveendran, P. P. ‘Genealogies of Indian Literature’. In Economic and Political Weekly. Vol. 41. No. 25. June 24-26, 2006.

- Jain, Jasbir. *Colonial Encounter: Henry Derozio*. Mysore: C C L R, 1982.
- Dwivedi A. N. *Toru Dutt*. New Delhi: Arnold-Heinemann, 1977.
- Anand, Mulk Raj. *The Kind Emperor's English or The Role of the English Language in Free India*. Bombay: Hind Kitabs, 1947.
- Iyengar, K. R. Srinivasa. *Indian Writing in English*. Revised edition, New Delhi: Sterling, 1962.
- M. K., Naik. *A History of Indian English Literature*. New Delhi: Sahitya Akademi, New Delhi, 2009.
- Mulk Raj Anand: *Untouchable*. New Delhi: Pearson Longman, 2009.
- Amitav Ghosh. *The Hungry Tide*. New Delhi: Orient Longman, 2000
- Devy, GN. *After Amnesia: Tradition and Change in Indian Literary Criticism*. Bombay: Orient Longman, 1992. ---. Ed. *Indian Literary Criticism: Theory and Interpretation*. Hyderabad: Orient Longman, 2002.
- Kapoor, Kapil. *Literary Theory: Indian Conceptual Framework*. New Delhi: West Press, 1998.
- Limbale, Sharankumar. *Towards an Aesthetic of Dalit Literature*. Hyderabad: Orient Longman, 2004.
- Mukherjee, Sujit. *A Dictionary of Indian Literature. Vol I (Beginnings to 1850)*. Hyderabad: Orient Longman, 1998.
- . *Towards a Literary History of India*. Simla : Indian Institute of Advanced Study, 1975.
- . *Translation as Discovery*. 1981. Hyderabad: Orient Longman, 1994.
- . *Translation as Recovery*. New Delhi: Pencraft, 2004.
- Paniker, Ayyappa. *Indian Narratology*. New Delhi: Indira Gandhi Centre for the Arts, 2003.
- Radhakrishnan, S. *The Hindu View of Life*. 1926. New Delhi: Harper Collins, 2014.
- Rege, Sharmila. *Writing Caste, Writing Gender: Reading Dalit Women's Testimonios*. New Delhi: Zubaan, 2006.
- Satchidanandan, K, ed. *Signatures: One Hundred Indian Poets*. Rev ed. New Delhi: National Book Trust, 2003.

3.2. Critical Theory – Paper II

Semester-III

Unit I: Classical Theories

Plato: *Republic* (Books -X), and *Ion*

Aristotle: *Poetics* (Chapter no.1, 2, 3,4, 5, 6,7, 8, 9,23, 24, 25, and 26), *Translated* by S.H. Butcher.

Horace: *Ars Poetica*

Longinus: *On the Sublime*

Unit II: Neo-Classical and Romantic Theories

John Dryden: *An Essay of Dramatic Poesy*

Alexander Pope: *An Essay on Criticism* (Part-I & II)

William Wordsworth: *Preface to Lyrical Ballads*

Samuel Taylor Coleridge: *Biographia Literaria* (Chapters 12, 13, 14 and 17)

Unit III: Victorian, Modern, & Archetypal Theories

Matthew Arnold: *The Functions of Criticism at the Present Time*

T. S. Eliot: *'Tradition and Individual Talent' & 'The Metaphysical Poets'*

I. A. Richards: *The Four Kinds of Meaning*

Northrop Frye: *The Archetypes of Literature*

Prescribed Texts:

- David Lodge: *Modern Criticism and Theory* (Longman :2008) with ISBN-13: 978-0582784543 or ISBN-10: 0582784549
- Lodge, David and Nigel Wood, eds. 1998. *Modern Criticism and Theory: A Reader*. Essex: Pearson Education Limited.
- [Raman Selden](#): *The Theory of Criticism: From Plato to the Present* (Reader) Paperback : 1988
- David Lodge : *Twentieth Century Literary Criticism: A Reader* (Paperback – 1972)
- Waterfield, Robin Plato: *Republic*. Translated, with notes and an introduction. Oxford: Oxford World's Classics. (1994).

Suggested Readings:

Bennett, Tony. 1979. *Formalism and Marxism*. London: Methuen.

Brannigan, John. 1998. *New Historicism and Cultural Materialism*. London: Macmillan.

Connor, Steven. 1997. *Postmodernist Culture: An Introduction to Theories of the Contemporary*, 2nd edn. Oxford: Blackwell.

Culler, Jonathan. 1983. *On Deconstruction: Theory and Criticism After Structuralism*. London: Routledge and Kegan Paul.

Eagleton, Terry. 1976. *Marxism and Literary Criticism*. London: Routledge.

Gallagher, Catherine and Stephen Greenblatt. 2000. *Practising New Historicism*. Chicago: University of Chicago Press.

Mulhern, Francis, ed. 1992. *Contemporary Marxist Literary Criticism*. London: Longman.

Norris, Christopher. 2002. *Deconstruction: Theory and Practice*. New York: Routledge.

Veese, H. Aram, ed. 1994. *The New Historicism Reader*. New York: Routledge.

Humphrey House Aristotle's *poetics* (Oxford, 1955).

Rene Wellek *A History of Modern Criticism, 1750-1950. The Romantic Age* (Jonathan Cape 1955).

Mary Warnock *Imagination* (Faber, 1976).

J.A.Chapman Wordsworth and Literary Criticism (London, 1931).
R.L.Breted S.T.Coleridge (London, 1971).
I.A.Richards Coleridge on Imagination (Routledge, 1955).
I.A.Richards Principles of literary Criticism (1952).
I.A.Richards Practical criticism (1929).
T.S.Eliot Selected Essays (Faber, 1932).
T.S.Eliot The Use of Poetry and the Use of Criticism (Faber, 1933).
Northrop Frye Anatomy of Criticism: Four Essays (Princeton, 1957).
Cleanth Brooks Modern Poetry and the Tradition (1939).
Cleanth Brooks Understanding Poetry (1938).
Robert Penn Warren
David Daiches Critical Approaches to Literature (1956).
Wimsatt and Brooks Literary Criticism: A Short History (1956).
Patricia Waugh Literary theory and Criticism (Oxford, 2006).
M A R Habib Modern Literary Criticism and theory
Peter Barry Beginning Theory
Francis Korn Elementary Structures Reconsidered: Levi-Strauss on Kinship (Routledge)
Adams and Searle Critical Theory Since 1965
Boris Wiseman Introducing Levi Strauss and Structural Anthropology

Elective Papers

3.3 American Literature-I

Semester-III

Unit-I:

Nathaniel Hawthorne: The Scarlet Letter
Mark Twain: The Adventures of Huckleberry Finn
Herman Melville: Moby-Dick

Unit-II:

Henry David Thoreau: Walden
Ralph Waldo Emerson: American Scholar
Edgar Allan Poe: 'The Fall of the House of Mr. Usher'

Unit III:

Walt Whitman: i) "Song of Myself", Book III (From 'Leaves of Grass')
ii) "Captain! My Captain!" iii) "When Lilacs Last in the Dooryard Bloom'd"
Emily Dickinson: i) "After Great Pain a Formal Feeling Comes" ii) "I Heard a Fly Buzz"
iii) "This is my letter to the World", iv) Success is Counted Sweetest'
Robert Frost: 'Mending Wall', 'The Road Not Taken', 'Birches', 'After Apple Picking'

Unit IV: Eugene O'Neill: *The Emperor Jones*

Arthur Miller: *Death of a Salesman*
Tennessee Williams: *A Streetcar Named Desire*

Suggested Readings:

Gay Wilson Arlen, The Solitary Singer: A critical Biography of Walt Whitman (New York: Macmillan, 1955).
Milton Hindus Leaves of Grass: One Hundred Years After (Stanford University Press, 1955).
G. F. Witcher This Was a Poet: A Critical Biography of Emily Dickson (1947).
Richard Cheese Emily Dickson (1951).
Henry James Hawthorne (1879).
Hyatt H waqqoner Hawthorne: A Critical Study (1962).
Yvor Winter Maule's Curse (1938).
Walter Blair Mark Twain and Huck Finn (California University Press, 1960).
Richard Letts Huckleberry Finn and His Critics (New York: Macmillan, 1962).
Virginia Floyd The Plays of Eugene O'Neill: A New Assessment (1985).
Sophus K. Winther Eugene O'Neill: A Critical Study (1934)
W E B Du Bois The Souls of Black Folk
Ford, Boris (ed.). The New Pelican Guide to English Literature, Vol.9: American Literature. London: Penguin, 1995.
Gray, Richard. A History of American Literature. 2nd ed. Chichester, West Sussex: Blackwell, 2012.
Crane, Gregg. The Cambridge Introduction to the 19th Century American Novel. Cambridge: CUP, 2007.
Lauter, Paul (ed.). A Companion to American Literature and Culture. Oxford: Blackwell, 2010.
Millington, Richard H., Ed. The Cambridge Companion to Nathaniel Hawthorne. Cambridge: CUP, 2004.
Weinstein, Cindy, Ed. The Cambridge Companion to Harriet Beecher Stowe. Cambridge: CUP, 2004.

3.4 African, Afro-American, and Latin American Literature

Semester-III

Unit I:

Chinua Achebe: Things Fall Apart
Harriet Beecher Stowe: Uncle Tom's Cabin
Tony Morrison: The Bluest Eye

Unit II:

Ngũgĩwa Thiong'o: A Grain of Wheat
Richard Wright: Native Son
Alice Walker: The Color Purple

Unit III:

Langston Hughes: 'Dreams Deferred,' 'As I Grow Older,' Advertisement for the Woldorf Astoria,' 'The Negro Mother,' 'The Negro Speaks of Rivers'
Martin Luther King: 'I Have a Dream': Text of Public Speech delivered on August 28, 1963 at the Lincoln Memorial, Washington DC during the Civil Rights March
J. M. Coetzee: Life & Times of Michael K

Unit IV:

Gabriel Okara: 1)The Call of the River Nun, 2)Little Snake and Little Frog
Wole Soyinka: The Lion and the Jewel
Gabriel García Márquez : *Love in the Time of Cholera*

Suggested Readings:

- B. Ashcroft, G. Griffiths and H. Tiffin: The Empire Writes Back, Theory and Practice in PostColonial Literature
- Rubin, David. After the Raj: British Novels of India Since 1947.
- Anupam, Adesh Pal. Decolonization: A Search for Alternatives Nagar and Tapas.
- Madan, InderNath. Premchand,.
- Dhawan, R.K., ed. Commonwealth Fiction.
- Islam, Shamsul. Kipling's Law: A Study of His Philosophy of Life.
- Wurgaft, Lewis D. The Imperial Imagination: Magic and Myth in Kipling's India
- Dillam, G.D. The Novels of Chinua Achebe
- Loomba, Ania. Colonialism/ Post Colonialism.
- Howells, Caroll Ann. Jean Rhys.
- Thomas, Sue. The Worlding of Jean Rhys.
- Thieme, John. Derek Walcott.
- Sawhney, Brajesh. Studies in the Literary Achievement of Louise Erdrich, Native American Writer: Fifteen Critical Essays.
- Gay Wilson Arlen, The Solitary Singer: A critical Biography of Walt Whitman (New York: Macmillan, 1955).
- Milton Hindus Leaves of Grass: One Hundred Years After (Stanford University Press, 1955).
- G. F. Witcher This Was a Poet: A Critical Biography of Emily Dickson(1947).
- Richard Cheese Emily Dickson (1951).
- Henry James Hawthorne (1879).
- Hyatt H waqqoner Hawthorne: A Critical Study(1962).
- Yvor Winter Maule's Curse (1938).
- Walter Blair Mark Twain and Huck Finn (California University Press, 1960).
- Richard Letts Huckleberry Finn and His Critics (New York: Macmillan, 1962).
- Virginia Floyd The Plays of Eugene O'Neill: A New Assessment (1985).
- Sophus K. Winther Eugene O'Neill: A Critical Study (1934)
- W E B Du Bois The Souls of Black Folk
- Ford, Boris (ed.). The New Pelican Guide to English Literature, Vol.9: American Literature. London: Penguin, 1995.
- Gray, Richard. A History of American Literature. 2nd Ed.. Chichester, West Sussex:Blackwell, 2012.
- Crane, Gregg. The Cambridge Introduction to the 19th Century American Novel. Cambridge: CUP, 2007.
- Lauter, Paul (ed.). A Companion to American Literature and Culture. Oxford: Blackwell, 2010.
- Millington, Richard H., Ed. The Cambridge Companion to Nathaniel Hawthorne. Cambridge: CUP, 2004.
- Weinstein, Cindy, Ed. The Cambridge Companion to Harriet Beecher Stowe. Cambridge: CUP, 2004.

3.5 Classical Literature

Unit I:

- Sophocles: Oedipus Rex
- Euripides: The Bacchae
- Terence: The Self Tormentor (*Heauton Timorumenos*)

Unit II:

- Homer: The Iliad
- Virgil: Aeneid
- Plato: Meno

Unit III:

- Seneca: Daughters of Troy (*The Trojan Women*)
- Aristophanes: The Frogs
- St. Augustine: Confessions

Unit IV:

- Aeschylus: Prometheus Unbound
- Dante: The Divine Comedy: 'Inferno'
- Pindar—Odes (Selected Poems from Pindar: The Complete Odes. Translated by Anthony Verity. Oxford: OUP, 2007.)
 - Olympian: 1 to 3
 - Pythians: 1 to 3
 - Nemeans: 1 to 3

Suggested Readings:

H. Van Thiel 1996, A Commentary on Three Translations
World Classics (Oxford) Translations of Greek and Roman Classics
Everyman's Library Editions Translations of Greek and Roman Classics
H. J. Rose A Handbook of Greek Mythology
Gilbert Norwood Greek Tragedy
H. D. F. Kitto Greek Tragedy (Methuen, 1939)
Casebook Tragedy: Development in Criticism
The Cambridge Companion to Greek Tragedy
B. M. W. Knox The Heroic Temper: Studies in Sophoclean Tragedy
Greek Drama: Aeschylus, Sophocles, Euripides, Aristophanes
Bantan Book, 1965)
W. F. Jackson Knight The Aeneid of Virgil (Penguin, 1960)
Gilbert Murray Ancient Greek Literature (Heinemann)
C. M. Bowra Ancient Greek Literature (Home University Library)
J. W. Mackail Latin Literature (Murray) Virgil The Eclogues and The Georgics (translator R. C.)

3.6 Pragmatics, Stylistics and Sociolinguistics

Unit-I- Fundamentals of Pragmatics

- i) Origin and Journey of Pragmatics
- ii) Definitions of Pragmatics
- iii) Semantics vs. Pragmatics
- iv) Component vs. Perspective
- v) Principles vs. rules

Principles of Pragmatics

- i) The Cooperative Principle and its Maxims
- ii) The Politeness Principle and its Maxims
- iii) Trade off Relationship between Cooperative Principle and Politeness Principle
- iv) Relevance Theory of Sperber and Wilson
- v) The Concept of 'Face', Positive and Negative Face

Unit-II- Important Concepts in Pragmatics

A) Implicature vs Explicature

B) Context and Conversation

(i) Utterer and Interpreter, (ii) The Mental World, (iii) The Social World (iv) The Physical World

C) Deixis i) Time Deixis ii) Place Deixis iii) Person Deixis iv) Discourse Deixis v) Social Deixis

Unit III: Stylistics:

Ordinary language and language of literature; foregrounding- deviations and parallelism; analysing metaphor

Unit IV: Sociolinguistics:

Language and society, Speech community, Varieties- languages, dialect, register, style; Language contact- pidgin, creole, diglossia, code mixing, code switching and borrowing

Recommended Reading:

- R. A. Hudson – Sociolinguistics
- Levinson, S. C. (1983), Pragmatics, Cambridge: CUP.
- Leech, Geoffrey (1974) Semantics, Penguin: Harmondsworth.
- Leech, Geoffrey (1980) Explorations in Semantics and Pragmatics, Amsterdam: John Benjamins.
- Lyons, John (1977) Semantics, (Vol. 1 and Vol. 2) Cambridge: CUP.
- Palmer, F. R. (1981) Semantics, Cambridge, CUP.
- Hurford, J. R., Heasley, B. & Smith M. B. (1983) Semantics : A Coursebook , Cambridge: CUP. 6.
- Kennedy, G. (2011) Structure and Meaning in English, New Delhi: Pearson 7. Syal,
- Pushpinder & Jindal D. V. (2001) An Introduction to Linguistics :
- Language, Grammar and Semantics, New Delhi : Prentice Hall of India
- Cruse, Allan, (2004) Meaning in Language : An Introduction to Semantics and Pragmatics, New York : OUP.
- Saeed, John (2003) Semantics, Oxford : Blackwell Publishing.
- Thakur, D. (1999) Linguistics Simplified : Semantics, Patna : Bharati Bhavan
- Cruse, D. A. (1986) Lexical Semantics, Cambridge: CUP.
- Austin, J. L. (1962), How to Do Things with Words, Oxford: Clarendon Press.
- Brown, G. and G. Yule (1983), Discourse Analysis, Cambridge: CUP.
- Brown, p. and Levinson, S. C. (1987), 'Politeness: Some Universals' in Language Usage, Cambridge: CUP
- Fowler, Roger – Literature as Social Discourse
- Grundy, Peter (2000), Doing Pragmatics, London: Edward Arnold.
- Leech, G. N. (1983), Principles of Pragmatics, London: Longman.
- Mey, Jacob L. (1993), Pragmatics: An Introduction, Oxford: Blackwell.
- [Revised edition is available and is preferred.]
- Schiffrin, D. (1994) Approaches to Discourse, Oxford: Blackwell.
- Searle, J. R. (1969), Speech Acts, Cambridge: CUP
- John Lyons – Language and Linguistics – An Introduction : CUP
- Sperber, D. & Wilson, D. (1986), Relevance: Communication and Cognition, Oxford: Basil Blackwell.
- Verschueren, Jef (1995), Handbook of Pragmatics, Amsterdam: John Benjamins.
- Verschueren, Jef (1999), Understanding Pragmatics, London: Arnold.
- Yule, George (1996), Pragmatics, Oxford: OUP

3.7 Literature and Gender

Unit I:

Mary Wollstonecraft: *A Vindication of the Rights of Woman*

Tarabai Shinde: "*Stree-Purush Tulna*" in Translation by Rosalind Hanlon.

Kate Millet: *Sexual Politics*

Unit II:

Virginia Woolf: *A Room of One's Own*

Simone de Beauvoir: *The Second Sex* (Volume 1, Chapter-1 to 3)

Judith Butler's "Subjects of Sex/Gender/Desire" from Judith Butler: *Gender Trouble: Feminism and the Subversion of Identity*

Unit III:

Ashwini Sukthanker : *Facing the Mirror* "Introduction" & *Selected Pieces*: 'Words, Yours and Mine'; 'The Point of Madness'; 'Closeted in a Triangle'; 'Tired of the Broom'; 'Silence and Invisibility'; 'Chakra/Circle'; 'You call me Unique..?';

Eve Kosofsky Sedgwick: "Introduction : Axiomatic" from *Between Men: English Literature and Male Homosocial Desire*

Jeanette Winterson: *Oranges Are Not the Only Fruit*

Unit IV:

Baby Kamble : *The Prison We Broke*

Arundhati Roy: *The Ministry of Utmost Happiness*

Shashi Deshpande : *That Long Silence*

Prescribed Text:

Ashwini Sukthanker, ed., '*Facing the Mirror*'; Penguin Books India, New Delhi: 1999 (ISBN: 10987654321)

Eve Kosofsky Sedgwick: *Between Men: English Literature and Male Homosocial Desire*, Columbia University Press, New York

Recommended Reading:

1. Walker, Alice. "The Colour Purple" Orion Publishing Group, 2004. (ISBN 9780753818923)

2. O'Hanlon, Rosalind. 2000. A Comparison Between Women and Men : Tarabai Shinde and the Critique of Gender Relations in Colonial India. Delhi, Oxford University Press, 2000, ISBN 0-19-564736-X.

3. Shinde, Tarabai. 1882. *Stri purush tulana*. (Translated by Maya Pandit). In S. Tharu and K. Lalita (Eds.) "Women writing in India. 600 B.C. to the present. Volume I: 600 B.C. to the early 20th century". The City University of New York City : The Feminist Press.

4. Kamble, Baby. 2009. *The Prisons We Broke*. Trans by Maya Pandit from Marathi Jina Amucha. new Delhi: Orient Black Swan, Print.

5. Deshpande, Shashi. *The Stone Women*.

6. Rich, Adrienne. 2003. *Fact of a Doorframe - Poems 1950-2001* Rev Paperback – Import, 7 Jan W. Norton and Company, New York .

7. Kalia Mamta. 1978. *Poems 78* Culcutta: Writers Workshop.

8. Kalia Mamta. 1979. *Poems 79* Culcutta: Writers Workshop.

9. Kalia Mamta. 1970. *Tribute to Papa and Other Poems*, Culcutta: Writers Workshop.

10. Ariel Levy: *Female Chauvinist Pigs: Women and the Rise of Raunch Culture*; Free Press, 2005 ISBN: 0-7432-4989-5

10. Links - wikipedia.org

11. Jstor.org

12. Rereadinglives.blogspot.com

13. Live Journal Inc

14. www.nybooks.com

15. www.cse.iitk.ac.in

16. www.inscribethebreath.com

17. www.wofford.edu

18. Sashbora.wordpress.com

3.8 Shakespearean Studies

Unit: I Tragedy & History

a) Hamlet

b) Romeo and Juliet

c) Henry IV Part I

Unit: II Comedy & Tragi-comedy

a) Twelfth Night

b) The Tempest

c) Measure for Measure

Unit: III Poems

a) The Rape of Lucrece

b) Venus and Adonis

c) Sonnets: 01,03,18, 19, 27, 65, 75, 80, 104,116, 129, 130

Unit: IV Criticism

a) A.C Bradley's Shakespearean Tragedy (Lectures on Hamlet and Othello only)

b) T.S. Eliot's ' Hamlet and his Problems'

c) Stephen Greenblatt: From the book " Renaissance Self Fashioning" : *Introduction and The Improvisation of Power*

Suggested Readings:

1. Barber, C.L. Shakespeare's Festive Comedy: A Study of Dramatic Form and its Relation to Social Custom. Princeton, Princeton University Press, 1959.
2. Bentley, Eric. The Life of Drama. London Methuen & Co. 1965.
3. Boulton, Marjorie. The Anatomy of Drama. New Delhi, Routledge and Kegan Paul, 1960.
4. Bradley, A.C. Shakespearean Tragedy, London, Macmillan, 1983.
5. Esslin, Martin. An Anatomy of Drama. London, Temple Smith, 1976.
6. Halliwell, Stephen. (trans and commentary. The Poetics of Aristotle. London, Duckworth, 1987.
7. Nicoll, Allardyce. The Theater of Dramatic Theory. Bristol: George, G. Harrap & Co. Ltd., 1962.
8. Nietzsche, Friedrich. The Birth of Tragedy. trans. Douglas Smith, Oxford, Oxford University Press, 2000.
9. Oscar Brockett, History of the Theatre, 7th ed., Holt, Rinehart & Winston, NY, 1995
10. Shepherd, Simon and Womack, Peter. English Drama: A Cultural History. Oxford, Blackwell, 1996.
11. Stantori, Sarah and Banham, Martin. eds. Cambridge Paperback Guide to Theatre, Cambridge University Press, 1996.
12. White, Martin. Renaissance Drama in Action: An Introduction to Aspects of Theatre Practice and Performance. London, Routledge, 1988.
13. Wickham, Glynne. A History of the Theatre, 2nd edition, London, Phaidon, 2007.
14. Charney, Maurice (2000). *Shakespeare on Love & Lust*. New York: Columbia University Press.
15. Halliday, F. E. (1964). *A Shakespeare Companion 1564-1964*. Baltimore: Penguin.
16. Drabble, Margaret. *The Oxford Companion to English Literature, Fifth Edition*. Oxford University Press (1985). ISBN 978-0198661306.
17. Kolin, Philip C. *Venus and Adonis: Critical Essays*. Routledge (2013). ISBN 9781136744310
- 18.a) Bullough, Geoffrey. *Narrative and Dramatic Sources of Shakespeare: Early Comedies, Poems, Romeo and Juliet*. Columbia University Press (1957). Page 162
- 18.b) Duncan-Jones, Katherine. Woudhuysen, H. R. eds. *Shakespeare, William. Shakespeare's Poems: Third Series*. Arden Shakespeare. (28 September 2007
19. "Why is the RSC staging *Venus and Adonis* with marionettes?". *the Guardian*.
20. *Venus and Adonis* at the [Boston Metro Opera] Archived 1 February 2014 at the Wayback Machine.
21. Review by Stephanie Lysaght in LA Weekly, 31 August 2006.
22. *Shakespeare, William (1609). Shakespeare's Sonnets: Never Before Imprinted*. London: Thomas Thorpe.
23. Lee, Sidney, ed. (1905). *Shakespeare's Sonnets: Being a reproduction in facsimile of the first edition*. Oxford: Clarendon Press. OCLC 458829162.
24. Alden, Raymond Macdonald, ed. (1916). *The Sonnets of Shakespeare*. Boston: Houghton Mifflin Company. OCLC 234756.
25. Rollins, Hyder Edward, ed. (1944). *A New Variorum Edition of Shakespeare: The Sonnets [2 Volumes]*. Philadelphia: J. B. Lippincott & Co.
26. Atkins, Carl D., ed. (2007). *Shakespeare's Sonnets: With Three Hundred Years of Commentary*. Madison: Fairleigh Dickinson University Press.
27. Burrow, Colin, ed. (2002). *The Complete Sonnets and Poems*. The Oxford Shakespeare. Oxford: Oxford University Press.
28. Duncan-Jones, Katherine, ed. (2010) [1st ed. 1997]. *Shakespeare's Sonnets*. The Arden Shakespeare, Third Series (Rev. ed.). London: Bloomsbury.
29. Evans, G. Blakemore, ed. (1996). *The Sonnets*. The New Cambridge Shakespeare. Cambridge: Cambridge University Press.
30. Kerrigan, John, ed. (1995) [1st ed. 1986]. *The Sonnets; and, A Lover's Complaint*. New Penguin Shakespeare (Rev. ed.). Penguin Books.
31. Mowat, Barbara A.; Werstine, Paul, eds. (2006). *Shakespeare's Sonnets & Poems*. Folger Shakespeare Library. New York: Washington Square Press.
32. Orgel, Stephen, ed. (2001). *The Sonnets*. The Pelican Shakespeare (Rev. ed.). New York: Penguin Books. ISBN 978-0140714531. OCLC 46683809.
33. Vendler, Helen, ed. (1997). *The Art of Shakespeare's Sonnets*. Cambridge, MA: The Belknap Press of Harvard University Press. ISBN 0-674-63712-7.
34. K.M. Newton *Twentieth Century Literary Theory*; Macmillan Publishers, 1997
35. Stephen Greenblatt: From the book "Renaissance Self Fashioning", University of Chicago Press, 2005

3.9 Non-Fiction

Unit:I

- a) Immanuel Kant: 'What is an Enlightenment?'
- b) Rousseau: The Social Contract
- c) Nietzsche: *On Truth and Lie in an Extra-Moral Sense*

Unit:II

- a) Charles Darwin : From "The Origin of Species" (Introduction & Chapters-I II, III)
- c) Karl Marx: *Capital*, Volume-I, Part-I, Chapter-I: *Commodities*
- c) Sigmund Freud: The Interpretation of Dreams, *Translated* by James Strachery, The following Chapters: I. THE SCIENTIFIC LITERATURE DEALING WITH THE PROBLEMS OF DREAMS
II. THE METHOD OF INTERPRETING DREAMS: AN ANALYSIS OF A SPECIMEN DREAM
III. A DREAM IS THE FULFILLMENT OF A WISH
V. THE MATERIAL AND SOURCES OF DREAMS
VI. THE DREAM –WORK (A) The Work of Condensation, (B) The Work of Displacement

Unit:III

- a) Jean-Paul Sartre: 'Being and Nothingness' - *Selected pieces* (Introduction: The Pursuit of Being & Part One The Problem of Nothingness Chapter One. The Origin of Negation , The Question II., Negations III, The Dialectical Concept of Nothingness IV. The Phenomenological Concept of Nothingness V. The Origin of Nothingness Chapter Two. Bad Faith I. Bad Faith and Falsehood II. Patterns of Bad Faith III. The "Faith" of Bad Faith)
- b) Naomi Wolf: *The Beauty Myth*
- c) Richard Dawkins: *The God Delusion*

Unit:IV

- a) B.R. Ambedkar: *Annihilation of Caste*. New Delhi: Bluemoon publishers, 2000.
- b) Amartya Sen: *An Argumentative Indian*
- c) Malay Chaudhari & Arindham Chaudhari: *The Great Indian Dream*

Suggested Readings:

1. Ambedkar, Dr. Babasaheb. Castes in India: Their Mechanism, Genesis and Development. Indian Antiquary. Vol. XLI. May 1917.
2. B.R. Ambedkar: *Annihilation of Caste*. New Delhi: Bluemoon publishers, 2000.
3. Buckler, William E. The Victorian Imagination: Essays in Aesthetic Exploration, Harvester
4. Gordon, Ian A. The Movement of English Prose. London: Longman Group
5. Gross, John. The Oxford Book of Essays, OUP
6. Jones, Edmund. English Critical Essays: Nineteenth Century. OUP. 7. Mill, John Stuart. The Subjection of Women. London: Longmans, 1869
8. Montaigne, Michel de. Essays of Montaigne. Vol. 1, Trans. Charles Cotton, Penguin, 2006
9. Russell, Bertrand. Free Thought and Official Propaganda. New York: B.W. Huebschinc, 1922
10. Snow, C. P. The Two Cultures and a Second Look. CUP, 1959.
11. The Pelican Book of English Prose, Vol. 2 (1780 to the Present)
12. Walker, Hugh. The English Essays and Essayists, Dent & Sons Ltd, London

4.1. Indian Writing in English – Compulsory Paper I

Semester-IV

Unit I: Poetry-II

- a. Nissim Ezekiel: 1) Background, Casually, 2) Enterprise 3) Poet, Lover, Birdwatcher 4) Goodbye Party for Miss Pushpa T. S.
- b. Kamala Das: An Introduction, The Old Playhouse, The Dance of the Eunuchs
- c. A. K. Ramanujan: Obituary (from An *Anthology of Commonwealth Poetry*)
- d. Jayant Mahapatra: Dawn at Puri
- e. Imtiyaz Dharker: Purdah I
- f. Syed Ammanuddin: Don't Call me Indo-Anglian (*An Anthology of Commonwealth Poetry*)

Unit II: Drama

- Girish Karnard: Tughlaq (New Delhi: OUP, 2012)
Vijay Tendulkar : Silence! The Court is in Session
Mahesh Dattani. Final Solutions
Dina Mehta: Brides are not for Burning

Unit III: Indian Literary Criticism: Theory and Interpretation

- a) Bharatamuni: *On Natya and Rasa: Aesthetics of Dramatic Experience: From the Natya Shastra (3rd century or older)*
- b) Balkrishna Sitaram Mardhekar: Poetry and Aesthetic Theory (1954)
- c) Gayatri Chakravorty Spivak: A Literary Representantion of the Subaltern: Mahashweta Devi's *Stanadayini*(1987)
- d) Aijaz Ahmad: Orientalism and After: Ambivalence & Cosmopolitan Location in the Work of Edward Said (1992)

Prescribed Texts: For Unit -III

- G. N., Devy. *Indian Literary Criticism: Theory and Interpretation*. New Delhi: Orient BlackSwan, 2010

Suggested Readings:

- Mehrotra, A. K. An Illustrated History of Indian Literature in English. New Delhi: Permanent Black, 2003.
- Mukherjee, Meenakshi. Twice born fiction. Arnold-Heinemann Publishers (India), 1974.
- Ramakrishnan, E. V. ed. Narrating India: The Novel in Search of the Nation. New Delhi: SahityaAkademi, 2005.
- Ranveendran, P. P. 'Genealogies of Indian Literature'. In Economic and Political Weekly. Vol. 41. No. 25. June 24-26, 2006.
- Jain, Jasbir. Colonial Encounter: Henry Derozio. Mysore: C C L R, 1982.
- Dwivedi A. N. Toru Dutt. New Delhi: Arnold-Heinemann, 1977.
- Anand, Mulk Raj. The Kind Emperor's English or The Role of the English Language in Free India. Bombay: Hind Kitabs, 1947.
- Iyengar, K. R. Srinivasa. Indian Writing in English. Revised edition, New Delhi: Sterling, 1962.
- M. K., Naik. A History of Indian English Literature. New Delhi: SahityaAkademi, New Delhi, 2009.
- Mulk Raj Anand: Untouchable. New Delhi: Pearson Longman, 2009.
- Amitav Ghosh. The Hungry Tide. New Delhi: Orient Longman, 2000
- Devy, GN. After Amnesia: Tradition and Change in Indian Literary Criticism. Bombay: Orient Longman, 1992. ---. Ed. Indian Literary Criticism: Theory and Interpretation. Hyderabad: Orient Longman, 2002.
- Kapoor, Kapil. Literary Theory: Indian Conceptual Framework. New Delhi: West Press, 1998.
- Limbale, Sharankumar. Towards an Aesthetic of Dalit Literature. Hyderabad: Orient Longman, 2004.
- Mukherjee, Sujit. A Dictionary of Indian Literature. Vol I (Beginnings to 1850). Hyderabad: Orient Longman, 1998.
- . Towards a Literary History of India. Simla : Indian Institute of Advanced Study, 1975.
- . Translation as Discovery. 1981. Hyderabad: Orient Longman, 1994.
- . Translation as Recovery. New Delhi: Pencraft, 2004.
- Paniker, Ayyappa. Indian Narratology. New Delhi: Indira Gandhi Centre for the Arts, 2003.
- Radhakrishnan, S. The Hindu View of Life. 1926. New Delhi: Harper Collins, 2014.
- Rege, Sharmila. Writing Caste, Writing Gender: Reading Dalit Women's Testimonios. New Delhi: Zuban, 2006.
- Satchidanandan, K, ed. Signatures: One Hundred Indian Poets. Rev ed. New Delhi: National Book Trust, 2003.
- Vatsyayan, SH. A Sense of Time: An Exploration of Time in Theory, Experience and Art. New Delhi: OUP, 1981

4.2. Critical Theory – Compulsory Paper II

Semester-IV

Unit I: New Criticism/ Structuralism/ Formalism/Hermeneutics Theories

- C. Wimsatt, William K. and Monroe Beardsley, *The Intentional Fallacy and The Affective Fallacy*
- Ferdinand de Saussure : *Nature of Linguistic Sign*
- Levi Strauss: *The Structural Study of Myth*
- Victor Shklovsky : *Art as Technique*
- Wolfgang Iser: *The Reading Process: A Phenomenological Approach*

Unit II: Marxism/Feminism/Psycho-analytical/Dialogic Criticism

- Walter Benjamin: '*The Work of Art in the Age of Mechanical Reproduction*'
- Louis Althusser: '*Ideology and Ideological State Apparatuses*'
- Elaine Showalter: *Toward a Feminist Poetics*
- Jacques Lacan: "*The Instance of the Letter in the Unconscious*" From David Lodge: *Modern Criticism and Theory* (Oxford)
- Mikhail Bakhtin: "Discourse in the Novel" (from *The Dialogic Imagination*)

Unit III: Post-Structuralism /Postmodernism/Post-Colonialism /New-Historicism

- Roland Barthes: *The Death of the Author* From David Lodge: *Modern Criticism and Theory* (Oxford)
- Jacques Derrida: *Structure, Sign and Play in the Discourse of Human Sciences* From David Lodge: *Modern Criticism and Theory* (Oxford)
- Michel Foucault: Part-I "Introduction" , "1. The Unities of Discourse" (from *The Archaeology of Knowledge Translated by A.M. Sheridan Smith*)
- Jean Lyotard: "Answering the Question: What is Postmodernism?" (From *The Postmodern Condition: A Report on Knowledge*)
- Edward Said: *Crisis [in Orientalism]* From David Lodge: *Modern Criticism and Theory* (Oxford)

Prescribed Texts:

- David Lodge: *Modern Criticism and Theory* (Longman :2008) with ISBN-13: 978-0582784543 or ISBN-10: 0582784549
- Lodge, David and Nigel Wood, eds. 1998. *Modern Criticism and Theory: A Reader*. Essex: Pearson Education Limited.
- [Raman Selden](#): *The Theory of Criticism: From Plato to the Present* (Reader) Paperback : 1988
- David Lodge : *Twentieth Century Literary Criticism: A Reader* (Paperback – 1972)
- Waterfield, Robin Plato: *Republic*. Translated, with notes and an introduction. Oxford: Oxford World's Classics. (1994).
- Michel Foucault: *The Archaeology of Knowledge Translated by A.M. Sheridan Smith*

Suggested Reading:

- Arendt Hannah, 1973. *Illuminations*. London: Fontana.
- Bakhtin, M.M. 1981. *The Dialogic Imagination: Four Essays*, trans. M. Holquist and C. Emerson. Austin: University of Texas Press.
- Bhabha, Homi K. 1994. *The Location of Culture*. London and New York: Routledge.
- During, Simon. 1992. *Foucault and Literature: Towards a Genealogy of Writing*. London: Routledge.
- Eagleton, Terry. 1996. *Literary Theory: An Introduction*. Oxford: Basil Blackwell.
- Foucault, Michel. 1979. 'What Is an Author?' in *Textual Strategies: Perspectives in Post-Structuralist Criticism*, ed. Josué V. Harari. London: Methuen.
- Lodge, David and Nigel Wood, eds. 1998. *Modern Criticism and Theory: A Reader*. Essex: Pearson Education Limited.
- Montag, Warren. 2003. *Louis Althusser*. Basingstoke: Palgrave Macmillan.
- Williams, Raymond. 1997. *Marxism and Literature*. Oxford: Oxford University Press.
- Bennett, Tony. 1979. *Formalism and Marxism*. London: Methuen.
- Brannigan, John. 1998. *New Historicism and Cultural Materialism*. London: Macmillan.
- Connor, Steven. 1997. *Postmodernist Culture: An Introduction to Theories of the Contemporary*, 2nd edn. Oxford: Blackwell.
- Culler, Jonathan. 1983. *On Deconstruction: Theory and Criticism After Structuralism*. London: Routledge and Kegan Paul.
- Eagleton, Terry. 1976. *Marxism and Literary Criticism*. London: Routledge.
- Gallagher, Catherine and Stephen Greenblatt. 2000. *Practising New Historicism*. Chicago: University of Chicago Press.
- Mulhern, Francis, ed. 1992. *Contemporary Marxist Literary Criticism*. London: Longman.
- Norris, Christopher. 2002. *Deconstruction: Theory and Practice*. New York: Routledge.
- Veese, H. Aram, ed. 1994. *The New Historicism Reader*. New York: Routledge.
- Patricia Waugh *Literary theory and Criticism* (Oxford, 2006).
- David Lodge *Modern Criticism and Theory*(Oxford)
- Kathy Althusser *Essays on ideology* (London, 1984).
- Roland Barthes *S/Z* (trans. Richard Miller) (New York, 1974).
- David Carroll *Paraesthetics: Foucault, Lyotard, Derrida* (London, Methuen 1987).
- Steven Cornor *Postmodernist Culture: An Introduction* (Oxford, 1989).
- Paul de Man *Resistance to theory* (Manchester University Press,1986).
- Ferdinand de Saussure *Course in General Linguistic* (London, 1974).
- Jacques Derrida of *Grammatology*(trans-GayatriSpivak) (John sHopkins University, 1976).
- Terry Eagleton *Literary Theory: An Introduction* (Oxford: Blackwell, 1983).
- Jean Jacques Lyotard *The Postmodern Condition: A Report On Knowledge* (Manchester University Press, 1986).
- Christopher Norris *The Truth About Postmodernism* (Oxford: Blackwell, 1993).
- Rene Wellek *A History of Modern Criticism: 1750-1950* (London: JonathanCape, 1986).

4.3 American Literature-II

Semester-IV

Unit-I:

- Henry James: 'The Turn of the Screw'
- Ernest Hemingway: *The Old Man and the Sea*
- William Faulkner: *The Sound and the Fury*

Unit-II:

- Ezra Pound: *The Return, The River Merchant's Wife, A Girl, In A Station Of The Metro, And The Days Are Not Full Enou...*, "E. P. Ode..." "Envoi"
- Wallace Stevens: i) *From The Man with the Blue Guitar: Section XII* ii) "The Snowman" iii) "A Mythology Reflects Its Region"
- Sylvia Plath: i) "Daddy" ii) "Tulips" iii) *Mad Girl's Love Song* 'I shut my eyes and all the world drops ...iv) *A Birthday Present* What is this, behind this veil, is it ...

Unit-III:

- Toni Morrison: *Beloved*
- Harper Lee: *To Kill a Mockingbird*
- John Steinbeck: *The Grapes of Wrath*

Unit-IV:

- Edward Albee: *The Zoo Story*
- J.D. Salinger: *The Catcher in the Rye*
- Joseph Heller: *Catch-22*

Suggested Readings:

- Gay Wilson Arlen, *The Solitary Singer: A critical Biography of Walt Whitman* (New York: Macmillan, 1955).
- Milton Hindus *Leaves of Grass: One Hundred Years After* (Stanford University Press, 1955).
- G. F. Witcher *This Was a Poet: A Critical Biography of Emily Dickson*(1947).
- Richard Cheese *Emily Dickson* (1951).
- Henry James *Hawthorne* (1879).
- Hyatt H waqqoner *Hawthorne: A Critical Study* (1962).
- Yvor Winter *Maule's Curse* (1938).

- Walter Blair Mark Twain and Huck Finn (California University Press, 1960).
Richard Letts Huckleberry Finn and His Critics (New York: Macmillan, 1962).
Virginia Floyd The Plays of Eugene O'Neill: A New Assessment (1985).
Sophus K. Winther Eugene O'Neill: A Critical Study (1934)
W E B Du Bois The Souls of Black Folk
Ford, Boris (ed.). The New Pelican Guide to English Literature, Vol.9: American Literature. London: Penguin, 1995.
Gray, Richard. A History of American Literature. 2nd ed. Chichester, West Sussex: Blackwell, 2012.
Crane, Gregg. The Cambridge Introduction to the 19th Century American Novel. Cambridge: CUP, 2007.
Lauter, Paul (ed.). A Companion to American Literature and Culture. Oxford: Blackwell, 2010.
Millington, Richard H., Ed. The Cambridge Companion to Nathaniel Hawthorne. Cambridge: CUP, 2004.
Weinstein, Cindy, Ed. The Cambridge Companion to Harriet Beecher Stowe. Cambridge: CUP, 2004.

4.4 World Literatures in English

Semester-IV

Unit 1:

1. Leo Tolstoy: *What is Art?*
2. Alexander Pushkin: (Selected Poems from Poems, Prose and Plays of Alexander Pushkin. New York: Modern Library, 1936.)
 - a) The Bronze Horseman, b) Winter Evening, c) The Coach of Life d) With Freedom's Seed, e) Beneath her Native Skies f) Arion g) To the Poet h) Elegy i) When in My Arms j) Autumn
3. Fyodor Dostoevsky: Crime and Punishment

Unit 2:

1. Albert Camus: The Outsider (The Stranger)
2. Marcel Proust: In Search of Lost Time (Remembrance of Things past')
3. Elie Wiesel: Night

Unit:3

1. Franz Kafka: *The Metamorphosis*
2. Friedrich Nietzsche: *Thus Spake Zarathustra*
3. Jean-Paul Sartre: *What is Literature?*

Unit:4

1. Alec Derwent Hope (Poems selected from The Penguin Book of Australian Verse edited by Harry Haseltine)
 - a. Australia, b. The Wandering Islandsc. The Death of the Bird, d. The Imperial Adam e. Pasiphae, f. Letter from the Lineg. Ode on the Death of Pius the Twelfth, h. Crossing the Frontier
2. Stéphane Mallarmé- (Selected poems from Collected Poems and Other Verse. Translated and notes by E. H. and A. M. Blackmore. Oxford: OUP, 2006.)
 - a. Funerary Toast, b. Prose, c. The Toom of Edgar Allan Poe, d. The Toom of Charles Baudelaire e. To Introduce Myself into your Tale... f. Homage g. A Few Sonnets, h. Little Ditty i. Remembering Belgian Friends, j. Album Leafk. Fan – l. Another Fan
3. Iris Murdoch: *The Sea, the Sea*

Suggested Readings:

- [Multilingual Bibliography of \(Text\)Books in Comparative Literature, World Literature\(s\), and Comparative Cultural Studies." CLCWeb: Comparative Literature and Culture \(Library\) \(1999–\)](#)
- [Boruszko, Graciela, and Steven Tötösy de Zepetnek, eds. New Work about World Literatures. Special Issue CLCWeb: Comparative Literature and Culture 15.6 \(2013\)](#)
- Casanova, Pascale. *The World Republic of Letters*. Trans. M. B. DeBevoise. Cambridge: Harvard University Press, 2004.
- D'haen, Theo. *The Routledge Concise History of World Literature*. London: Routledge, 2011.
- D'haen, Theo, David Damrosch, and Djelal Kadir, eds. *The Routledge Companion to World Literature*. London: Routledge, 2011.
- D'haen, Theo, César Domínguez, and Mads Rosendahl Thomsen, eds. *World Literature: A Reader*. London: Routledge, 2012.
- Damrosch, David. *How to Read World Literature*. London: Blackwell, 2009.
- Damrosch, David. *What Is World Literature?* Princeton: Princeton University Press, 2003.
- Damrosch, David, April Alliston, Marshall Brown, Page duBois, Sabry Hafez, Ursula K. Heise, Djelal Kadir, David L. Pike, Sheldon Pollock, Bruce Robbins, Haruo Shirane, Jane Tylus, and Pauline Yu, eds. *The Longman Anthology of World Literature*. New York: Pearson Longman, 2009. 6 Vols.
- Davis, Paul, John F. Crawford, Gary Harrison, David M. Johnson, and Patricia Clark Smith, eds. *The Bedford Anthology of World Literature*. New York: Bedford/St. Martin's, 2004. 6 Vols.
- Gossens, Peter *Weltliteratur. Modelle transnationaler Literaturwahrnehmung im 19. Jahrhundert*. Stuttgart: J.B. Metzler, 2011.
- Hashmi, Alamgir. *The Commonwealth, Comparative Literature, and the World*. Islamabad: Indus Books, 1988.

- [Juvan, Marko, ed. *World Literatures from the Nineteenth to the Twenty-first Century. Special Issue CLCWeb: Comparative Literature and Culture 15.5 \(2013\)*](#)
- Lawall, Sarah, ed. *Reading World Literature: Theory, History, Practice*. Austin: University of Texas Press, 1994.
- Pizer, John. *The Idea of World Literature: History and Pedagogical Practice*. Baton Rouge: Louisiana State University Press, 2006.
- Prendergast, Christopher, ed. *Debating World Literature*. London: Verso, 2004.
- Puchner, Martin, Suzanne Conklin Akbari, Wiebke Denecke, Vinay Dharwadker, Barbara Fuchs, Caroline Levine, Sarah Lawall, Pericles Lewis, and Emily Wilson, eds. *The Norton Anthology of World Literature*. New York: W.W. Norton, 2012. 6 Vols.
- Rothenberg, Jerome, and Pierre Joris, eds. *Poems for the Millennium: A Global Anthology*. Berkeley: University of California Press, 1998. 2 Vols.
- Sturm-Trigonakis, Elke. *Comparative Cultural Studies and the New Weltliteratur*. West Lafayette: Purdue University Press, 2013.
- Tanoukhi, Nirvana. "The Scale of World Literature". *New Literary History* 39.3 (2008).
- Thomsen, Mads Rosendahl. *Mapping World Literature: International Canonization and Transnational Literatures*. London: Continuum, 2008.
- Tötösy de Zepetnek, Steven, and Tutun Mukherjee, eds. *Companion to Comparative Literature, World Literatures, and Comparative Cultural Studies*. New Delhi: Cambridge University Press India, 2013.
- Vipper, Yuri B. *A Fundamental Study of the History of World Literature*. USSR Academy of Sciences: Social Sciences Vol. XVI, No. 1, 1985 pp. 84–93.
- [Vipper, Yuri B. *National Literary History in History of World Literature: Theoretical Principles of Treatment*. *New Literary History* Vol. 16, No. 3, On Writing Histories of Literature \(Spring, 1985\), pp. 545–558](#)

4.5 Colonial and Post-Colonial Studies

Unit-I

Bill Ashcroft, G. Griffiths and H. Tiffin: *The Empire Writes Back*

Salman Rushdie: *Midnight's Children*

Bapsi Sidhwa: *Ice Candy Man*

Monika Ali: *Brick Lane*

Unit-II

Wole Soyinka: *Death and the King's Horseman*

Nadine Gordimer: *July's People*

Jean Rhys: *Wide Sargasso Sea*

Adrienne Rich: i) "Diving into the Wreck" ii) "Delta"

Unit-III

Katherine Mansfield: *The Man with the Wooden Leg*

George Lamming: *In the Castle of My Skin*

Mohsin Hamid: *The Reluctant Fundamentalist*

Maya Angelou: "Still I Rise," "I Know Why the Caged Bird Sings"

Unit-IV

Derek Walcott: *A Far Cry from Africa*

V. S. Naipaul: *Miguel Street*

Gabriel Okara: i) "The Mystic Drum" ii) "Once Upon a Time" iii) "Piano and Drums"

Shyam Selvadurai: *Funny Boy*

Suggested Readings:

1. B. Ashcroft, G. Griffiths and H. Tiffin: *The Empire Writes Back, Theory and Practice in PostColonial Literature*
2. Rubin, David. *After the Raj: British Novels of India Since 1947*.
3. Anupam, Adesh Pal. *Decolonization: A Search for Alternatives* Nagar and Tapas.
4. Madan, InderNath. *Premchand,*
5. Dhawan, R.K., ed. *Commonwealth Fiction*.
6. Islam, Shamsul. *Kipling's Law: A Study of His Philosophy of Life*.
7. Wurgaft, Lewis D. *The Imperial Imagination: Magic and Myth in Kipling's India*
8. Dillam, G.D. *The Novels of Chinua Achebe*
9. Loomba, Ania. *Colonialism/ Post Colonialism*.
10. Howells, Caroll Ann. *Jean Rhys*.
11. Thomas, Sue. *The Worlding of Jean Rhys*.
12. Thieme, John. *Derek Walcott*.
13. Sawhney, Brajesh. *Studies in the Literary Achievement of Louise Erdrich, Native American Writer: Fifteen Critical Essays*.

4.6 English Language Teaching

UNIT-I

What language teaching is about? Distinction between L 1 and L 2 , Second

Language learning and bilingualism, second language versus foreign language learning and acquisition.

Language Teaching Theories, Grammar Translation or Traditional Method

The Direct Method

The Reading Method

UNIT-II

The Teaching of Segmental Features of English
The Supra Segmental Features of English
Audio Visual and Supplementary Aids
The use of Audio Visual aids in teaching, Aids Supplementary to text Books.

Language Teaching: The Construction and use of language tests techniques to test the production sound segments, techniques for testing of intonation.
Syntax : Sentence types – Simple, Compound, complex; Constituents, Immediate Constituents, IC Analysis;

UNIT-III

Syntactic devices: Word order, Function words and content words, Government, concord.
Semantics : Sememe, Types of meaning: Synonymy, Antonymy, Polysymy, Homonymy, Collocation, Sets.
Introduction to Phrase Structure Grammar.
Limitation to Phrase Structure Grammar

Unit - VII

Teaching Communication Skills
Comprehension, Precis
Composition (guided and free)
Letter writing
Technology-aided communication
Role of ICT in the teaching of English

Recommended Reading:

1. Lado, Robert: Language Testing.
2. Meras A Edmond :A Language Teachers Guide.
3. Stern, H.H.: Fundamental concepts of Language Teaching
4. Corder, S. Pit: Introducing Applied Linguistics
5. Ed. Kinsella, Valerie :Language Teaching and Linguistics : Surveys.
6. Ed. Jalling, Hans:Modern Language Teaching
7. Hayes, A.S.:Language Laboratory Facilities.
8. Nagaraj, Geetha: English Language Teaching, Orient Language Pvt. Ltd.

4.7 Cultural Studies

Unit One: Beginnings and Early Perspectives

1. Matthew Arnold: Culture and Anarchy (Preface, Introduction, Chapter-I Sweetness and Light)
2. Antonio Gramsci, "The Intellectuals-Formation of the Intellectuals- Different Positions of Urban and Rural Type of Intellectuals" Part I of Chapter I of Selections from The Prison Notebooks .
3. Raymond Williams, "Culture is Ordinary" from Culture and Society: 1780-1950, (London: Chatto and Windus, 1958) or the new edition New York: Columbia University Press, 1963).
4. Stuart Hall, "Notes on Deconstructing the Popular" from Peoples' History and Socialist Theory, ed, R Samuel

Unit Two: Critique of Modernity

1. Walter Benjamin: "The Work of Art in the Age of its Technological Reproducibility"
2. Max Horkheimer and Theodor Adorno, "The Culture Industry: Enlightenment as Mass Deception", From Horkheimer and Adorno, Dialectic of Enlightenment, New York: Herder and Herder,
3. Roland Barthes, "What is Myth Today?" from Mythologies (New York: Hill and Wang, 1872)
4. bell hooks: A Revolution of Values: The Promise of Multicultural Change Tomlinson, *John. Globalization and Culture*

Unit Three: Culture, Gender, Post-colonialism and Globalization

1. Laura Mulvey: "Visual Pleasure and Narrative Cinema"
2. Gayatri Chakravorty Spivak, "How to read a culturally different book?" from Francis Baker et al,ed, *Colonial Discourse, Post-colonial Theory*
- 3 Excerpt from Arjun Appadurai, Modernity at Large: Cultural Dimensions of Globalization.
- 4 Donna Haraway, "A Cyborg Manifesto: Science, Technology and Socialist Feminism in the Late Twentieth Century" from Haraway, Simians, Cyborg and Women: The Reinvention of Nature (New York: Rutledge, 1991)

Unit Four: Some Examples/ Practices

- 1) Nation, Nationhood and its Fragments.
Text (Cinematic Text)
Lagaan (Film) Directed by Ashutosh Gowariker
- 2) Globalization and the Global South
Text (Cinematic Text)
Slumdog Millionaire Directed by Danny Boyle
- 3) Problematising the issues of Class, Caste and Gender
Text (Cinematic Text)
Sairat Directed by Nagraj Manjule
- 4) Bodies as Metaphors.
Literary Text
Helene Cixous: *The Laugh of the Medusa*

Suggested Readings:

1. Williams, Raymond. Excerpts from 'Culture', Keywords, Rev. Ed. (New York: OUP, 1983), pp. 87-93 and 236-8.
2. Michel Foucault, 1993, Space, Power, Knowledge, Simon During (ed), Cultural Studies Reader, London, Routledge, p.134 – 141.

3. Brooker Peter. A Glossary of Cultural Theory, London. Arnold Pb. 2003
4. Halls, Stuart. 'Cultural Studies: Two Paradigms', Media, Culture and Society 2.1(1980):57-72.
5. Bell, David. An Introduction to cybercultures, London. Routledge. 2001.
6. Barker, Chris. Cultural Studies: Theory and Practice. London: Sage, 2003.
7. Barker, Chris, The Sage Dictionary of Cultural Studies. Sage, 2004.
8. Nayar, Pramod K, An Introduction to Cultural Studies. New Delhi: Viva Books, 2009.
9. Tony Bennett and John Frow, eds. The Sage Handbook of Cultural Analysis. Sage, 2008.
10. Andrew Milner, Contemporary Cultural Theory: An Introduction, Routledge, 2002.
11. Easthope, Anthony. Literary into Cultural Studies. London. Routledge. 1991.
12. Barthes, Roland: Mythologies, London: Vintage, 1990
13. Marx, Karl: Capital Volume I, London: Vintage, 1995
14. Sardar, Ziauddin. Introducing Cultural Studies. Icon Books. 2010.
15. Meenakshi Gigi Durham and Douglas M Kellner, eds, Media and Cultural Studies. Malden, MA: Blackwell, 2006.
16. Gramsci, Antonio. Selections from the Prison Notebooks. Ed and Tr. Q. Hoare and G. Nowell Smith. London: Lawrence and Wishart, 1971.
17. Spivak, Gayatri Chakravorty. In Other Worlds: Essays in Cultural Politics. London. Methuen, 1987.
18. Geertz, Clifford. The Interpretation of Cultures. New York, Basic Books. 1973.
19. Althusser, Louis. Lenin and Philosophy and Other Essays. Tr. Ben Brewster. New York: Monthly Review Press, 1971.
20. Bell, David. An Introduction to cybercultures, London. Routledge. 2001.
21. De Certeau, Michel. The Practice of Every Day Life. Tr. R. Johnson: London. U.C.P. 1988.
22. Hebdige, Dick. Subculture: The Meaning of Style. New York: Methuen, 1979.
23. Imre Szeman and Timothy Kaposy, Cultural Theory: An Anthology. Wiley Blackwell, 2010.
24. Toby Miller, ed. A Companion to Cultural Studies. Blackwell, 2001.
25. Andrew Edgar and Peter Sedgwick, Key Concepts in Cultural Theory, Routledge, 1999.
26. Anderson, Benedict. Imagined Communities. 1991. Verso. London.
27. Chatterjee, Partha, 'Whose Imagined community' in The Nation and Its Fragments, Colonial and Post Colonial Histories, Princeton, 1993.
28. Nandy, Ashis, Extract, Bonfire of Creeds, Delhi: OUP, 2004, p.108-129.
29. Nandy, Ashis et al, Extract, Creating a Nationality, Delhi: OUP, 1995.
30. Niranjana, Tejaswini. 'Integrating Whose Nation? Tourists and Terrorists in 'Roja''. Economic and Political Weekly. 15 January 1994, 79-82.
31. Chakravarty, Venkatesh and M S SPandian. 'More on Roja'. Economic and Political Weekly. 12 March 1994, 642-645.
32. Niranjana, T. Roja revisited. 'Economic and Political Weekly' 29(21): May 1994:1299.
33. Dirks, Nicholas B. 'The Home and the Nation: Consuming Culture and Politics in Roja'. Pleasure and the Nation: The History, Politics and Consumption of Public Culture in India. Eds. Rachel Dwyer and Christopher Pinney. Oxford University Press: New Delhi, 2001. 161-185.
34. Das, Veena. 'Cultural rights and the Definition of Community' in Oliver Mendelsohn and Upendra Baxi (ed.): The rights of subordinated peoples, Delhi: Oxford University Press, 1994, p.117-158.
35. Appadurai, Arjun, Global Disjuncture and Cultural Difference in Simon During (ed), Cultural Studies Reader, London, Routledge, p.220 – 230.
36. Soja, Edward. 1993. 'History: Geography: Modernity, in Simon During (ed), Cultural Studies Reader, London, Routledge, p.113 – 125.
37. Said, Edward, extract from Orientalism, 'Introduction'
38. Ahmad, Aijaz (1992) 'Orientalism and After: Ambivalence and Cosmopolitan Location in the Work of Edward Said' in EPW, 25 July.
39. Niranjana, Tejaswini, P. Sudhir, and Vivek Dhareshwar (1993) eds. 'Introduction'. Interrogating Modernity: Culture and Colonialism in India. Calcutta: Seagull, pp. 1-18.
40. Sen, Amartya (2004) 'How Does Culture Matter' in Vijayendra Rao and Michael Walton (eds.) Culture and Public Action, New Delhi: Permanent Black, p.37-58.
41. Ambedkar, B.R., Annihilation of Caste, New Delhi: Navayana, 2014

4.8 Translation Studies

Unit – I: Introducing Translation Studies

1. What is Translation?, The Process of Translation, The Qualities of a Translator
2. Language Varieties in Translation & On Equivalence (Text and Culture)
3. Types of Translation/Modes of translation, such as:
 - a. Semantic / Literal translation
 - b. Free / sense/ literary translation
 - c. Functional / communicative translation
 - d. Technical / Official/Machine Translation
 - e. Transcreation/ Interpretation/ Transliteration
(Other types: Partial vs. total translation, text-oriented vs. reader-oriented translation, literal vs. free translation, intralingual vs. interlingual translation)
4. The Significance and Relevance of Translation, Translation and Comparative Literature
5. Translation Dynamics and Language Development with Special Reference to Hindi/Marathi Translation
6. Communication, Mass Media and the Challenge of Translation/ Translating Advertisements: Some Problems

Unit – II: Theories of Translation

- a) Walter Benjamin: 'The Task of the Translator' from *The Translation Studies Reader*, Ed. by L. Venuti, Routledge Publication, 2000.
- b) Eugene Nida 'Principles of Translation as exemplified by Bible Translating'. R. A. Brower (ed.): On Translation, New York, OUP.
- c) Jakobson, Roman: "On Linguistic Aspects of Translation" from *The Translation Studies Reader*, Ed. by L. Venuti, Routledge Publication, 2000.
- d) Bassnett Susan: 'Postcolonial Translation: Theory and Practice' (1998) Bassnett S, Lefevere A. 1998 'Constructing Cultures'. [The Translation Turn in Cultural Studies. pp 123-140].

Unit - III: Aspects of Translation

- a) Problems in Translation (Challenges and Remedies)
- b) Limits of Translation
- c) Translatability and untranslatability
- d) Roles of Translator

Unit-IV: Close study of the SL and TL texts to understand the nuances of translation

Study of the Structures of English and Hindi

Study of the Structures of English and Marathi

Translating Literary texts

Translation and Culture

Close study of the SL and TL texts to understand the nuances of translation Marathi/Hindi texts translated into English for study

The following **Poems from Chitre, Dilip trans. (1991) Says Tuka**

- i) I was only dreaming, ii) If only you would, iii) How I utterly lost my hold on reality, iv) I scribble and cancel it again, v) Some of you may say, vi) To arrange words, vii) When my father died

Short Stories

- i) Gangadhar Gadgil: Soni, Our Cow (Trans by Gangadhar Gadgil)
- ii) Munshi Premchand: 'Kafan' (Trans as 'The Shroud' by Frances W. Pritchett)

Autobiography:

Laxman Gaikwad: *The Branded* (a translation of his [autobiographical novel](#) *Uchalaya*)

Prescribed Texts:

- 1) *Translation and Interpreting* ed. by Gargesh, R. & Goswami, K. K. New Delhi: Orient Longman Private Limited, 2007.
- 2) *The Translation Studies Reader*, Ed. by L. Venuti, Routledge Publication, 2000.
- 3) Chitre, Dilip (Trans) *Says Tuka*. Penguin Books, 1991.
- 4) Laxman Gaikwad: *The Branded* translated by P.A. Kolharkar published by Sahitya Akademi (1 September 1999)

Suggested Readings:

Basnett, S. and Lefevere, A. ed. 1990. Translation, History and Culture. London: Princeton University Press.

Basnett, S, Translation Studies. London: Methuen.

Catford, J. C. 1965. A Linguistic Theory of Translation. Oxford University Press.

Chaudhuri, S. 1999. Translation and Understanding. Oxford University Press.

Gargesh, R. and K.K. Goswami (eds). 2007. Translation and Interpreting. Delhi: Orient Longman Pvt. Ltd.

Lal, P. 1996. Transcreation. Calcutta: Writers Workshop.

Mukherjee, S. 1981. Translation as Discovery. Delhi: Allied Publishers.

Newmark, P. 1981. Approaches to Translation. Pergamon Press.

Niranjana, T. 1992. Siting Translation. University of California Press.

Nida, Eugene A. 1975. Language, Structure and Translation (Essays selected by A. S. Dil). Stanford University Press.

Nida, Eugene A. & C. R. Taber. 1974. The Theory and Practice of Translation. Leiden: E. J. Brill.

Ramakrishna, S. ed. 1997. Translation and Multilingualism. Delhi: Pencraft.

Singh, Udaya Narayana. 2009. Translation as Growth. Delhi: Pearson/Longman.

Somers, H. (ed) 2003. Computers and Translation: A Translator's Guide. Amsterdam: John Benjamins.

Venuti, L. (ed.), 1992. Rethinking Translation: Discourse, Subjectivity, and Ideology. London: Routledge Publishers.

4.9 Alternative Literature

Unit I: Dalit literature (Selected Pieces from 'Poisoned Bread' ed. by Arjun Dangle, Orient Black Swan Pub.)

- a) Arjun Dangle: *Dalit Literature Past, Present and Future* (Introduction to *POISONED BREAD*: Orient Black Swan, 2009)
- b) Shankarrao Kharat: A Corpse in the Well
- c) Anna Bhau Sathe: Gold from the Grave
- d) Namdev Dhasal: 1) "The Day She was Gone" 2) "New Delhi 1985"
3) "On the Way to the Dargah"

Unit II: LGBT Literature from India

- a) Aweek Sen : Preludes (from 'The Phobic and erotic' by ed. By Brinda Bose and Subhabrata Bhattacharya)
- b) Ruth Vanita : Preface and part I introduction : Ancient Indian Materials
(from 'Same-Sex Love in India' ed. by Ruth Vanita and Saleem Kidwai)
- c) Sandhya Gokhale: Quest (2006)- Popular Prakashan Mumbai
- d) R. Raj Rao: Sex, Sexuality, Gender and Culture (first chapter from " Criminal Love ?"
: Queer Theory, culture, and Politics in India, Sage Publication

Unit III: Children's Literature

- a. Lewis Carol: Alice's Adventures in Wonderland
- b. C.S. Lewis: Narnia Series- The Lion, the Witch and the Wardrobe
- c. R.L. Stevenson: The Treasure Island
- d. J. K. Rowling: The Philosopher's Stone/ The Order of Phoenix

Unit IV: Science Fiction and Fantasy

- a) Jules Verne: Journey to the Centre of the World
- b) Mary Shelley: Frankenstein
- c) Aldous Huxley: Brave New World
- d) William Gibson: Neuromancer

Recommended Readings:

- Aston, N.M. Ed. (2001) *Dalit Literature and African-American Literature*. New Delhi: Prestige Books. [ISBN 81-7551-116-8](#).
- Chakraborty, Mridula Nath and MacCarter, Kent (2016) [Issue 55.1: Dalit Indian and Indigenous Australian Cordite Poetry Review](#), full issue in translation.
- Dangle, Arjun (1992) Ed. [Poisoned Bread: Translations from Modern Marathi Dalit Literature](#). Hyderabad: Orient Longman.
- Dasan, M. Pratibha, V. Chandrika, C.S. and Pradeepan Pampirikunnu (2012) Eds. [The Oxford India Anthology of Malayalam Dalit Writing](#), OUP India
- Dutta, Angana and Sarangi, Jaydeep (2015) Trans. Eds. *Surviving in My world: Growing up Dalit in Bengal*. Kolkata: Stree-Samya.
- Sarangi, Jaydeep Ed. "Stories of Social Awakening: Jatin Bala", Authorspress, New Delhi, 2017
- Franco, Fernando, Macwan, Jyotsna & Ramanathan, Suguna (2004) *Journeys to Freedom: Dalit Narratives*. Bombay: Popular Prakashan. [ISBN 81-85604-65-7](#), [ISBN 978-81-85604-65-7](#).
- [Limbale, Sharankumar](#). (2004) *Towards an Aesthetic of Dalit Literature* Orient Longman. [ISBN 81-250-26568](#).
- Manohar, D.Murali (2013) Ed. *Critical Essays on Dalit Literature*. New Delhi: Atlantic. [ISBN 9788126917846](#).
- Manohar, D.Murali (2013) Ed. *Dalit Hindu Narratives*, New Delhi: Global, 2013. [ISBN 9788189630799](#)
- Prasad, Amar Nath and Gaijan, M.B. (2007) *Dalit Literature : A Critical Exploration*. [ISBN 81-7625-817-2](#).
- Purushotham, K. (2013) Trans. and Ed. *Black Lilies: Telugu Dalit Poetry* New Delhi: Critical Quest.
- [Ravikumar](#) and Azhagarasan, R (2012) Eds. [The Oxford Anthology of Tamil Dalit Writing](#). New Delhi: OUP India. [ISBN 978-0-19-807938-5](#)
- [Ravikumar](#) (2009) [Venomous Touch: Notes on Caste, Culture and Politics](#). Calcutta: Samaya
- [Satyanarayana, K & Tharu, Susie](#) (2011) *No Alphabet in Sight: New Dalit Writing from South Asia, Dossier 1: Tamil and Malayalam*, New Delhi: Penguin Books.
- [Satyanarayana, K & Tharu, Susie](#) (2013) *From those Stubs Steel Nibs are Sprouting: New Dalit Writing from South Asia, Dossier 2: Kannada and Telugu*, New Delhi: HarperCollins India.
- Satyanarayana, K and Tharu, Susie (2013). *The Exercise of Freedom: An Introduction to Dalit Writing*. New Delhi: Navayana. p. 21. [ISBN 9788189059613](#).
- Uma, Alladi. Rani, K. Suneetha. and Manohar, D. Murali. (2014) Eds. *English in the Dalit Context*. New Delhi: OrientBlackswan.
- *Same Sex-Love in India (2000)* by Ruth Vanita and Salim Kidwai.
- *.Queering India(2002)* by Ruth Vanita
- *YARAANA(1999)* by Hoshang Merchant
- *FACING THE MIRROR(1999)* by Ashwini Sukthankar
- *FORBIDDEN SEX/ FORBIDDEN TEXT (2008)* by Hoshang Merchant
- *BOY FRIEND(2003)* by R.Raj Rao
- *HOSTEL ROOM NO.131(2010)* by R.Raj Rao
- *Phobic and the Erotic: The Politics of Sexualities in the Contemporary India* by Brinda Bose and Subhabrata Bhattacharya etc.
- Hoshang Merchant's *Forbidden Sex and Forbidden Texts*
- Ruth Vanita's *Queering India(2002)*
- Michel Foucault's multi-volume *History of Sexuality* (1976-1984)
- Eve-Sedgwick's *Epistemology of the Closet(1990)* and *Between Men: English Literature and Male Homosocial Desire(1985)*
- Judith Butler's *Gender Trouble: Feminism and the subversion of Identity* (1990)
- *Anderson, Nancy (2006). Elementary Children's Literature. Boston: Pearson Education. ISBN 0-205-45229-9.*
- *Chapleau, Sebastien (2004). New Voices in Children's Literature Criticism. Lichfield: Pied Piper Publishing. ISBN 978-0-9546384-4-3.*
- *Hahn, Daniel (2015). The Oxford Companion to Children's Literature. Oxford: Oxford University Press. ISBN 978-0-19-969514-0.*

- *Huck, Charlotte (2001). Children's Literature in the Elementary School, 7th ed. New York: McGraw-Hill. [ISBN 0-07-232228-4](#).*
- *Hunt, Peter (1991). Criticism, Theory, and Children's Literature. Oxford: Blackwell. [ISBN 0-631-16231-3](#).*
- *Lesnik-Oberstein, Karin (1996). "Defining Children's Literature and Childhood". In Hunt, Peter. International Companion Encyclopedia of Children's Literature. London: Routledge. pp. 17–31. [ISBN 0-415-08856-9](#).*
- *Lesnik-Oberstein, Karin (1994). Children's Literature: Criticism and the Fictional Child. Oxford: Clarendon Press. [ISBN 0-19-811998-4](#).*
- *Lesnik-Oberstein, Karin (2004). Children's Literature: New Approaches. Basingstoke: Palgrave. [ISBN 1-4039-1738-8](#).*
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Appendix-B

एम. ए. (मराठी) : सत्र तिसरे

आवश्यक पत्रिका
घटक :

पत्रिका १ : उपयोजित मराठी

१. कार्यालयीन पत्रव्यवहार, टिप्पणी लेखन
२. इतिवृत्त लेखन, अहवाल लेखन
३. स्व-परिचय पत्र, नोकरीसाठी अर्जलेखन
४. माहिती पत्रक, जाहीर निवेदन
५. जाहिरात लेखन
६. निमंत्रण पत्रिका, कार्यक्रम पत्रिका
७. सारांश लेखन
८. लेखनविषयक नियम व मुद्रितशोधन

संदर्भग्रंथ :

- १) व्यावहारिक मराठी, डॉ. लीला गोविलकर, डॉ. जयश्री पाटणकर, स्नेहवर्धन पब्लिशिंग हाऊस पुणे, २००४.
- २) व्यावहारिक मराठी, ल. रा. नसिराबादकर, फडके प्रकाशन, कोल्हापूर, आठवी आवृत्ती, २००८.
- ३) उपयोजित मराठी, डॉ. ग. ना. जोगळेकर कृतज्ञता ग्रंथ, संपा. डॉ. केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे, २०१२.
- ४) उपयोजित मराठी, डॉ. संजय संभाजी लांडगे, दिलीपराज प्रकाशन प्रा. लि., पुणे, २०११.
- ५) उपयोजित मराठी व प्रसार माध्यमांची कार्यशैली, संपा. डॉ. संदीप सांगळे, डायमंड पब्लिकेशन्स, पुणे.
- ६) मराठी भाषा : संचित आणि नव्या दिशा, संपा. विजय कुवळेकर, डी. वाय. पाटील अभिमत विद्यापीठ, पुणे, २०१६.

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आवश्यक पत्रिका
घटक :

पत्रिका २ : भाषाविज्ञान

१. भाषेचे स्वरूप व कार्य : ध्वनी आणि अर्थ
२. भाषाभ्यासाच्या पद्धती : ऐतिहासिक, वर्णनात्मक, तौलनिक, उपयोजित, समाजभाषाविज्ञान
३. भाषिक व भाषेतर संप्रेषण व्यवहार, उच्चार व लेखन यांतील भेद.
४. वर्णनात्मक भाषाविज्ञानाची अंगे : स्वन, स्वनिम, स्वनांतर, पद, पदिम, पदांतर, वाक्यविचार, अर्थविचार.

संदर्भग्रंथ :

- १) भाषाविज्ञान परिचय, डॉ. स. गं. मालशे व इतर, पद्मगंधा प्रकाशन, पुणे, द्वितीय आवृत्ती, २००५.
- २) भाषाविज्ञान : वर्णनात्मक व ऐतिहासिक, डॉ. स. गं. मालशे व इतर, पद्मगंधा प्रकाशन, पुणे, सुधारित तृतीय आवृत्ती, २००५.
- ३) आधुनिक भाषाविज्ञान (संरचनावादी आणि सामान्य), संपा. कल्याण काळे, डॉ. अंजली सोमण, प्रतिमा प्रकाशन, पुणे, १९९९.
- ४) आधुनिक भाषाविज्ञान : सिद्धांत आणि उपयोजन, मिलिंद मालशे, लोकवाङ्मय गृह, मुंबई, चौथी आवृत्ती, २००९.
- ५) मराठीचा भाषिक अभ्यास, संपा. मु. श्री. कानडे
- ६) वैखरी : भाषा आणि भाषाव्यवहार, अशोक रा. केळकर, स्नेहवर्धन प्रकाशन, पुणे.
- ७) सामाजिक भाषाविज्ञान, डॉ. रमेश धोंगडे, दिलीपराज प्रकाशन प्रा. लि., पुणे, द्वितीय आवृत्ती, २०१२.

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ऐच्छिक पत्रिका
घटक :

पत्रिका ३ : अ) विशेष ग्रंथकार संत चोखामेळा

१. संत चोखामेळा : व्यक्ती आणि वाङ्मय, संपा. भालचंद्र नेमाडे, शब्दालय प्रकाशन, श्रीरामपूर.

संदर्भग्रंथ :

- १) महाद्वाराच्या पायरीशी, संपा. हेमंत इनामदार, ल. रा. नसिराबादकर, हेमंत प्रकाशन, कोल्हापूर, १९९०.
- २) जोहार चोखोबा, संपा. सचिन परब व श्रीरंग गायकवाड, नाग-नालंदा प्रकाशन, विशालनगर, जि. सांगली.

किंवा

ऐच्छिक पत्रिका घटक : पत्रिका ३ : ब) विशेष ग्रंथकार विभावरी शिरूरकर (मालतीबाई बेडेकर)

१. कथासंग्रह : कळ्यांचे निःश्वास, पॉप्युलर प्रकाशन, मुंबई.
२. कादंबरी : बळी, देशमुख अँड कंपनी पब्लिशर्स प्रा. लि., पुणे.
३. कादंबरी : खरे मास्तर, पॉप्युलर प्रकाशन, मुंबई.
४. वैचारिक/ललित : मनस्विनीचं चिंतन, पॉप्युलर प्रकाशन, मुंबई.

संदर्भग्रंथ :

- १) भारतीय साहित्याचे निर्माते — विभावरी शिरूरकर, अरुणा श्री. दुभाषी, साहित्य अकादमी २०११.
- २) धार आणि काठ, नरहर कुरुंदकर.
- ३) मराठी लेखिका : चिंता आणि चिंतन, भालचंद्र फडके.
- ४) विभावरीचे टिकाकार, संपा. द्वा. भ. कर्णीक प्र. पु. नाडकर्णी.
- ५) मराठी साहित्य समाज आणि संस्कृती, आनंद यादव, मेहता पब्लिशिंग हाऊस, पुणे.
- ६) मराठी कादंबरी : पहिले शतक, कुसुमावती देशपांडे.

किंवा

ऐच्छिक पत्रिका घटक : पत्रिका ३ : क) विशेष ग्रंथकार नागनाथ कोत्तापल्ले

१. कथासंग्रह : राजधानी, पद्मगंधा प्रकाशन, पुणे.
२. कादंबरी : गांधारीचे डोळे, सायन पब्लिकेशन्स प्रा. लि., पुणे.
३. ललित : उद्याच्या सुंदर दिवसासाठी, सायन पब्लिकेशन्स प्रा. लि., पुणे.
४. कविता : मूडस् आणि नंतरच्या कविता, सायन पब्लिकेशन्स प्रा. लि., पुणे.

संदर्भग्रंथ :

- १) समकालीन साहित्य, संपा. मनोहर जाधव, श्रीकांत देशमुख, प्रतिमा प्रकाशन, पुणे.
- २) नागनाथ कोत्तापल्ले : साहित्य व समीक्षा, डॉ. शंकर राऊत, स्वरूप प्रकाशन, औरंगाबाद.
- ३) नागनाथ कोत्तापल्ले : सार्थक साहित्यप्रवास, संभाजी मलगे, अक्षरमानव प्रकाशन, पुणे.
- ४) नागनाथ कोत्तापल्ले : व्यक्ती आणि वाङ्मय, संपा. शैलेश त्रिभुवन, शब्दाली प्रकाशन, पुणे.
- ५) नागनाथ कोत्तापल्ले यांचे साहित्य, संपा. पृथ्वीराज तौर, चांदवडकर, अथर्व प्रकाशन, जळगाव.
- ६) नागनाथ कोत्तापल्ले : व्यक्ती आणि वाङ्मय, संपा. संजय शिंदे, चिन्मय प्रकाशन, औरंगाबाद.

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ऐच्छिक पत्रिका घटक : पत्रिका ४ : अ) ग्रामीण साहित्य

१. ग्रामीण साहित्याची संकल्पना व स्वरूप
 - १.१ ग्रामीण साहित्याची व्याख्या
 - १.२ ग्रामीण साहित्याचे स्वरूप
 - १.३ ग्रामीण साहित्याच्या प्रेरणा
 - १.४ ग्रामीण साहित्य आणि चळवळ
२. साहित्यकृती : विषवृक्षाच्या मुळ्या, वासुदेव मुलाटे, स्वरूप प्रकाशन, औरंगाबाद.
३. साहित्यकृती : उखडलेली झाडे, आनंद यादव, मेहता पब्लिशिंग हाऊस, पुणे.
४. साहित्यकृती : सुगरणचा खोपा, प्रतिमा इंगोले.
५. साहित्यकृती : काया मातीत मातीत, विडल वाघ, देशमुख अँड कंपनी प्रा. लि., पुणे.

संदर्भग्रंथ :

- १) ग्रामीण साहित्य : स्वरूप आणि समस्या, आनंद यादव, मेहता पब्लिशिंग हाऊस, पुणे.
- २) ग्रामीणता : साहित्य आणि वास्तव, आनंद यादव, मेहता पब्लिशिंग हाऊस, पुणे.
- ३) ग्रामीण साहित्य : स्वरूप आणि शोध, डॉ. नागनाथ कोत्तापल्ले, मेहता पब्लिशिंग हाऊस, पुणे.
- ४) ग्रामीण साहित्य, वासुदेव मुलाटे
- ५) ग्रामीण साहित्य : एक चिंतन, डॉ. द. ता. भोसले, मनोविकास प्रकाशन, मुंबई, २००९.
- ६) ग्रामीण वाङ्मयाचा इतिहास, चंद्रकुमार नलगे, रिया पब्लिकेशन्स, कोल्हापूर.
- ७) ग्रामीण वाङ्मयाचा इतिहास, संपा. रामचंद्र काळुंखे, कैलास पब्लिकेशन्स, औरंगाबाद.
- ८) साहित्यातील नवे प्रवाह : आकलन आणि अन्वयार्थ, डॉ. माधव पुटवाड, सुविद्या प्रकाशन, पुणे.
- ९) अन्वय, माधव पुटवाड, बळीवंश प्रकाशन, नांदेड.
- १०) साहित्यिक आनंद यादव, डॉ. रवींद्र ठाकूर, बळीवंत प्रकाशन, नांदेड.
- ११) साहित्याचे वर्तन आणि वर्तमान, डॉ. प्रल्हाद लुलेकर, साकेत प्रकाशन, औरंगाबाद.

किंवा

ऐच्छिक पत्रिका
घटक :

पत्रिका ४ : ब) दलित साहित्य

१. दलित साहित्याची संकल्पना व स्वरूप
 - १.१ दलित साहित्य : प्रेरणा व स्वरूप
 - १.२ दलित साहित्य आणि दलित चळवळ
२. साहित्यकृती : मरण स्वस्त होत आहे, बाबुराव बागुल, लोकवाङ्मय गृह, मुंबई.
३. साहित्यकृती : जिणं आमुचं, बेबी कांबळे
४. साहित्यकृती : गोलपिठा, नामदेव ढसाळ
५. साहित्यकृती : माकडीचा माळ, अण्णाभाऊ साठे

संदर्भग्रंथ :

- १) दलित साहित्य : वेदना आणि विद्रोह, भालचंद्र फडके, श्रीविद्या प्रकाशन, पुणे
- २) दलित साहित्य : प्रवाह आणि प्रकार, डॉ. अविनाश सांगोलेकर, प्रतिमा प्रकाशन, पुणे.
- ३) दलित साहित्य : एक अभ्यास, अर्जुन डांगळे, म. रा. सा. सं. मंडळ, मुंबई.
- ४) दलित साहित्य : स्वरूप व भूमिका, वामन निंबाळकर, प्रबोधन प्रकाशन, नागपूर.
- ५) दलित साहित्य : चर्चा आणि चिंतन, गंगाधर पानतावणे, साकेत प्रकाशन, औरंगाबाद.
- ६) दलित साहित्य : आजचे क्रांतिविज्ञान, बाबुराव बागुल, बुद्धिस्ट प्रकाशन, नागपूर.
- ७) दलित साहित्य : दिशा व दिशांतर, दत्ता भगत
- ८) दलित साहित्याच्या निमित्ताने, सदा कऱ्हाडे, अभिनव प्रकाशन, मुंबई.
- ९) निळी पहाट, रा. ग. जाधव, श्रीविद्या प्रकाशन, पुणे.
- १०) दलित साहित्य : सिद्धांत आणि स्वरूप, यशवंत मनोहर
- ११) दलित कविता, म. सु. पाटील, लोकवाङ्मय गृह, मुंबई
- १२) दलित साहित्य : एक आकलन, बाळकृष्ण कवठेकर, अजब पुस्तकालय, कोल्हापूर
- १३) समग्र लेखक बाबुराव बागुल, संपा. कृष्णा किरवले
- १४) बाबुराव बागुल : व्यक्ती आणि वाङ्मय, सुखदेव ढाणेकर, स्वरूप प्रकाशन, औरंगाबाद, दुसरी आवृत्ती, २००६.
- १५) स्त्री आत्मकथन, संपा. प्रा. चंद्रकुमार नलगे, डॉ. गंगाधर पानतावणे, सुरेश एजन्सी, पुणे, १९९०.
- १६) दलित साहित्य आणि ललित, गो. म. कुलकर्णी
- १७) मराठी कवितेच्या नव्या दिशा, महेंद्र भवरे, लोकवाङ्मय गृह, मुंबई, २००७.
- १८) दलित साहित्याचे सौंदर्यशास्त्र, शरणकुमार लिंबाळे, दिलीपराज प्रकाशन, पुणे.
- १९) दलित साहित्य : चर्चा-चिंतन-समीक्षा, डॉ. चिंतामण कांबळे, कस्तुरी प्रकाशन, अमळनेर, जि. जळगाव.
- २०) दलित साहित्य : प्रेरणा आणि स्वरूप, दिलीपराज प्रकाशन प्रा. लि., पुणे.

किंवा

ऐच्छिक पत्रिका
घटक :

पत्रिका ४ : क) स्त्रीवादी साहित्य

१. स्त्रीवादी साहित्य : संकल्पना व स्वरूप
 १. स्त्रीवादी साहित्य : व्याख्या
 २. स्त्रीवादी साहित्य : स्वरूप व वैशिष्ट्ये
 ३. पाश्चात्य स्त्रीवादी साहित्याचा संक्षिप्त परिचय
 ४. मराठी स्त्रीवादी साहित्याचा संक्षिप्त परिचय
५. साहित्यकृती : स्त्रीपुरुष तुलना, ताराबाई शिंदे, संपा. विलास खोले, प्रतिमा प्रकाशन, पुणे.
६. साहित्यकृती : काव्यफुले, सावित्रीबाई फुले, सावित्रीबाई फुले समग्र वाङ्मय, संपा. डॉ. मा. गो. माळी, म. रा. साहित्य आणि संस्कृती मंडळ, मुंबई.
७. साहित्यकृती : ब्र, कविता महाजन राजहंस प्रकाशन, पुणे.
८. साहित्यकृती : वेणा (कवितासंग्रह), नीरजा, मैत्रेय प्रकाशन, मुंबई, सुधारित आवृत्ती, २००९.

संदर्भग्रंथ :

- १) मराठी विश्वकोश, खंड २०वा
- २) वाङ्मयीन संज्ञा-संकल्पना कोश, संपा. प्रभा गणोरकर व इतर, ग. रा. भटकळ फाउण्डेशन, मुंबई, २००१.
- ३) मराठी वाङ्मयकोश खंड चौथा समीक्षा-संज्ञा, समन्वयक संपादक विजया राजाध्यक्ष, म. रा. साहित्य आणि संस्कृती मंडळ, मुंबई, २००२.
- ४) संदर्भासहित स्त्रीवाद(स्त्रीवादाचे समकालीन चर्चाविश्व), संपा. वंदना भागवत व इतर, शब्द पब्लिकेशन्स, मुंबई, २०१४.
- ५) स्त्रीवाद, संपा. सुमती लांडे, शब्दालय प्रकाशन, श्रीरामपूर, २००७.

- ६) स्त्रीवाद आणि मराठी साहित्य, डॉ. वंदना महाजन, विजय प्रकाशन, नागपूर, २०१३.
 ७) स्त्रीवादी विचार आणि समीक्षेचा मागोवा, डॉ. शोभा पाटील, स्नेहवर्धन प्रकाशन, पुणे, २००७.
 ८) स्त्रीवादी सामाजिक विचार, विद्युत भागवत, डायमंड पब्लिकेन्स, पुणे.
 ९) स्त्रीवादी समीक्षा : संकल्पना व उपयोजन, संपा. डॉ. मंगला वरखेडे, का. स. वाणी मराठी प्रगत अध्ययन संस्था, धुळे.
 १०) साहित्यातील नवे प्रवाह : आकलन आणि अन्वयार्थ, डॉ. माधव पुटवाड, सुविद्या प्रकाशन, पुणे.
 ११) अर्वाचीन मराठी काव्यमीमांसा(डॉ. अक्षयकुमार काळे गौरवग्रंथ), संपा. डॉ. राजेंद्र नाईकवाडे व इतर, पद्मगंधा प्रकाशन, पुणे, २०१४.

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एम. ए. (मराठी) : सत्र चवथे

आवश्यक पत्रिका

घटक :

पत्रिका १ : उपयोजित मराठी

१. प्रसारमाध्यमांसाठी लेखन
२. ग्रंथ परीक्षण
३. संपादन प्रक्रिया
४. भाषांतर प्रक्रिया
५. भाषण व वक्तृत्व, सूत्रसंचालन कला
६. शोधनिबंधाचे लेखन
७. कोशवाङ्मयासाठी लेखन
८. संगणकावरील मराठीचे लेखन
९. इंटरनेटचा वापर व मराठी, मराठी संकेतस्थळे, ब्लॉगलेखन
१०. सामाजिक माध्यमांवरील मराठी : ट्वीटर, फेसबुक इत्यादी

संदर्भग्रंथ :

- १) उपयोजित मराठी(डॉ. ग. ना. जोगळेकर कृतज्ञता ग्रंथ), संपा. डॉ. केतकी मोडक व इतर, पद्मगंधा प्रकाशन, पुणे, २०१२.
- २) उपयोजित मराठी, डॉ. संजय संभाजी लांडगे, दिलीपराज प्रकाशन प्रा. लि., पुणे, २०११.
- ३) उपयोजित मराठी व प्रसार माध्यमांची कार्यशैली, संपा. डॉ. संदीप सांगळे, डायमंड पब्लिकेशन्स, पुणे.
- ४) भाषांतर मीमांसा, संपा. डॉ. कल्याण काळे, डॉ. अंजली सोमण, प्रतिमा प्रकाशन, पुणे.
- ५) शोधनिबंधाची लेखनपद्धती, स. गं. मालशे, लोकवाङ्मय गृह, मुंबई, तृतीय आवृत्ती २००७.
- ६) मराठी भाषा : संचित आणि नव्या दिशा, संपा. विजय कुवळेकर, डी. वाय. पाटील अभिमत विद्यापीठ, पुणे, २०१६.

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आवश्यक पत्रिका

घटक :

पत्रिका २ : भाषाविज्ञान

१. मराठीची पूर्वपीठिका व उत्पत्ती : भाषाकुलाची संकल्पना, आर्यभाषाकुल व आर्यभारतीय भाषा - मराठी भाषा उत्पत्ती व उत्पत्ती काल.
२. मराठीचा कालिक अभ्यास : यादवकाळ, बहामनीकाळ, शिवकालीन मराठी, पेशवेकालीन मराठी, आंग्लकालीन मराठी
३. मराठीच्या प्रमुख बोली : वऱ्हाडी, नागपुरी, अहिराणी, कोकणी, डांगी.
४. अन्य भाषांचा मराठीवरील परिणाम : फारशी, इंग्रजी, कानडी
५. व्याकरणविचार :
 अ) नाम, सर्वनाम, विशेषण आणि त्यांची विकारसरणी
 ब) विभक्तिविचार
६. आदर्श लिपीची मूलतत्त्वे व मराठीची लेखनपद्धती

संदर्भग्रंथ :

- १) मराठी भाषा : उद्गम आणि विकास, कृ. पां. कुलकर्णी
- २) यादवकालीन मराठी भाषा, डॉ. शं. गो. तुळपुळे
- ३) मराठी बखरीतील फार्सीचे स्वरूप, डॉ. यु. म. पठाण
- ४) मराठीचे ऐतिहासिक भाषाशास्त्र, डॉ. र. रा. गोसावी, स्नेहवर्धन पब्लिशिंग हाऊस, पुणे, १९९९.
- ५) भाषाविज्ञान : वर्णनात्मक व ऐतिहासिक, डॉ. स. गं. मालशे व इतर, पद्मगंधा प्रकाशन, पुणे, सुधारित तृतीय आवृत्ती, २००५.
- ६) आधुनिक भाषाविज्ञान (संरचनावादी आणि सामान्य), संपा. कल्याण काळे, डॉ. अंजली सोमण, प्रतिमा प्रकाशन, पुणे, १९९९.
- ७) मराठीचा भाषिक अभ्यास, संपा. मु. श्री. कानडे
- ८) वैखरी : भाषा आणि भाषाव्यवहार, मॅजेस्टिक बुक स्टॉल, मुंबई, १९८३.
- ९) ध्वनिविचार, ना. गो. कालेलकर
- १०) मराठी व्याकरण, लीला गोविलकर

ऐच्छिक पत्रिका पत्रिका ३ : अ) मराठी बालसाहित्य

घटक :

१. श्यामची आई, साने गुरुजी, पुणे विद्यार्थी गृह, पुणे.
२. राणीचा बाग, विंदा करंदीकर, पॉप्युलर प्रकाशन, मुंबई.
३. गावाकडं, इंद्रिजित भालेराव
४. वाचू-आनंदे (कुमार गट दोन), माधुरी पुरंदरे, ज्योत्स्ना प्रकाशन, पुणे.
५. अमृतफळे, जी. ए. कुलकर्णी, कॉन्टिनेन्टल प्रकाशन, पुणे.

संदर्भग्रंथ :

- १) मराठी बालवाङ्मय : स्वरूप आणि अपेक्षा, सुलभा शाह, २००१.
- २) मराठी बालसाहित्य : प्रवाह आणि स्वरूप, लीलावती भागवत, १९९५.
- ३) बालशिक्षण-बालसाहित्य : विविध आयाम, मंदा खांडगे, लीला दीक्षित, २००६.
- ४) बालसाहित्याची रूपरेषा, मालतीबाई दांडेकर, १९६४.
- ५) आधुनिक मराठी वाङ्मयाचा इतिहास (भाग २), अ. ना. देशपांडे, १९७१.
- ६) बालवाङ्मय, देवीदास बागुल, १९६७.

किंवा

ऐच्छिक पत्रिका पत्रिका ३ : ब) मराठी वैचारिक साहित्य

घटक :

१. सार्वजनिक सत्यधर्म, महात्मा ज्योतिबा फुले, संपा. डॉ. वासुदेव मुलाटे, स्वरूप प्रकाशन, औरंगाबाद, चौथी आवृत्ती २०१४.
२. अनंत पैलूंचा सामाजिक योद्धा : दलितेतरांसाठी डॉ. बाबासाहेब आंबेडकर, डॉ. प्रल्हाद लुलेकर, सायन पब्लिकेशन्स प्रा. लि., पुणे.
३. भारतीय स्त्री प्रश्न, संपा. निर्मला जाधव, ताराबाई शिंदे स्त्री अभ्यास केंद्र, डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद
४. आस्तिक शिरोमणी चार्वाक, आ. ह. साळुंखे, लोकायत प्रकाशन, सातारा.

संदर्भग्रंथ :

- १) एकोणिसाव्या शतकातील मराठी गद्य (खंड १), संपा. भास्कर लक्ष्मण भोळे, साहित्य अकादेमी.
- २) एकोणिसाव्या शतकातील मराठी गद्य (खंड २), संपा. भास्कर लक्ष्मण भोळे, साहित्य अकादेमी.
- ३) विसाव्या शतकातील मराठी गद्य (खंड १), संपा. भास्कर लक्ष्मण भोळे, साहित्य अकादेमी.
- ४) विसाव्या शतकातील मराठी गद्य (खंड २), संपा. भास्कर लक्ष्मण भोळे, साहित्य अकादेमी.
- ५) मराठी वाङ्मयाचा इतिहास (खंड ७, भाग ४), संपा. रा. ग. जाधव, महाराष्ट्र साहित्य परिषद, पुणे.

किंवा

ऐच्छिक पत्रिका पत्रिका ३ : क) भाषांतरित मराठी साहित्य

घटक :

१. भाषांतर : व्याख्या, स्वरूप, प्रकार आणि महत्त्व
२. अर्थाच्या शोधात, व्हिक्टर फ्रॅंकल, मेहता पब्लिशिंग हाऊस, पुणे, २०१४.
३. एकविंशती, रवींद्रनाथ टागोर (अनुवाद मामा वरेरकर), साहित्य अकादेमी, नवी दिल्ली.
४. ऑथेल्लो, वि. वा. शिरवाडकर, पॉप्युलर प्रकाशन, मुंबई.
५. नगाऱ्यांप्रमाणे वाजणारे शब्द (नगारे की तरह बजते हैं), निर्मला पुतुल, अनुवाद कविता महाजन, मनोविकास प्रकाशन, पुणे.

संदर्भग्रंथ :

- १) भाषांतर, सदा कऱ्हाडे, लोकवाङ्मय गृह, मुंबई, १९९८.
- २) भाषांतर आणि भाषा, विलास सारंग, मौज प्रकाशन, मुंबई, २०११.
- ३) भाषांतर मीमांसा, संपा. डॉ. कल्याण काळे, डॉ. अंजली सोमण, प्रतिमा प्रकाशन, पुणे
- ४) अनुवादमीमांसा, संपा. केशव तुपे, साक्षात प्रकाशन, औरंगाबाद, २०१२.

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ऐच्छिक पत्रिका पत्रिका ४ : अ) विज्ञान साहित्य

घटक :

१. विज्ञान साहित्य : संकल्पना व स्वरूप
 १. विज्ञान साहित्य : व्याख्या
 २. विज्ञान साहित्य : स्वरूप व वैशिष्ट्ये
 ३. पाश्चात्य विज्ञान साहित्याचा संक्षिप्त आढावा
 ४. मराठी विज्ञान साहित्याचा संक्षिप्त आढावा
२. साहित्यकृती : प्रेषित, जयंत नारळीकर, मौज प्रकाशन, मुंबई.
३. साहित्यकृती : पुढल्या हाका, सुबोध जावडेकर, मॅजेस्टिक पब्लिशिंग हाऊस, २०११.
४. साहित्यकृती : पुनर्जन्म, माधुरी शानभाग, मेनका प्रकाशन, पुणे, १९९९.
५. साहित्यकृती : विज्ञानकथा, रेखा बैजल, ज्ञानदत्त प्रकाशन, पुणे.

संदर्भग्रंथ :

- १) विज्ञान-साहित्य आणि संकल्पना, संपा. डॉ. व. दि. कुलकर्णी, निरंजन घाटे, नीहारा प्रकाशन, पुणे, १९९०.
- २) मराठी विश्वकोश, खंड १६ (टीप - विज्ञानकथा)
- ३) वाङ्मयीन संज्ञा-संकल्पना कोश, संपा. प्रभा गणोरकर व इतर, ग. रा. भटकळ फाउण्डेशन, मुंबई, २००१.
- ४) मराठी वाङ्मयकोश खंड चौथा समीक्षा-संज्ञा, समन्वयक संपादक विजया राजाध्यक्ष, म. रा. साहित्य आणि संस्कृती मंडळ, मुंबई, २००२.

किंवा

**ऐच्छिक पत्रिका
घटक :**

पत्रिका ४ : ब) आदिवासी साहित्य

१. आदिवासी साहित्य : संकल्पना व स्वरूप
 - १.१ आदिवासी साहित्याची व्याख्या
 - १.२ आदिवासी साहित्य निर्मितीमागील प्रेरणा व हेतू
 - १.३ आदिवासी बोली व साहित्याचा अनुबंध
 - १.४ आदिवासी साहित्य आणि दलित चळवळ
२. साहित्यकृती : वाडा (कादंबरी), माधव सरकुंडे
३. साहित्यकृती : नवसा भिलणीचा एल्गार, नजुबाई गावित
४. साहित्यकृती : रोडाली, वाहरू सोनवणे
५. साहित्यकृती : उदई, प्रकाश चव्हाण

संदर्भग्रंथ :

- १) आदिवासी साहित्य : स्वरूप आणि समीक्षा, डॉ. विनायक तुमराम, विजय प्रकाशन, नागपूर.
- २) भारतीय आदिवासी, गुरुनाथ नाडगोंडे, कॉन्टिनेन्टल प्रकाशन, पुणे, १९७९.
- ३) महाराष्ट्रातील आदिवासी मराठी साहित्य : एक शोध, डॉ. माहेश्वरी गावित, दास्ताने रामचंद्र आणि कं., पुणे.
- ४) आदिवासी साहित्य : चिंतन आणि चिकित्सा, तुकाराम रोंगटे, दिलीपराज प्रकाशन, पुणे, २०१४.
- ५) रानफुलांच्या कविता, डॉ. संजय लोहकरे, मारुती आजळ, अक्षता प्रकाशन, पुणे, २०१३.
- ६) कवी आणि कविता, डॉ. संजय लोहकरे, मेधा पब्लिशिंग हाऊस, अमरावती, २०१४.
- ७) वैदर्भीय आदिवासी : जीवन आणि संस्कृती, डॉ. शैलजा देवगावकर, मंगेश प्रकाशन, नागपूर.
- ८) महाराष्ट्रातील आदिवासी जमाती, डॉ. गोविंद गारे, कॉन्टिनेन्टल प्रकाशन, पुणे, २०००.
- ९) आदिवासी मराठी साहित्य, संपा. प्रमोद मुनघाटे, प्रतिमा प्रकाशन, पुणे.
- १०) आदिवासी कवितेचा उषःकाल आणि सद्यःस्थिती, डॉ. तुकाराम रोंगटे, संस्कृती प्रकाशन, पुणे, २००७.
- ११) नवदोत्तर आदिवासी कविता(लेख), डॉ. विनोद कुमारे : सर्वधारा, जाने.-फेब्रु.-मार्च २०१७
- १२) नवदोत्तर आदिवासी कथा(लेख), डॉ. संजय लोहकरे : सर्वधारा, एप्रिल-मे-जून २०१७
- १३) दलित कविता, म. सु. पाटील, लोकवाङ्मय गृह, मुंबई
- १४) दलित साहित्य : एक आकलन, बाळकृष्ण कवठेकर, अजब पुस्तकालय, कोल्हापूर
- १५) समग्र लेखक बाबुराव बागुल, संपा. कृष्णा किरवले
- १६) दलित साहित्य आणि ललित, गो. म. कुलकर्णी
- १७) महाराष्ट्रातील दलित : शोध आणि बोध, डॉ. गोविंद गारे
- १८) मराठी कवितेच्या नव्या दिशा, महेंद्र भवरे, लोकवाङ्मय गृह, मुंबई, जुलै २००७.

किंवा

**ऐच्छिक पत्रिका
घटक :**

पत्रिका ४ : क) मुस्लिम मराठी साहित्य

१. इंधन, हमीद दलवाई, मौज प्रकाशन, मुंबई.
२. भोगले जे दुःख, आशा अपराद, मेहता पब्लिशिंग हाऊस, पुणे, २००८.
३. हिलाल, राजन खान, मॅजेस्टिक प्रकाशन, मुंबई.
४. व्यवहाराचा काळा घोडा, अजीम नवाज राही, मुक्तछंद प्रकाशन, नागपूर.

संदर्भग्रंथ :

- १) मराठी वाङ्मयाचा इतिहास (खंड ७, भाग ४), संपा. रा. ग. जाधव, म. सा. परिषद, पुणे.
- २) आधुनिक मराठी साहित्य आणि सामाजिकता, संपा. डॉ. मृणालिनी शहा, डॉ. विद्यागौरी टिळक, पद्मगंधा प्रकाशन, पुणे, २००७.
- ३) साठोत्तरी मराठी वाङ्मयातील प्रवाह, संपा. डॉ. शरणकुमार लिंबाळे, दिलीपराज प्रकाशन प्रा. लि., २००७.
- ४) नवे प्रवाह, जुने प्रवाह, विजय प्रकाशन, पुणे.
- ५) कथाकार राजन खान, प्रा. डॉ. शाम गायकवाड, अक्षर मानव प्रकाशन, पुणे.

सूचना (सर्व विषयांसाठी) :

प्रकल्प/कृतिसंशोधन :

प्रत्येक विषयात लेखी परीक्षेसोबत प्रकल्प/कृतिसंशोधन कार्य समाविष्ट करण्यात आले आहे. त्यासाठी प्रत्येक विषयांत अभ्यासक्रमाव्यतिरिक्त विषय (परंतु अभ्यासक्रमाशी संबंधित) प्रत्येक विद्यार्थ्याला देण्यात येईल. उदा. लयतत्त्व कवितेला लावून दाखवा, विशिष्ट साहित्यकृतीचे आस्वादक पद्धतीने समीक्षण करा, कोशवाङ्मयासाठी टिपण तयार करा, विशेष ग्रंथकार याविषयांत आपल्या परिसरातील साहित्यिकाची मुलाखत घेऊन त्याचे शब्दांकन करा, मराठीतील निसर्गकविता यावर शोधनिबंध तयार करा, आपल्या परिसरातील लोककलेची माहिती व विशेष नोंदवा, आपल्या परिसरातील म्हणी-वाक्प्रचार यांचे संकलन करून विशेष नोंदवा, लोकगीतांचे संकलन, लोककथांचे संकलन, ग्रामीण स्त्री कथाकार यावर टिपण तयार करा, आपल्या परिसरातील वाङ्मयीन चळवळी, सांस्कृतिक कार्यक्रमांचे वृत्तांकन टिपण तयार करा, विशिष्ट हस्तलिखिताचे मुद्रितशोधन करा, विशिष्ट प्रकरणाचे भाषांतर करा, ग्रामसंस्कृतीची माहिती नोंदवणे, एकोणिसाव्या शतकातील साहित्य व प्रबोधन यावर टिपण, महानुभाव साती ग्रंथ, इत्यादी स्वरूपाच्या विषयावर विद्यार्थ्याला प्रकल्पकार्य/कृतिसंशोधनकार्य करून त्याविषयीचा लिखित अहवाल (टिपण/शोधनिबंध) सादर करावा लागेल.

मौखिक परीक्षा :

प्रकल्प/कृतीसंशोधनासाठी निवडलेल्या विषयावर आधारित मौखिक परीक्षा घेण्यात येईल.



Appendix-C

एम.ए. भाग-२ (हिन्दी)

प्रश्नपत्र -१

आधुनिक काव्य

प्रस्तावना :

आधुनिक हिन्दी काव्य पुनर्नवा के रूप में नवीन भावभूमि एवं वैचारिक गतिशीलता लेकर अवतरित हुआ। आधुनिकता, इहलौकिकता, वि वजनीनता एवं वैज्ञानिक दृष्टिकोण इसकी प्रमुख विशेषताएँ हैं। उपेक्षित विषय भी यहाँ सार्थक एवं प्रासंगिक हो गए। उन्नीसवीं शती के उत्तरार्ध से अद्यावधि तक की संवेदनाएँ, भावनाएँ एवं नूतन विचार सरणियाँ इसमें अभिव्यक्त हुई हैं। मुकम्मल मनुष्य इसमें अभिव्यंजित हुआ है। विविध धाराओं में प्रवाहमान आधुनिक हिन्दी काव्य प्रेरणा और ऊर्जा का अजस्र स्रोत है। अंतःसंवेदना तथा ज्ञान क्षितिज के विस्तार के लिए अत्यंत आवश्यक एवं प्रासंगिक हैं।

तृतीय सत्र

इकाई - १

१.	मैथिलीशरण गुप्त	-	यशोधरा
२.	जयशंकर प्रसाद	-	कामायनी - श्रद्धा, इडा, लज्जा और आनंद सर्ग
३.	सुर्यकांत त्रिपाठी निराला	-	सरोज स्मृति एवं कुकुरमुत्ता
४.	सुमित्रानंदन पंत	-	परिवर्तन, नौका विहार, एक तारा, मौन निमंत्रण

इकाई - २

द्वुत्पाठ के लिये निर्मांकित ६ कवियों का अध्ययन किया जायेगा

१.	श्रीधर पाठक	२.	अयोध्यासिंह उपाध्याय 'हरिऔध'
३.	जगन्नाथदास रत्नाकर	४.	केदारनाथसिंह
५.	हरिवंशराय बच्चन	६.	गिरिजाकुमार माथुर

अंक विभाजन :

लिखित प्रश्नपत्र	-८० अंक
आंतरिक मूल्यांकन	- २० अंक

कुल = १०० अंक

प्रश्नपत्र का स्वरूप

समय ३ घंटे

पूर्णांक - ८०

प्रश्न - १ इकाई-१ के प्रत्येक कवि की कृति से १-१ व्याख्या इस प्रकार कुल चार व्याख्याएँ पूछी

जायेगी, जिनमें से दो व्याख्याएँ करना अनिवार्य है। प्रत्येक व्याख्या पर ८ अंक निर्धारित है। (२ X ८ = १६ अंक)

प्रश्न - २ इकाई १ के कवियों पर अथवा कविताओं पर चार दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें २ प्रश्न हल करने होंगे। प्रत्येक प्रश्न पर १६ अंक निर्धारित हैं २ X १६ = ३२ अंक

प्रश्न - ३ इकाई २ के प्रत्येक कवि पर १ - १ लघुत्तरी प्रश्न इस प्रकार कुल ६ प्रश्न पूछे जायेंगे जिनमें से ४ प्रश्न हल करने होंगे। प्रत्येक

प्रश्न के लिए ४ अंक निर्धारित है। ४ X ४ = १६ अंक

प्रश्न - ४ संपूर्ण पाठ्यक्रम से १६ अति लघुत्तरी / वस्तुनिष्ठ प्रश्न पूछे जायेंगे। प्रत्येक प्रश्न के लिये १ अंक होगा (१६ X १ = १६ अंक)

आंतरिक मूल्यांकन

- १) विद्यार्थी को संबंधित प्रश्नपत्र के पाठ्यक्रम पर आधारित एक शोधपत्र लिखना होगा, जिसके लिए १० अंक निर्धारित हैं।
- २) महाविद्यालय में कार्यरत विषय अध्यापक द्वारा विषय से संबंधित मौखिकी परीक्षा ली जायेगी, जिसके लिए १० अंक निर्धारित हैं। कुल २० अंक

एम.ए. भाग-२ (हिन्दी)

प्रश्नपत्र -१

आधुनिक काव्य

चतुर्थ सत्र

इकाई - १

१.	महादेवी वर्मा	-	निशा की धो देता राकेश, वे मुस्काते फूल नहीं, छाया की आँख मिचौनी, जो तुम आ जाते एक बार, कह दे माँ क्या अब देखूँ, इस इक बूँद आँसू में, जिस दिन नीरव तारों से (कविताएँ - 'संधिनी' से)
२.	स.ही. वात्सायन 'अज्ञेय'	-	नदी के द्वीप, असाध्य वीणा, बावरा अहेरी, हरी घास पर क्षण भर
३.	मुक्तिबोध	-	अंधेरे में, ब्रह्मराक्षस
४.	नागार्जुन की ७ कविताएँ	-	
१.	चंदु मैने सपना देखा	२.	उनको प्रणाम
३.	बादल को धिरते देखा	४.	अकाल और उसके बाद
५.	मेरी भी आभा है इसमें	६.	मन करता है
७.	अग्निबीज		(नागार्जुन प्रतिनिधि कविताएँ, राजकमल प्रकाशन)

इकाई - २

द्वुत्पाठ के लिये निर्मांकित ६ कवियों का अध्ययन किया जायेगा

१.	कुँवरनारायण	२.	शमशेर बहादुर सिंह
३.	धर्मवीर भारती	४.	दुष्यंतकुमार
५.	जगदीश गुप्त	६.	भारत भूषण अग्रवाल

अंक विभाजन :

लिखित प्रश्नपत्र	-	८० अंक
आंतरिक मूल्यांकन	-	२० अंक

कुल = १०० अंक

प्रश्नपत्र का स्वरूप

समय ३ घंटे

पूर्णांक - ८०

प्रश्न - १ इकाई-१ के प्रत्येक कवि की कृति से १-१ व्याख्या इस प्रकार कुल चार व्याख्याएँ पूछी

जायेगी, जिनमें से दो व्याख्याएँ करना अनिवार्य है। प्रत्येक व्याख्या पर ८ अंक निर्धारित है। (२ X ८ = १६ अंक)

प्रश्न - २ इकाई १ के कवियों पर अथवा कविताओं पर चार दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें २ प्रश्न हल करने होंगे। प्रत्येक प्रश्न पर

१६ अंक निर्धारित हैं २ X १६ = ३२ अंक

प्रश्न - ३ इकाई २ के प्रत्येक कवि पर १ - १ लघूत्तरी प्रश्न इस प्रकार कुल ६ प्रश्न पूछे जायेंगे जिनमें से ४ प्रश्न हल करने होंगे।

प्रत्येक प्रश्न के लिए ४ अंक निर्धारित है। ४ X ४ = १६ अंक

प्रश्न - ४ संपूर्ण पाठ्यक्रम से १६ अति लघूत्तरी / वस्तुनिष्ठ प्रश्न पूछे जायेंगे। प्रत्येक प्रश्न के लिये १ अंक

होगा (१६ X १ = १६ अंक)

आंतरिक मूल्यांकन

- १) विद्यार्थी को संबंधित प्रश्नपत्र के पाठ्यक्रम पर आधारित एक शोधपत्र लिखना होगा, जिसके लिए १० अंक निर्धारित हैं।
- २) महाविद्यालय में कार्यरत विषय अध्यापक द्वारा विषय से संबंधित मौखिकी परीक्षा ली जायेगी, जिसके लिए १० अंक निर्धारित हैं।

कुल २० अंक

एम.ए. भाग-२ (हिन्दी)

प्रश्नपत्र -२

आधुनिक गद्य साहित्य

प्रस्तावना :

आधुनिक काल में गद्य साहित्य को अभूतपूर्व सफलता मिली है। यह मानव मन और मस्तिष्क की अभिव्यक्ति का सशक्त एवं अनिवार्य माध्यम बन गया है। मनुष्य का राग-विराग, तर्क वितर्क तथा चिंतन-मनन जिस रागात्मकता के साथ कौशलपूर्ण ढंग से गद्य में अभिव्यक्त होता है वैसा अन्य साहित्यांग में नहीं। आधुनिक काल में गद्य के विविध रूपों का विकास इस तथ्य का साक्षी है कि प्रौढ़ मन-मस्तिष्क की पूर्ण अभिव्यक्ति गद्य में ही संभव है। निबंध गद्य का प्रौढ़-शक्तिशाली प्रतिरूप, उसकी वैयक्तिक एवं स्वातंत्र्य चेतना का विवक्षित प्रतिनिधि है। नाटक, उपन्यास, कहानी तथा अन्य विविध विधाओं के रूप में गद्य साहित्य वामन से विराट बन गया है। आज मनुष्य को उसकी प्रवृत्ति, परिवेश, परिस्थिति, तथा चिंतन की विकास प्रक्रिया के साथ सहज प्रामाणिक रूप में गद्य के माध्यम से ही जाना जा सकता है। अतः इसका अध्ययन अनिवार्य है।

तृतीय सत्र

इकाई - १

१.	ध्रुवस्वामिनी	-	जयशंकर प्रसाद
२.	पोस्टर	-	डॉ. शंकर शेष
३.	मित्रो मरजानी	-	कृष्णा सोबती
४.	तमस	-	भीष्म साहनी

इकाई - २

द्वुतपाठ के लिये निम्नांकित छह रचनाकारों का अध्ययन किया जायेगा

१.	मोहन राकेश	-	नाटककार के रूप में
२.	लक्ष्मीनारायण मिश्र	-	नाटककार के रूप में
३.	उपेन्द्रनाथ अश्क	-	कहानीकार के रूप में
४.	मन्नू भंडारी	-	कहानीकार के रूप में
५.	फणी वरनाथ रेणु	-	उपन्यासकार के रूप में
६.	यशपाल	-	उपन्यासकार के रूप में

अंक विभाजन :

लिखित प्रश्नपत्र	-	८० अंक
आंतरिक मूल्यांकन	-	२० अंक

कुल = १०० अंक

प्रश्नपत्र का स्वरूप

समय ३ घंटे

पूर्णांक - ८०

प्रश्न - १ इकाई-१ की प्रत्येक कृति से १-१ व्याख्या इस प्रकार कुल चार व्याख्याएँ पूछी जायेगी, जिनमें से दो व्याख्याएँ करना अनिवार्य है। प्रत्येक व्याख्या पर ८ अंक निर्धारित है।

(२ X ८ = १६ अंक)

प्रश्न - २ इकाई १ की कृतियों पर चार दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें २ प्रश्न हल करने होंगे। प्रत्येक प्रश्न पर १६ अंक निर्धारित हैं २ X १६ = ३२ अंक

प्रश्न - ३ इकाई २ के प्रत्येक रचनाकार पर १ - १ लघूत्तरी प्रश्न इस प्रकार कुल ६ प्रश्न पूछे जायेंगे जिनमें से ४ प्रश्न हल करने होंगे। प्रत्येक प्रश्न के लिए ४ अंक निर्धारित है।

४ X ४ = १६ अंक

प्रश्न - ४ संपूर्ण पाठ्यक्रम से १६ अति लघूत्तरी / वस्तुनिष्ठ प्रश्न पूछे जायेंगे। प्रत्येक प्रश्न के लिये १ अंक होगा (१६ X १ = १६ अंक)

आंतरिक मूल्यांकन

- १) विद्यार्थी को संबंधित प्रश्नपत्र के पाठ्यक्रम पर आधारित एक शोधपत्र लिखना होगा, जिसके लिए १० अंक निर्धारित हैं।
- २) महाविद्यालय में कार्यरत विषय अध्यापक द्वारा विषय से संबंधित मौखिकी परीक्षा ली जायेगी, जिसके लिए १० अंक निर्धारित हैं। कुल २० अंक

एम.ए. भाग-२ (हिन्दी)

प्रश्नपत्र -२

आधुनिक गद्य साहित्य

चतुर्थ सत्र

इकाई - १

- | | | | |
|----|---------------------|---|--|
| १. | कुछ शब्द कुछ रेखाएँ | - | विष्णु प्रभाकर |
| २. | जूठन | - | ओमप्रकाश वाल्मीकि |
| ३. | निबंध निलय | - | संपादक आचार्य सत्येन्द्र (वाणी प्रकाशन दिल्ली)
बालकृष्ण भट्ट आचार्य रामचंद्र शुक्ल, आचार्य हजारीप्रसाद द्विवेदी, डॉ. रामविलास शर्मा, श्रीविद्यानिवास मिश्र,
कुबेरनाथ राँय, डॉ. नगेन्द्र. |
| ४. | कथान्तर | - | संपादक-परमानंद श्रीवास्तव, (राजकमल प्रकाशन दिल्ली)
चंद्रधर शर्मा गुलेरी, प्रेमचंद, जैनेन्द्र, धर्मवीर भारती,
कमलेश्वर, उषा प्रियम्वदा, निर्मल वर्मा. |

इकाई - २

द्रुतपाठ के लिये निम्नांकित छह रचनाकारों का अध्ययन किया जायेगा

- | | | | |
|----|-------------------|---|--------------------------|
| १. | श्यामसुंदर दास | - | आलोचक के रूप में |
| २. | अज्ञेय | - | कहानीकार के रूप में |
| ३. | पांडेय बेचन शर्मा | - | कहानीकार के रूप में |
| ४. | अमृत राय | - | जीवनीकार के रूप में |
| ५. | हरिवंशराय बच्चन | - | आत्मकथाकार के रूप में |
| ६. | कुबेरनाथ राय | - | ललित निबंधकार के रूप में |

अंक विभाजन :

- | | | |
|------------------|---|--------|
| लिखित प्रश्नपत्र | - | ८० अंक |
| आंतरिक मूल्यांकन | - | २० अंक |

कुल = १०० अंक

प्रश्नपत्र का स्वरूप

समय ३ घंटे

पूर्णांक - ८०

प्रश्न - १ इकाई-१ की प्रत्येक कृति से १-१ व्याख्या इस प्रकार कुल चार व्याख्याएँ पूछी जायेगी, जिनमें से दो व्याख्याएँ करना अनिवार्य है। प्रत्येक व्याख्या पर ८ अंक निर्धारित है।

(२ X ८ = १६ अंक)

प्रश्न - २ इकाई १ की कृतियों पर चार दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें २ प्रश्न हल करने होंगे। प्रत्येक प्रश्न पर १६ अंक निर्धारित हैं २ X १६ = ३२ अंक

प्रश्न - ३ इकाई २ के प्रत्येक रचनाकार पर १ - १ लघुत्तरी प्रश्न इस प्रकार कुल ६ प्रश्न पूछे जायेंगे जिनमें से ४ प्रश्न हल करने होंगे। प्रत्येक प्रश्न के लिए ४ अंक निर्धारित है।

४ X ४ = १६ अंक

प्रश्न - ४ संपूर्ण पाठ्यक्रम से १६ अति लघुत्तरी / वस्तुनिष्ठ प्रश्न पूछे जायेंगे। प्रत्येक प्रश्न के लिये १ अंक होगा (१६ X १ = १६ अंक)

आंतरिक मूल्यांकन

- १) विद्यार्थी को संबंधित प्रश्नपत्र के पाठ्यक्रम पर आधारित एक शोधपत्र लिखना होगा, जिसके लिए १० अंक निर्धारित हैं।
- २) महाविद्यालय में कार्यरत विषय अध्यापक द्वारा विषय से संबंधित मौखिकी परीक्षा ली जायेगी, जिसके लिए १० अंक निर्धारित हैं। कुल २० अंक

एम.ए. (हिन्दी) द्वितीय वर्ष

प्रश्नपत्र -३

भाषाविज्ञान एवं हिन्दी भाषा

प्रस्तावना :

साहित्य आद्यंत एक भाषिक निर्मिति है। साहित्य के गंभीर अध्ययन के लिए भाषिक व्यवस्था का सुस्पष्ट सर्वांगीण ज्ञान अपरिहार्य है। भाषा विज्ञान, भाषा की वस्तुनिष्ठ अध्ययन प्रणाली के रूप में भाषिक इकाइयों तथा भाषा संरचना के विभिन्न स्तरों पर उनके अंतरसंबंधों के विन्यास को आलोकित कर न केवल अध्येता को भाषिक अंतर्दृष्टि देता है, अपितु भाषा-विषयक विवेचन के लिए एक निरूपक भाषा भी प्रदान कराता है। मूल भाषा व्यवस्था पर आरोपित द्वितीयक साहित्यिक व्यवस्था की भाषिक प्रकृति की स्वीकृति, प्राचीन भारतीय एवं अधुनातक पा चात्य साहित्य चिंतन में समान रूप से लक्षणीय है। कहने की आवश्यकता नहीं कि भाषा के साहित्येतर, प्रयोजनमूलक रूपों के अध्ययन में भी भाषा वैज्ञानिक चिंतन का लाभ उतना ही महत्वपूर्ण है।

भाषावैज्ञानिक आधार पर हिन्दी भाषा का ऐतिहासिक विकासक्रम, भौगोलिक विस्तार, भाषिक स्वरूप, विविधरूपता तथा हिन्दी में कम्प्यूटर सुविधाओं विषयक जानकारी एवं देवनागरी के वैशिष्ट्य, विकास और मानकीकरण का विवरण हिन्दी के अध्येता के लिए अत्यंत उपयोगी है।

तृतीय सत्र

पाठ्यविषय :

(क) भाषा विज्ञान

इकाई १. भाषा और भाषाविज्ञान :

भाषा की परिभाषा और अभिलक्षण, भाषाव्यवस्था और भाषा-संरचना और भाषिक-प्रकार्य। भाषाविज्ञान स्वरूप एवं व्याप्ति, अध्ययन की दिशाएँ - वर्णनात्मक, ऐतिहासिक और तुलनात्मक

इकाई २. स्वन प्रक्रिया :

स्वनविज्ञान का स्वरूप और शाखाएँ, वागवयव्य और उनके कार्य, स्वन की अवधारणा और स्वनो का वर्गीकरण, स्वनगुण, स्वनिक परिवर्तन। स्वनिम विज्ञान का स्वरूप, स्वनिम की अवधारणा, स्वनिम के भेद, स्वनिमिक विश्लेषण।

इकाई ३. रूप प्रक्रिया :

रूप प्रक्रिया का स्वरूप और शाखाएँ, रूपिम की अवधारणा और भेद : मुक्त - आबद्ध, अर्थदर्शी और संबंधदर्शी, संबंधदर्शी रूपिम के भेद और प्रकार्य। वाक्य की अवधारणा, वाक्य के भेद, वाक्य-विश्लेषण, निकटस्थ-अवयव विश्लेषण, गहन-संरचना और बाह्य-संरचना।

इकाई ४. अर्थविज्ञान :

अर्थ की अवधारणा, अर्थ परिवर्तन के कारण, अर्थ परिवर्तन की दिशाएँ

इकाई ५. वाक्य विज्ञान :

वाक्य की अवधारणा, वाक्य के भेद, वाक्य विश्लेषण, निकटस्थ अवयव विश्लेषण, हिंदी वाक्य रचना, पदक्रम और अन्विति

अंक विभाजन :

लिखित प्रश्नपत्र	-	८० अंक
आंतरिक मूल्यांकन	-	२० अंक

कुल = १०० अंक

प्रश्नपत्र का प्रारूप -

- प्रश्न १ (क) विभाग (भाषाविज्ञान) की पाँच इकाइयों में से पाँच प्रश्न। प्रत्येक इकाई में से एक आलोचनात्मक प्रश्न पूछे जायेंगे। जिनमें से तीन प्रश्न हल करने होंगे। ३ X १६ = ४८ अंक
- प्रश्न २ संपूर्ण पाठ्यक्रम से आठ लघुतरी प्रश्न पूछे जाएंगे जिनमें से चार प्रश्न हल करने होंगे। ४ X ४ = १६ अंक
- प्रश्न ३ संपूर्ण पाठ्यक्रम से १६ अति लघुतरी / वस्तुनिष्ठ प्रश्न पूछे जायेंगे। प्रत्येक प्रश्न के लिये १ अंक होगा (१६ X १ = १६ अंक)

एम.ए. (हिन्दी) द्वितीय वर्ष
प्रश्नपत्र -३
भाषाविज्ञान एवं हिन्दी भाषा
चतुर्थ सत्र

पाठ्यविषय :

(ख) हिन्दी भाषा

- हिन्दी की ऐतिहासिक पृष्ठभूमि : प्राचीन भारतीय आर्यभाषाएँ - वैदिक तथा लौकिक संस्कृत और उनकी विशेषताएँ। मध्यकालीन भारतीय आर्यभाषाएँ पालि प्राकृत - शौरसेनी, अर्धमागधी, मागधी, अपभ्रंश और उनकी विशेषताएँ। आधुनिक भारतीय आर्यभाषाएँ और उनका वर्गीकरण।
- हिन्दी का भौगोलिक विस्तार : हिन्दी की उपभाषाएँ, पश्चिमी हिन्दी, पूर्वी हिन्दी, राजस्थानी, बिहारी तथा पहाड़ी और उनकी बोलियाँ। खड़ीबोली, ब्रज और अवधी की विशेषताएँ।
- हिन्दी का भाषिक स्वरूप : हिन्दी की स्वनिम व्यवस्था - खंड्य, खंड्येतर। हिन्दी शब्द रचना - उपसर्ग, प्रत्यय, समास। रूपरचना - लिंग, वचन और कारक-व्यवस्था के संदर्भ में हिन्दी के संज्ञा सर्वनाम विशेषण और क्रियारूप। हिन्दी वाक्य-रचना : पदक्रम और अन्विति।
- देवनागरी लिपी : विशेषताएँ और मानकीकरण।
- हिन्दी के विविध रूप : संपर्क - भाषा, राष्ट्रभाषा, राजभाषा के रूप में हिन्दी, माध्यम-भाषा, संचार- भाषा, हिन्दी की संवैधानिक स्थिति।
- हिन्दी में कम्प्यूटर सुविधाएँ : आंकडा-संसाधन और शब्द-संसाधन, वर्तनी-शोधक, मशीनी अनुवाद हिन्दी भाषा-शिक्षण

अंक विभाजन :

लिखित प्रश्नपत्र	-	८० अंक
आंतरिक मूल्यांकन	-	२० अंक

कुल = १०० अंक

प्रश्नपत्र का प्रारूप -

- प्रश्न १ (ख) विभाग (हिन्दी भाषा) की छह इकाइयों में से पाँच प्रश्न। छह इकाइयों में से कुल पाँच आलोचनात्मक प्रश्न पूछे जायेंगे। जिनमें से तीन प्रश्न हल करने होंगे। ३ X १६ = ४८ अंक
- प्रश्न २ संपूर्ण पाठ्यक्रम से आठ लघुतरी प्रश्न पूछे जाएंगे जिनमें से चार प्रश्न हल करने होंगे। ४ X ४ = १६ अंक
- प्रश्न ३ संपूर्ण पाठ्यक्रम से १६ अति लघुतरी / वस्तुनिष्ठ प्रश्न पूछे जायेंगे। प्रत्येक प्रश्न के लिये १ अंक होगा (१६ X १ = १६ अंक)

एम.ए. (हिन्दी) भाग - २
प्रश्नपत्र - ४
निबंध / परियोजना
तृतीय सत्र

(अ) निबंध :

इस प्रश्नपत्र में आदिकाल, भक्तिकाल एवं रीतिकाल पर आधारित विषय दिए जाएंगे जिनमें से किसी दो विषय पर निबंध लिखने होंगे। जिसके लिए अस्सी अंक होंगे। (२ X ४० = ८० अंक)

अंक विभाजन :

लिखित प्रश्नपत्र	-	८० अंक
आंतरिक मूल्यांकन	-	२० अंक

कुल = १०० अंक

एम.ए. (हिन्दी) भाग - २
प्रश्नपत्र - ४
निबंध / परियोजना
चतुर्थ सत्र

(आ) विनिबंध : (स्त्री विमर्श, दलित विमर्श, आदिवासी विमर्श, कृषि विमर्श, बाल साहित्य विमर्श)

हिन्दी साहित्य अथवा हिन्दी भाषा से संबंधित किसी एक विषय को आधार बनाकर विद्यार्थी एक परियोजना प्रस्तुत करेगा। विद्यार्थी अपनी परियोजना किसी ऐसे प्राध्यापक के मार्गदर्शन में संपन्न करेगा जिसे कम से कम पांच वर्षों का अध्यापन अनुभव हो। यह परियोजना लगभग १०० पृष्ठों की होगी। १५ मार्च तक इस परियोजना की दो प्रतियाँ विद्यापीठ को प्रस्तुत करना होगा। इसके लिए १०० अंक होंगे।

अंक विभाजन निम्नानुसार होगा -

विनिबंध लेखन	-	६० अंक
मौखिक	-	४० अंक

कुल = १०० अंक

(इ) लघुशोध प्रबंध (Disseration)

लघुशोध प्रबंध हेतु निर्देश

- लघुशोध प्रबंध प्रस्तुत करने वाले विद्यार्थी को एम.ए. भाग -१ परीक्षा में कम से कम ५५ प्रतिशत अंक प्राप्त करना आवश्यक होगा।
- प्रश्न पत्र चार के अन्तर्गत लघुशोध प्रबंध के लिये ६० अंक लेखन के लिये और मौखिकी के लिये ४० अंक होंगे।
- लघुशोध प्रबंध लेने वाले विद्यार्थी को मार्गदर्शक स्वीकृति के लिये अपना आवेदन विद्यापीठ के ३१ अगस्त के पूर्व ही भेजना होगा।
- जिन प्राध्यापकों ने आचार्य पदवी प्राप्त की हो या जिन्हें पांच वर्ष का स्नातकोत्तर कक्षाओं को पढ़ाने का अनुभव हो अथवा जिन्हें सात वर्षों का स्नातक कक्षाओं को पढ़ाने का अनुभव हो उन्हें मार्गदर्शन स्वीकृति मिल सके।
- एक परीक्षा के लिये एक मार्गदर्शक के पास पांच शोधार्थी से अधिक नहीं होना चाहिये।
- महाराष्ट्र विश्वविद्यालय एक्ट १९९४ की धारा ३६ (A)(६) के अन्तर्गत दर्शाई गई कार्यवाही लघुशोध प्रबंध पर लागू होगी।
- ग्रीष्मकालीन परीक्षा के लिये १५ मार्च तक अपने लघुशोध प्रबंध को विश्वविद्यालय में जमा कराना होगा। उस पर मार्गदर्शन का प्रमाणपत्र अत्यन्त आवश्यक है।
- लघुशोध प्रबंध की २ प्रतियाँ विश्वविद्यालय में जमा करानी होंगी। लघुशोध प्रबंध लगभग १०० पृष्ठों का हो लघुशोध प्रबंध टंकित अथवा सुवाच्च अक्षरों में होना आवश्यक है।
- किसी एक परीक्षक के पास पाँच से अधिक लघुशोध प्रबंध न भेजे जाये।
- शोध प्रबंध विषय की सम्पूर्ण जानकारी अत्यन्त गोपनीय रखना आवश्यक है एवं आवश्यकता पडने पर उसे प्रबंध समिति के सामने प्रस्तुत किया जायेगा।
- लघुशोध प्रबंध के सभी अधिकार अमरावती विश्वविद्यालय के पास ही रहेंगे।

सहायक ग्रंथ सूची

- कबीर और जायसी - पुरुषोत्तम बाजपेयी
- स्वातंत्र्योत्तर हिंदी काव्य विधाएँ - बापूराव देसाई
- नयी कविता : एक मूल्यांकन - शंभूदत्त पाण्डेय
- प्रेमचंद और उनकी उपन्यास कला - रघुवर दयान
- मुक्तिबोध कविता और जीवन - चंद्रकांत देवताले
- अज्ञेय - निर्मला शर्मा
- तुलसी के अध्ययन की नई दिशाएँ - रामप्रसाद मिश्र
- दुष्यंतकुमार और नई कविता - विनय सिंह
- बालकृष्ण शर्मा 'नवीन' भावबोध के आयाम - विजयलक्ष्मी सालोदिया
- धर्मवीर भारती की साहित्य साधना - पुष्पा भारती
- भाषा विज्ञान एवं समान भाषा विज्ञान - गिरीष परदेशी
- भाषा और भाषा विज्ञान - तेजपाल चौधरी
- मुक्तिबोध की काव्यभाषा - सनतकुमार
- महादेवी का काव्य वैभव - रमेशचंद्र गुप्त
- पंत के काव्य में कल्पना और कर्तृत्व - बिजरानी भार्गव
- आचार्य हजारीप्रसाद द्विवेदी : व्यक्तित्व एवं साहित्य - गणपतिचंद्र गुप्त
- समकालीन हिंदी कवित्व : अज्ञेय और मुक्तिबोध के संदर्भ में - भवदेव पाण्डेय
- भीष्म साहनी ; उपन्यास साहित्य - राजे वर सक्सेना
- राहुल सांकृत्यायन ; सृजन और संघर्ष - जगतसिंह

२०. निराला काव्य में विविध आयाम - डॉ.इन्द्रराज सिंह
२१. साहित्य में गद्य की विविध विधाएँ - डॉ. कैलाशचंद्र भाटिया
२२. हिंदी निबंध के आधारस्तंभ - प्रो. हरिमोहन
२३. प्रतिनिधि हिंदी निबंधकार - प्रो. हरिमोहन
२४. आचार्य रामचंद्र शुक्ल निबंध संरचना - योगेश प्रताप सिंह
२५. मैला आँचल : शिल्प और दृष्टि - बट्टीप्रसाद
२६. अंधेरे में एक विश्लेषण - डॉ.विजयपाल सिंह
२७. छायावादोत्तर हिंदी कविता : एक अंतरयात्रा - डॉ.मधुबाला सान्याल
२८. हिंदी काव्य-चिंतन के मूलाधार - योगेन्द्र प्रताप सिंह
२९. उत्तर आधुनिक अवधारणा - श्रीप्रकाश मिश्र
३०. दलित-विमर्श और हिंदी साहित्य साहित्य - दीपक कुमार पाण्डेय
३१. साहित्यिक आन्दोलनों और साहित्य विवादों का इतिहास - अपराजिता श्रीवास्तव
३२. नारी चेतना के आयाम - अलका प्रकाश
३३. आधुनिकता और हिंदी उपन्यास - इंद्रनाथ मदान
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३५. हिंदी पाठानुसंधान - कन्हैया सिंह
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३७. कामायनी : एक पुनर्विचार - गजानन माधव मुक्तिबोध
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३९. हिंदी साहित्य का वैज्ञानिक इतिहास - १ (१९८४ से १९५७ ई.तक) - गणपतिचंद्र गुप्त
४०. हिंदी साहित्य का वैज्ञानिक इतिहास - २ (१९५७ से अब तक) - गणपतिचंद्र गुप्त
४१. हिंदी नाटक का आत्मसंघर्ष - गिरीश रस्तोगी
४२. निराला : आत्महंता आस्था - दूधनाथ सिंह
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४५. हिंदी साहित्य : बीसवीं शताब्दी - नंददुलारे वाजपेयी
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४८. २१वीं शती का हिंदी उपन्यास - पुष्पपाल सिंह
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५०. आधुनिक हिंदी साहित्य का इतिहास - बच्चन सिंह
५१. इक्कीसवीं सदी का हिंदी साहित्य - सं.: रवीन्द्रनाथ मिश्र
५२. हिंदी उपन्यास : एक अन्तर्यात्रा - रामदरश मिश्र
५३. पंत, प्रसाद और मैथिलीशरण - रामधारी सिंह 'दिनकर'
५४. देवनागरी लिपि और हिंदी : संघर्षों की ऐतिहासिक यात्रा - रामनिरंजन परिमलेन्दु
५५. कामायनी का पुनर्मूल्यांकन - रामस्वरूप चतुर्वेदी
५६. स्त्री-लेखन : स्वरूप और संकल्प - रोहिणी अग्रवाल
५७. हिंदी बाल साहित्य की रूपरेखा - श्रीप्रसाद
५८. हिंदी साहित्य का उत्तरवर्ती काल - सत्यदेव मिश्र
५९. हिंदी वेब साहित्य - सुनील कुमार लवटे
६०. हिंदी नाटक के पाँच दशक - कुसुम खेमानी
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६२. स्त्री विमर्श : विविध पहलू - कल्पना वर्मा
६३. आदिवासी साहित्य-यात्रा - सं.रमणिका गुप्ता
६४. दलित-विमर्श और हिंदी साहित्य - दीपक कुमार पाण्डेय
६५. भारतीय दलित आन्दोलन का इतिहास (चार खंड) - मोहनदास नैमिशराय
६६. मानक हिंदी का स्वरूप - कलानाथ शास्त्री
६७. आधुनिक भाषाविज्ञान के सिद्धान्त - रामकिशोर शर्मा
६८. भाषा विज्ञान : हिंदी भाषा और लिपि - रामकिशोर शर्मा
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७२. भारतीय उपन्यास : कथासार - १ सं.प्रभाकर माचवे
७३. भारतीय उपन्यास : कथासार - २ सं.प्रभाकर माचवे
७४. नयी सदी की पहचान : श्रेष्ठ महिला कथाकार - सं.ममता कालिया
७५. कामायनी का पुनर्मूल्यांकन - रामस्वरूप चतुर्वेदी
७६. आधुनिक साहित्य की प्रवृत्तियाँ - नामवर सिंह
७७. उपन्यास की रचना-प्रक्रिया - परमानंद श्रीवास्तव
७८. कहानी की रचना-प्रक्रिया - परमानंद श्रीवास्तव
७९. उत्तर आधुनिक मीडिया विमर्श - सुधीश पचोरी
८०. भारतीय नारी सन्त परम्परा - बलदेव वंशी
८१. स्त्री-विमर्श का लोकपक्ष - अनामिका
८२. स्त्री-विमर्श : भारतीय परिप्रेक्ष्य - डॉ.के.एम.मालती
८३. आदिवासी स्वर और नई शताब्दी - सं.रमणिका गुप्ता
८४. आदिवासी-स्वर : सामाजिक आर्थिक जीवन - सं.कुमार चौहान, श्रीमती रेनु चौहान
८५. आदिवासी स्वर : वाचिक परम्परा व साहित्य - सं.वी.एस.चटर्जी, जयशंकर उपाध्याय
८६. भारतीय दलित साहित्य: परिप्रेक्ष्यपुत्री सिंह, कमला प्रसाद, राजेन्द्र शर्मा
८७. दलित साहित्य : वेदना और विद्रोह - शरणकुमार लिंबाले
८८. दलित साहित्य : बुनियादी सरोकार - कृष्णदत्त पालीवाल
८९. दलित साहित्य के प्रतिमान - डॉ.एन.सिंह

१०. संत कबीर और संत तुकड़ोजी के हिन्दी साहित्य का तुलनात्मक अध्ययन - डॉ.संगीता जगताप
 ११. सतसई काव्य परम्परा और बाल सतसई - डॉ.संगीता जगताप
 १२. बाल सतसई प्रबोधिनी - स्वामी विजयानन्द, डॉ.राम बहोरी त्रिपाठी
 १३. धर्मवीर भारती की कविता - डॉ. विभा शुक्ला
 १४. 'दूसरा सप्तक' के कवियों की काव्य भाषा - डॉ.तीर्थराज राय
 १५. राष्ट्रीय चेतना के संदर्भ में भारत के राष्ट्रकवि मैथिलीशरण गुप्त एवं मॉरिशस के राष्ट्रकवि डॉ.ब्रजेन्द्र भगत 'मधुकर' के काव्य का तुलनात्मक अध्ययन - डॉ.ज्योति एन.मंत्री
 १६. शब्दकोश - डॉ.अजितसिंह बौहार, डॉ.गणेश पेंडीखरे, वंदना भारोतराव गुरनुले, डॉ.महेन्द्रसिंह पवार
 १७. डॉ.परशुराम शुक्ल का बाल साहित्य - डॉ.आनंद बक्षी
 १८. नरेश मेहता के मिथकीय खंडकाव्य - डॉ.वर्षा शाह
 १९. धर्मवीर भारती का रचना संसार - डॉ.सुरेशकुमार केसवानी
 १००. शरद जोशी के साहित्य में व्यंग्य - डॉ. संतोष विजय येरावार
 १०१. मैत्रेयी पुष्पा के उपन्यासों में स्त्री जीवन संघर्ष - डॉ.शिवशेट्टे गोविंद गुंडप्पा
 १०२. देश विभाजन के परिप्रेक्ष्य में आधा गाँव - शिवशेट्टे गोविंद गुंडप्पा
 १०३. श्रीकांत वर्मा के काव्य में सामाजिक चेतना - प्रा.डॉ. सुरेखा मंत्री
 १०४. सुमित्रानन्दन पंत के काव्य में प्रकृति प्रेम और दर्शन - डॉ.सुरेखा प्रेमचंद मंत्री
 १०५. डॉ.शंकर शेष और रत्नाकर मतकरी के नाटकों का तुलनात्मक अध्ययन - डॉ.रवीन्द्र कुमार शिरसाट
 १०६. मोहन राकेह के नाटकों में नारी भावना - डॉ.रमा शुक्ला
 १०७. मैथिलीशरण गुप्त के काव्य में नारी भावना - डॉ.अनिल पाखरे
 १०८. दलित साहित्य सामाजिक सरोकार- डॉ. वाय.सी.मेंडे

Appendix-D

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - १

तृतीय सत्र

अनुवाद: ऐतिहासिक संदर्भ एवं भाषा का सामाजिक संदर्भ

- १) इकाई - पश्चिम में अनुवाद चिंतन की परंपरा एवं अनुवाद सिद्धांतों का विकास
 २) इकाई - भारतीय भाषाओं में अनुवाद चिंतन
 ३) इकाई - अनुवाद के क्षेत्र में प्रमुख विद्वानों का योगदान
 अ) रघुनाथराव ब) रामचंद्र शुक्ल क) हरिवंशराय बच्चन ड) डॉ.रघुवीर इ) रामधारीसिंह दिनकर ई) मैथिलीशरण गुप्त
 ४) इकाई - अनुवाद चिंतन
 १) जॉन ड्राइडन २) गुरुदेव रवींद्रनाथ
 ५) इकाई - भाषा का सामाजिक संदर्भ
 १) भाषा का सामाजिक संदर्भ २) हिंदी का सामाजिक संदर्भ
 क) रिश्ते नाते की शब्दावली
 ख) सर्वनाम और संबोधन रूप
 ग) कोड मिश्रण एवं कोड परिवर्तन
 अंक विभाजन (प्रथम सत्र)

१) दीर्घोत्तरी प्रश्न	3 x 16 = 48
२) लघुत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न	16 x 1 = 16
	80

आंतरिक मूल्यांकन

- १) विभागीय इकाई जॉच परीक्षा 10 अंक
 २) प्रमुख विद्वानों के रचना के अनुवाद का उदाहरण 10 अंक
 कुल अंक - 100

सूचना -

- १) प्रत्येक इकाई से एक ऐसे कुल पांच दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।
 २) पांचों इकाई से कुल आठ लघुत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
 ३) संपूर्ण पाठ्यक्रम से सोलह वस्तुनिष्ठ प्रश्न पूछे जायेंगे दिये गये सभी प्रश्नों को हल करना अनिवार्य होगा।

संदर्भ ग्रंथ सूची

अनुवाद: त्रैमासिक (जुलाई- सितम्बर तथा अक्टोबर- दिसम्बर १९९८ का संयुक्त अंक) भारतीय अनुवाद परिषद

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - १

चतुर्थ सत्र

अनुवाद: ऐतिहासिक संदर्भ एवं भाषा का सामाजिक संदर्भ

- १) इकाई - हिंदी साहित्य में अनुवाद
 २) इकाई - अनुवाद प्रशिक्षण पाठ्यक्रम एवं अनुवाद क्षेत्र में कार्यरत संस्थाएं
 ३) इकाई - अनुवाद के क्षेत्र में प्रमुख विद्वानों का योगदान
 अ) भारतेंदू हरिचंद्र ब) गोस्वामी तुलसीदास क) मोहन राकेश ड) अब्दुल रहिम खान इ) राजेद्र यादव ई) भोलानाथ तिवारी
 ४) इकाई - अनुवाद चिंतन
 १) सूर्यकांत त्रिपाठी 'निराला' २) विष्णु प्रभाकर
 ५) इकाई - अनुवाद संबंधी विचार
 डॉ. राजेद्र प्रसाद, आचार्य महावीर प्रसाद द्विवेदी, महादेवी वर्मा,
 एडवर्ड फिट्जरेल्ड, ऍलेक सांद्र सेकेविच, मैथ्यू अर्नाल्ड

अंक विभाजन (द्वितीय सत्र)

१) दीर्घोत्तरी प्रश्न	3 x 16 = 48
२) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न	16 x 1 = 16
	80

आंतरिक मूल्यांकन

१) विभागीय इकाई जॉच परीक्षा	10 अंक
२) प्रमुख विद्वानों के रचना के अनुवाद का उदाहरण	10 अंक
	कुल अंक - 100

सूचना -

- १) प्रत्येक इकाई से एक ऐसे कुल पांच दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।
- २) पांचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
- ३) संपूर्ण पाठ्यक्रम से सोलह वस्तुनिष्ठ प्रश्न पूछे जायेंगे दिये गये सभी प्रश्नों को हल करना अनिवार्य होगा।

संदर्भ ग्रंथ सूची

अनुवाद: त्रैमासिक (जुलाई- सितम्बर तथा अक्टूबर- दिसम्बर १९९८ का संयुक्त अंक) भारतीय अनुवाद परिषद

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - २

तृतीय सत्र

अनुवाद व्यवहार की समस्याएं एवं अनुवाद व्यवहार

- १) इकाई - सर्जनात्मक साहित्य का अनुवाद एवं व्यवहार- साहित्य के अनुवाद की समस्याएं
- २) इकाई - प्रमुख साहित्य रूपों के संबंध में कविता, कथा-साहित्य, नाटक-साहित्य, समीक्षा, अनुवाद व अनुसृजन ज्ञान के साहित्य का अनुवाद एवं व्यवहार
- ३) इकाई - सामाजिक विज्ञान और विधि अनुवाद एवं व्यवहार- प्रमुख सामाजिक विज्ञान (इतिहास, राजनीति, विज्ञान, दर्शन, अर्थशास्त्र, वाणिज्य) के सामग्री के अनुवाद की समस्याएं, विधि साहित्य के अनुवाद की समस्याएं
- ४) इकाई - प्रशासनिक अनुवाद की समस्याएं तथा (बैंक, एल.आय.सी., बीमा संबंधी) अनुवाद एवं व्यवहार राजभाषा हिंदी का स्वरूप प्रशासनिक शब्दावली
- ५) इकाई - कार्यालयीन सामग्री (टिप्पणी, आलेख, प्रारूप, प्रतिवेदन, कार्यालयीन पत्रादि) के अनुवाद की समस्याएं

अंक विभाजन (प्रथम सत्र)

१) दीर्घोत्तरी प्रश्न	2 x 16 = 32
२) अनुवाद व्यवहार	2 x 8 = 16
३) लघूत्तरी प्रश्न	4 x 4 = 16
४) वस्तुनिष्ठ प्रश्न/अतिलघूत्तरी प्रश्न	16 x 1 = 16
	80

आंतरिक मूल्यांकन

१) प्रायोगिक कार्य (अनुवाद मराठी से हिंदी)	10 अंक
२) विभागीय इकाई जॉच परीक्षा	10 अंक
	कुल अंक - 100

सूचना -

- १) प्रत्येक इकाई से एक ऐसे कुल पांच दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें से दो प्रश्न हल करना अनिवार्य होगा।
 - २) साहित्य का अनुवाद एवं व्यवहार इस इकाई से एक तथा अन्य सभी इकाइयों से प्रत्येकी एक अनुवाद व्यवहार का प्रश्न होगा, जिसमें से परीक्षार्थी को कोई दो अनुवाद व्यवहार के प्रश्न हल करने होंगे।
 - ३) पांचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
 - ४) संपूर्ण पाठ्यक्रम से सोलह वस्तुनिष्ठ प्रश्न पूछे जायेंगे दिये गये सभी प्रश्नों को हल करना अनिवार्य होगा।
- विशेष - छात्रों को एम.ए. (अनुवाद हिंदी) भाग-२ के प्रश्नपत्र - २ के लिए परीक्षा भवन में कोश ग्रंथों (Dictionary) के उपयोग की छूट होगी।

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - २

चतुर्थ सत्र

अनुवाद व्यवहार की समस्याएं एवं अनुवाद व्यवहार

- १) इकाई - जनसंचार माध्यमों में अनुवाद एवं व्यवहार पत्र-पत्रिकाएं, आकाशवाणी, दूरदर्शन की सामग्री
- २) इकाई - प्राकृतिक विज्ञान और प्रौद्योगिकी का अनुवाद एवं व्यवहार - प्रमुख प्राकृतिक विज्ञानों (भौतिक विज्ञान, गणित, रसायनविज्ञान, जीवविज्ञान, वनस्पति विज्ञान)
- ३) इकाई - इंजीनियरिंग के संदर्भ में वैज्ञानिक साहित्य के अनुवाद की समस्याएं (प्रत्येक वर्ग से अनुवाद व्यवहार अपेक्षित है - I)
- ४) इकाई - अनुवाद परीक्षण एवं संपादन (Vetting)

५) इकाई - प्रशासनिक अभिव्यक्तियां वाक्यांश (अंग्रेजी हिंदी-हिंदी से अंग्रेजी)

अंक विभाजन (प्रथम सत्र)

१) दीर्घोत्तरी प्रश्न	2 x 16 = 32
२) अनुवाद व्यवहार	2 x 8 = 16
३) लघूत्तरी प्रश्न	4 x 4 = 16
४) वस्तुनिष्ठ प्रश्न/अतिलघूत्तरी प्रश्न	16 x 1 = 16
	कुल अंक 80

आंतरिक मूल्यांकन

- १) प्रायोगिक कार्य (अनुवाद अंग्रेजी से हिंदी) 10 अंक
२) विभागीय इकाई जॉच परीक्षा 10 अंक

कुल अंक - 100

सूचना -

- १) प्रत्येक इकाई से एक ऐसे कुल पांच दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें से दो प्रश्न हल करना अनिवार्य होगा।
२) साहित्य का अनुवाद एवं व्यवहार इस इकाई से एक तथा अन्य सभी इकाइयों से प्रत्येकी एक अनुवाद व्यवहार का प्रश्न होगा, जिसमें से परीक्षार्थी को कोई दो अनुवाद व्यवहार के प्रश्न हल करने होंगे।
३) पाँचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
४) संपूर्ण पाठ्यक्रम से सोलह वस्तुनिष्ठ प्रश्न पूछे जायेंगे दिये गये सभी प्रश्नों को हल करना अनिवार्य होगा।

विशेष - छात्रों को एम.ए. (अनुवाद हिंदी) भाग-२ के प्रश्नपत्र - २ के लिए परीक्षा भवन में कोश ग्रंथों (Dictionary) के उपयोग की छूट होगी।

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - ३ (वैकल्पिक) एक

तृतीय सत्र

आधुनिक हिंदी साहित्य का प्रवृत्तिमूलक व भाषागत परिचय

आधुनिक हिंदी साहित्य की विविध विधाओं (कविता, उपन्यास, नाटक, कहानी एवं निबंध) का परिचयात्मक अध्ययन एवं भाषागत

विशेषताएँ -

- | | | |
|----------------------|--|--|
| १) इकाई : - काव्य - | १. कामायनी (श्रद्धा, स्वप्न) जयशंकर प्रसाद | २. पंचवटी -- मैथिलीशरण गुप्त |
| २) इकाई : -- उपन्यास | १. रंगभूमि - प्रेमचंद | २. बूंद और समुद्र - अमृतलाल नागर |
| ३) इकाई : - नाटक | १. ध्रुवस्वामिनी - जयशंकर प्रसाद | २. लहरों के राजहंस - मोहन राकेश |
| ४) इकाई : - कहानियाँ | १. पुरस्कार- जयशंकर प्रसाद | २. वापसी - उषा प्रियवंदा |
| ५) इकाई : - निबंध | १. श्रद्धा-भक्ति - आ.रामचंद्र शुक्ल | २. नाखून क्यों बढ़ते हैं - हजारी प्रसाद द्विवेदी |
| | ३. तितुरता हुआ गणतंत्र - हरिशंकर परसाई | |

अंक विभाजन (प्रथम सत्र) :-

१) संदर्भ सहित व्याख्या	2 x 8 = 16
२) आलोचनात्मक प्रश्न	2 x 16 = 32
३) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न/अति लघूत्तरी प्रश्न	16 x 1 = 16
	कुल अंक - 80

आंतरिक मूल्यांकन

- १) किसी एक लेखक का जीवन परिचय 10 अंक
२) विभागीय इकाई जॉच परीक्षा 10 अंक

कुल अंक - 100

प्रश्नपत्र का स्वरूप

प्रश्न १- इकाई - १ से कामायनी तथा पंचवटी, इकाई-२ से रंगभूमि तथा बूंद और समुद्र, इकाई- ३ से ध्रुवस्वामिनी तथा लहरों के राजहंस पाठ्यपुस्तकों से एक-एक पद्यांश और गद्यांश (कुल-६) के व्याख्या पूछे जायेंगे जिनमें से दो व्याख्या करनी पड़ेगी। प्रत्येक व्याख्या के

लिए ८ अंक होंगे।

प्रश्न २- इकाई - १,२ तथा ३ से प्रत्येकी २-२ दीर्घोत्तरी प्रश्न (कुल-६) प्रश्न पूछे जायेंगे, जिनमें से किन्हीं दो प्रश्नों के उत्तर लिखने होंगे। प्रत्येक प्रश्न १६ अंकों का होगा।

प्रश्न ३ - पाँचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।

प्रश्न ४- संपूर्ण पाठ्यक्रम से सोलह अतिलघूत्तरी/वस्तुनिष्ठ प्रश्न पूछे जायेंगे। दिये गये सभी प्रश्नों को हल करना अनिवार्य है।

संदर्भ ग्रंथ सूची

- १) चिन्तामणी ---- आ. रामचंद्र शुक्ल
- २) श्रेष्ठ कहानियाँ --- मन्नू भंडारी
- ३) प्रतिनिधि कहानियाँ -- राजेन्द्र यादव
- ४) कहानी विविधा --- डॉ. देवीशंकर अवस्ती
- ५) मानसरोवर -- प्रेमचंद
- ६) कल्पलता -- हजारीप्रसाद द्विवेदी
- ७) परसाई रचनावली -- भाग - ३
- ८) हिंदी रामकाव्य में भगवान राम का चरित्र -- डॉ शंकर बुंदेले
- ९) प्रेमचंद कथा साहित्य -- समीक्षा और मूल्यांकन -- डॉ धर्मध्वज त्रिपाठी
- १०) हिंदी नाटक : मूल्य चिंतन और रंगदृष्टि, डॉ ओमप्रकाश सारस्वत
- ११) मोहन राकेश और उनके नाटक -- गिरिश रस्तोगी
- १२) हिंदी कहानी -- प्रक्रिया और पाठ, सुरेन्द्र चौधरी, दिनकर सं. डॉ. सावित्री सिन्हा

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - ३ (वैकल्पिक) एक

चतुर्थ सत्र

आधुनिक हिंदी साहित्य का प्रवृत्तिमूलक व भाषागत परिचय

- १) इकाई : - काव्य १. कामायनी (आशा) जयशंकर प्रसाद २. रश्मि रथी -- रामधारीसिंह दिनकर
 २) इकाई : - उपन्यास १. बाणभट्ट की आत्मकथा - हजारीप्रसाद द्विवेदी २. शेखर एक जीवनी - अज्ञेय
 ३) इकाई : - नाटक १. अंधेर नगरी- भारतेन्दु हरिश्चंद्र २. आठवाँ सर्ग - सुरेन्द्र वर्मा
 ४) इकाई : - कहानियाँ १. ईदगाह - प्रेमचंद २. करवा का व्रत- यशपाल ३. मैं हार गई - मन्नु भंडारी
 ५) इकाई : - परशुराम शुक्ल की बाल सतसई से - १) बालवंदन २) बच्चे और राष्ट्र ३) बेटी और समाज के दोहे

अंक विभाजन (द्वितीय सत्र) :-

१) संदर्भ सहित व्याख्या	2 x 8 = 16
२) आलोचनात्मक प्रश्न	2 x 16 = 32
३) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न/अति लघूत्तरी प्रश्न	16 x 1 = 16

कुल अंक - 80

आंतरिक मूल्यांकन

- १) किसी एक लेखक का जीवन परिचय 10 अंक
 २) विभागीय इकाई जॉच परीक्षा 10 अंक
 कुल अंक - 100

प्रश्नपत्र का स्वरूप

प्रश्न १- इकाई - १ से कामायनी तथा हुंकार, इकाई-२ से पुनर्नवा तथा रागदरबारी, इकाई-३ से अंधेर नगरी तथा आठवाँ सर्ग पाठ्यपुस्तकों से एक-एक पद्यांश और गद्यांश (कुल-६) के व्याख्या पूछे जायेंगे जिनमें से दो व्याख्या करनी पड़ेगी। प्रत्येक व्याख्या के लिए ८ अंक होंगे।
 प्रश्न २- इकाई - १,२ तथा ३ से प्रत्येकी २-२ दीर्घोत्तरी प्रश्न (कुल-६) प्रश्न पूछे जायेंगे, जिनमें से किन्हीं दो प्रश्नों के उत्तर लिखने होंगे। प्रत्येक प्रश्न १६ अंकों का होगा।
 प्रश्न ३ - पाँचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
 प्रश्न ४- संपूर्ण पाठ्यक्रम से सोलह अतिलघूत्तरी/वस्तुनिष्ठ प्रश्न पूछे जायेंगे। दिये गये सभी प्रश्नों को हल करना अनिवार्य है।

संदर्भ ग्रंथ सूची

- १) चिन्तामणी - आ. रामचंद्र शुक्ल
- २) श्रेष्ठ कहानियाँ - मन्नु भंडारी
- ३) प्रतिनिधि कहानियाँ - राजेन्द्र यादव
- ४) कहानी विविधा - डॉ. देवीशंकर अवस्वी
- ५) मानसरोवर - प्रेमचंद
- ६) कल्पलता - हजारीप्रसाद द्विवेदी
- ७) परसाई रचनावली - भाग - ३
- ८) हिंदी रामकाव्य में भगवान राम का चरित्र -- डॉ शंकर बुंदेले
- ९) प्रेमचंद कथा साहित्य -- समीक्षा और मूल्यांकन -- डॉ धर्मध्वज त्रिपाठी
- १०) हिंदी नाटक : मूल्य चिंतन और रंगदृष्टि, डॉ ओमप्रकाश सारस्वत
- ११) मोहन राकेश और उनके नाटक -- गिरिश रस्तोगी
- १२) हिंदी कहानी -- प्रक्रिया और पाठ, सुरेन्द्र चौधरी, दिनकर सं. डॉ. सावित्री सिन्हा
- १३) बाल सतसई -- डॉ.परशुराम शुक्ल
- १४) सतसई काव्य परंपरा और बाल सतसई - डॉ. संगिता जगताप
- १५) बाल सतसई प्रबोधिनी - स्वामी विजयानंद, डॉ. रामबहोरी त्रिपाठी

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - ३ (वैकल्पिक) दो

तृतीय सत्र

राजभाषा प्रशिक्षण

प्रस्तावना -

कार्यालयीन-हिंदी का एक नया स्वरूप इधर विकसित हुआ है। इसका व्यवस्थित ज्ञान प्राप्त कर लेने पर रोजगार की संभावनाओं में अभिवृद्धि होगी और राजभाषा का स्तरोन्वयन भी होगा।

पाठ्यविषय

- १) इकाई - प्रशासन - व्यवस्था और भाषा। भारत की बहुभाषिकता और एक संपर्क भाषा की आवश्यकता।
 २) इकाई - राजभाषा विषयक सांविधानिक प्रावधान- राजभाषा अधिनियम (अनुच्छेद ३४३ से ३५१ तक), राष्ट्रपति के आदेश (१९५२, १९५५, १९६०),

राजभाषा अधिनियम १९६३ (यथा संशोधित १९६७), राजभाषा संकल्प(१९६८) (यथानुमोदित १९६१), राजभाषा नियम १९७६, द्विभाषा नीति और त्रिभाषा सूत्र। हिंदीतर राज्यों के प्रशासनिक क्षेत्रों में हिंदी की स्थिति। अंतरराष्ट्रीय स्तर पर हिंदी। हिंदी के प्रचार-प्रसार में विभिन्न हिंदी संस्थाओं की भूमिका। हिंदी और देवनागरी लिपि के मानकीकरण की समस्या।

- ३) इकाई - हिंदी कम्प्यूटीकरण ।
 ४) इकाई - भूमण्डलीकरण के परिप्रेक्ष्य में हिंदी का भविष्य
 ५) इकाई - हिंदी संकेताक्षर और कूटपद निर्माण। हिंदी में वैज्ञानिक और तकनीकी परिभाषिक शब्दावली।
 अंक विभाजन (प्रथम सत्र)

१) दीर्घोत्तरी प्रश्न	3 x 16 = 48
२) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न/अति लघूत्तरी प्रश्न	16 x 1 = 16
	कुल अंक 80

आंतरिक मूल्यांकन

- १) प्रायोगिक कार्य (कार्यालयी हिंदी) 10 अंक
 २) विभागीय इकाई जॉच परीक्षा 10 अंक

कुल अंक - 100

एम. ए. भाग. २ (अनुवाद हिंदी)
प्रश्नपत्र - ३ (वैकल्पिक) दो
चतुर्थ सत्र
राजभाषा प्रशिक्षण

प्रस्तावना -

कार्यालयीन-हिंदी का एक नया स्वरूप इधर विकसित हुआ है। इसका व्यवस्थित ज्ञान प्राप्त कर लेने पर रोजगार की संभावनाओं में अभिवृद्धि होगी और राजभाषा का स्तरोन्वयन भी होगा।

पाठ्यविषय

- १) इकाई - राजभाषा (कार्यालयी हिंदी) की प्रकृति।
 राजभाषा का अनुप्रयोगात्मक पक्ष: हिंदी आलेखन, टिप्पण, संक्षेपण तथा पत्राचार ।
 २) इकाई - कार्यालय अभिलेखों के हिंदी अनुवाद की समस्या। केंद्र एवं राज्य शासन के विभिन्न मंत्रालयों में हिन्दीकरण की प्रगति।
 ३) इकाई - बैंकिंग, बीमा और अन्य वाणिज्यिक क्षेत्रों में हिंदी अनुप्रयोग की स्थिति।
 ४) इकाई - विधिक क्षेत्र में हिंदी।
 ५) इकाई - सूचना प्रौद्योगिकी (संचार माध्यमों) के परिप्रेक्ष्य में हिंदी और देवनागरी लिपि।
 अंक विभाजन (द्वितीय सत्र)

१) दीर्घोत्तरी प्रश्न	3 x 16 = 48
२) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न/अतिलघूत्तरी प्रश्न	16 x 1 = 16
	कुल अंक - 80

आंतरिक मूल्यांकन

- १) विभागीय इकाई जॉच परीक्षा 10 अंक
 २) प्रायोगिक कार्य (कार्यालयीन हिंदी पत्राचार) 10 अंक

कुल अंक - 100

एम. ए. भाग. २ (अनुवाद हिंदी)
प्रश्नपत्र - ३ (वैकल्पिक) तीन
तृतीय सत्र
कोशविज्ञान

प्रस्तावना -

कोशविज्ञान कोश निर्माण की सैद्धांतिकी के रूप में आज के बहुभाषाभाषी विश्वग्राम में एक अत्यंत उपयोगी शास्त्र है। भाषाविज्ञान के विभिन्न अंगभूत, शास्त्रों और शाखाओं ध्वनिविज्ञान, लिपिविज्ञान, रूपविज्ञान, अर्थविज्ञान और ऐतिहासिक भाषाविज्ञान के समेकित अनुप्रयोग पर आधारित यह शास्त्र कोश-निर्माण के विभिन्न पक्षों, कोश के प्रकारों, कोश-निर्माण की प्रक्रिया, कोश की समस्याओं, आदि से अध्येता को अवगत कराते हुए आवश्यक अंतर्दृष्टि प्रदान करता है।

- १) इकाई - कोश, परिभाषा और स्वरूप। कोश की उपयोगिता। कोश और व्याकरण का अंतःसंबंध।
 २) इकाई - कोश के भेद - समभाषी, द्विभाषी और बहुभाषी कोश, एककालिक और कालक्रमिक कोश, विषय कोश, पारिभाषिक कोश, व्युत्पत्ति कोश, समांतर कोश, अध्येता कोश, विश्वकोश, बोली कोश।
 ३) इकाई - कोश निर्माण की प्रक्रिया :- सामग्री संकलन, प्रविष्टिक्रम, व्याकरणिक कोटि, उच्चारण,
 ४) इकाई - कोश निर्माण की प्रक्रिया :- व्युत्पत्ति अर्थ (पर्याय, व्याख्या, चित्र) प्रयोग, उप-प्रविष्टियों, संदर्भ और प्रतिसंदर्भ।
 ५) इकाई - कोश-निर्माण: विज्ञान या कला।
 अंक विभाजन (प्रथम सत्र)

१) दीर्घोत्तरी प्रश्न	3 x 16 = 48
२) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न	16 x 1 = 16
	कुल अंक 80

आंतरिक मूल्यांकन

१) विभागीय कार्यक्रमों में सहभागिता एवं उपस्थिति	10 अंक
२) प्रायोगिक कार्य	10 अंक
	कुल अंक - 100

सूचना -

- १) प्रत्येक इकाई से एक ऐसे कुल पांच दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।
- २) पांचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
- ३) संपूर्ण पाठ्यक्रम से सोलह वस्तुनिष्ठ प्रश्न पूछे जायेंगे दिये गये सभी प्रश्नों को हल करना अनिवार्य होगा।

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - ३ (वैकल्पिक) तीन

चतुर्थ सत्र

कोशविज्ञान

प्रस्तावना -

कोशविज्ञान कोश निर्माण की सैद्धांतिकी के रूप में आज के बहुभाषाभाषी विश्वग्राम में एक अत्यंत उपयोगी शास्त्र है। भाषाविज्ञान के विभिन्न अंगभूत, शास्त्रों और शाखाओं ध्वनिविज्ञान, लिपिविज्ञान, रूपविज्ञान, अर्थविज्ञान और ऐतिहासिक भाषाविज्ञान के समेकित अनुप्रयोग पर आधारित यह शास्त्र कोश-निर्माण के विभिन्न पक्षों, कोश के प्रकारों, कोश-निर्माण की प्रक्रिया, कोश की समस्याओं, आदि से अध्येता को अवगत कराते हुए आवश्यक अंतर्दृष्टि प्रदान करता है।

- १) इकाई - प्रविष्टि संरचना, रूपिम, शब्द और शब्दम, सरल, व्युत्पन्न और सामाजिक शब्दम, सामाजिक शब्दम सहप्रयोगात्मक, व्युत्पादक समास, सहप्रयोग और संदर्भ।
- २) इकाई - रूप अर्थ संबंध :- अनेकार्थकता समानार्थकता समनामता, समध्वन्यात्मकता, विलोमता।
- ३) इकाई - कोश निर्माण की समस्याएं :- समभाषी, द्विभाषी और बहुभाषी कोशों के संदर्भ में अलिखित भाषाओं का कोश-निर्माण।
- ४) इकाई - कोशविज्ञान और अन्य विषयों का संबंध :- कोशविज्ञान और स्वनविज्ञान, व्याकरण, व्युत्पत्तिशास्त्र और अर्थविज्ञान का संबंध।
- ५) इकाई - पाश्चात्य कोश परंपरा, भारतीय कोश परंपरा तथा हिंदी कोश साहित्य का इतिहास। हिंदी के प्रमुख कोश और कोशकार।

अंक विभाजन (द्वितीय सत्र)

१) दीर्घोत्तरी प्रश्न	3 x 16 = 48
२) लघूत्तरी प्रश्न	4 x 4 = 16
३) वस्तुनिष्ठ प्रश्न	16 x 1 = 16

80

आंतरिक मूल्यांकन

१) विभागीय इकाई जाँच परीक्षा	10 अंक
२) प्रायोगिक कार्य	10 अंक
	कुल अंक - 100

सूचना -

- १) प्रत्येक इकाई से एक ऐसे कुल पांच दीर्घोत्तरी प्रश्न पूछे जायेंगे जिनमें से तीन प्रश्न हल करना अनिवार्य होगा।
- २) पांचों इकाई से कुल आठ लघूत्तरी प्रश्न पूछे जायेंगे जिनमें से चार प्रश्न हल करना अनिवार्य होगा।
- ३) संपूर्ण पाठ्यक्रम से सोलह वस्तुनिष्ठ प्रश्न पूछे जायेंगे दिये गये सभी प्रश्नों को हल करना अनिवार्य होगा।

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - ४

तृतीय सत्र

अनुवाद परियोजना / विनिबंध एवं मौखिकी

१) अनुवाद परियोजना

विश्वविद्यालय द्वारा निर्दिष्ट शिक्षक की देखरेख में ८० अंक

क) किसी प्रयुक्त विशेष के कम से कम २० पृष्ठ (एक पृष्ठ में ३०० शब्द होना अनिवार्य है) सामग्री का अंग्रेजी से हिंदी में अनुवाद ६० अंक

ख) आधुनिक भारतीय भाषा (इस विश्वविद्यालय में मराठी भाषा) की ०५ पृष्ठ (एक पृष्ठ में ३०० शब्द होना अनिवार्य है) सामग्री का मराठी से हिंदी में अनुवाद - २० अंक

अथवा

विनिबंध पुनरानुवाद/ दोष- विश्लेषण/ तुलनात्मक मूल्यांकन/ पुनरीक्षण (Vetting) आदि किसी एक का विस्तृत विश्लेषण

२) मौखिकी-अनुवाद सिद्धांत, पारिभाषिक शब्दावली, अनुवाद के क्षेत्र में सामाजिक-सांस्कृतिक परिवेश संबंधी भाषागत समस्याएं आदि पर प्रश्न -२० अंक

संदर्भ ग्रंथ सूची

- १) अनुवाद भाषाएं - समस्याएं, एन. ई. विश्वनाथ अय्यर
- २) साहित्यानुवाद: संवाद और संवेदना- डॉ. आरसु
- ३) काव्यानुवाद की समस्याएं - भोलानाथ तिवारी, महेन्द्र चतुर्वेदी
- ४) भारतीय भाषाएं और हिंदी अनुवाद, समस्या-समाधान, सं. कैलाशचंद्र भाटिया
- ५) राजभाषा हिंदी में वैज्ञानिक साहित्य के अनुवाद की दिशाएं, डॉ. हरिमोहन
- ६) वैज्ञानिक साहित्य के अनुवाद की समस्याएं, डॉ. भोलानाथ तिवारी
- ७) अनुवाद की समस्याएं, सं. जी. गोपीनाथन - एस गोस्वामी
- ८) कार्यालयी - अनुवाद की समस्याएं, डॉ. भोलानाथ तिवारी - डॉ. कृष्णकुमार गोस्वामी, अजीतलाल गुलाटी
- ९) बैंकों में अनुवाद प्रविधि, डॉ. सीता कुंचित पादम

- १०) कार्यलयी अनुवाद निदेशिका, जी. गोपीनाथ श्रीवास्तव
 ११) अनुवाद विज्ञान, डॉ. भोलानाथ तिवारी
 १२) अनुवाद: सिद्धांत और समस्याएं, डॉ. रवीन्द्रनाथ श्रीवास्तव - डॉ. कृष्णकुमार गोस्वामी
 १३) अनुवाद: सिद्धांत एवं अनुप्रयोग, डॉ. नगेद्र
 १४) वृहद प्रशासन शब्दावली Glossary administrative Terms (मानव संसाधन विकास मंत्रालय शिक्षा विभाग)
 १५) कार्यालय सहायिका केन्द्रीय सचिवालय हिंदी परिषद दिल्ली, मूल संपादक, हरिबाबू कंसल

एम. ए. भाग. २ (अनुवाद हिंदी)

प्रश्नपत्र - ४

चतुर्थ सत्र

अनुवाद परियोजना / विनिबंध एवं मौखिकी

- १) अनुवाद परियोजना विश्वविद्यालय द्वारा निर्दिष्ट शिक्षक की देखरेख में ८० अंक
 क) किसी प्रयुक्त विशेष के कम से कम २० पृष्ठ (एक पृष्ठ में ३०० शब्द होना अनिवार्य है) सामग्री का अंग्रजी से हिंदी में अनुवाद ६० अंक
 ख) आधुनिक भारतीय भाषा (इस विश्वविद्यालय में मराठी भाषा) की ०५ पृष्ठ (एक पृष्ठ में ३०० शब्द होना अनिवार्य है) सामग्री का मराठी से हिंदी में अनुवाद - २० अंक

अथवा

विनिबंध पुनरानुवाद/ दोष- विश्लेषण/ तुलनात्मक मूल्यांकन/ पुनरीक्षण (Vetting) आदि किसी एक का विस्तृत विश्लेषण

- २) मौखिकी -अनुवाद सिद्धांत,पारिभाषिक शब्दावली,अनुवाद के क्षेत्र में सामाजिक-सांस्कृतिक परिवेश संबंधी भाषागत समस्याएं आदि पर प्रश्न -२० अंक

संदर्भ ग्रंथ सूची

- १) अनुवाद भाषाएं - समस्याएं , एन. ई. विश्वनाथ अय्यर
 २) साहित्यानुवाद: संवाद और संवेदना- डॉ. आरसु
 ३) काव्यानुवाद की समस्याएं - भोलानाथ तिवारी, महेन्द्र चतुर्वेदी
 ४) भारतीय भाषाएं और हिंदी अनुवाद, समस्या-समाधान, सं. कैलाशचंद्र भाटिया
 ५) राजभाषा हिंदी में वैज्ञानिक साहित्य के अनुवाद की दिशाएं, डॉ. हरिमोहन
 ६) वैज्ञानिक साहित्य के अनुवाद की समस्याएं, डॉ. भोलानाथ तिवारी
 ७) अनुवाद की समस्याएं, सं. जी. गोपीनाथन - एस गोस्वामी
 ८) कार्यलयी - अनुवाद की समस्याएं, डॉ. भोलानाथ तिवारी - डॉ. कृष्णकुमार गोस्वामी, अजीतलाल गुलाटी
 ९) बैंकों में अनुवाद प्रविधि, डॉ. सीता कुंचित पादम
 १०) कार्यलयी अनुवाद निदेशिका, जी. गोपीनाथ श्रीवास्तव
 ११) अनुवाद विज्ञान, डॉ. भोलानाथ तिवारी
 १२) अनुवाद: सिद्धांत और समस्याएं, डॉ. रवीन्द्रनाथ श्रीवास्तव - डॉ. कृष्णकुमार गोस्वामी
 १३) अनुवाद: सिद्धांत एवं अनुप्रयोग, डॉ. नगेद्र
 १४) वृहद प्रशासन शब्दावली Glossary administrative Terms (मानव संसाधन विकास मंत्रालय शिक्षा विभाग)
 १५) कार्यालय सहायिका केन्द्रीय सचिवालय हिंदी परिषद दिल्ली, मूल संपादक, हरिबाबू कंसल

Appendix-E

वाङ्मय पारंगत भाग-२
 संस्कृत साहित्य आणि अलंकार (वर्ग घ)
 साहित्यशास्त्र (सत्र ३रे) प्रश्नपत्रिका-१

एकूण गुण ८०
 अंतर्गत - २०

Unit – I	मम्मटकृत काव्यप्रकाश उल्लास-१	१६ गुण
Unit – II	मम्मटकृत काव्यप्रकाश उल्लास-२	१६ गुण
Unit – III	मम्मटकृत काव्यप्रकाश उल्लास-७	१६ गुण
Unit – IV	मम्मटकृत काव्यप्रकाश उल्लास-८	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न	१६ गुण
प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १ ला		
अ)	३ पैकी २ कारिकांचे स्पष्टीकरण	१० गुण
ब)	टिपा लिहा ४ पैकी २	०६ गुण
प्रश्न २ रा	अ) ३ पैकी २ कारिकांचे स्पष्टीकरण	१० गुण
	ब) टिपणे लिहा ४ पैकी २	०६ गुण
प्रश्न ३ रा	अ) दीर्घांतरी प्रश्न २ पैकी १	१० गुण
	ब) टिपणे लिहा ४ पैकी २	०६ गुण
प्रश्न ४ था	अ) दीर्घांतरी प्रश्न २ पैकी १	१० गुण
	ब) टिपणे लिहा ४ पैकी २	०६ गुण
प्रश्न ५ वा	वस्तुनिष्ठ प्रश्न (वरील चार घटकांवर आधारित)	१६ गुण

संदर्भ ग्रंथ सूची :-

- १) श्रीमम्मटाचार्य विरचित काव्यप्रकाश- डॉ.सत्यव्रतसिंह चौखम्भा प्रकाशन विद्याभवन, वाराणसी
 काव्यप्रकाश- कृष्ण श्रीनिवास अर्जुनवाडकर, अरविंद मंगरुळकर देशमुख प्रकाशन ७३३९९ बुधवार, पुणे
 काव्यप्रकाश- डॉ.नीला प्र.सोमलवार, कौमुदी प्रकाशन, पुणे
 अंतर्गत मूल्यामापन- २० गुण (स्वाध्याय लेखन)

वाङ्.मय पारंगत भाग-२
 संस्कृत साहित्य आणि अलंकार (वर्ग घ)
 प्रश्नपत्रिका-१

साहित्यशास्त्र (सत्र ४थे)

एकूण गुण ८०

अंतर्गत मूल्यामापन गुण-२०

Unit – I	ध्वन्यालोक उद्योत-२	१६ गुण
Unit – II	भामहकृत काव्यलंकार (परिच्छेद-१)	१६ गुण
Unit – III	भामहकृत काव्यालंकार (परिच्छेद-२)	१६ गुण
Unit – IV	मम्मटकृत वामनकृत काव्यलंकार सूत्रवृत्ती (प्रथम अधिकरण)	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला

अ) ४ पैकी २ कारिकांचे स्पष्टीकरण करा १० गुण

ब) टिपा लिहा ४ पैकी २ ०६ गुण

प्रश्न २ रा अ) ४ पैकी २ कारिकांचे स्पष्टीकरण १० गुण

ब) टिपणे लिहा ४ पैकी २ ०६ गुण

प्रश्न ३ रा अ) ४ पैकी दोन कारिकांचा स्पष्टीकरणासह अनुवाद १० गुण

ब) टिपणे लिहा ४ पैकी २ ०६ गुण

प्रश्न ४ था अ) ४ पैकी २ कारिकांचा स्पष्टीकरणासह अनुवाद १० गुण

ब) ४ पैकी २ व टिपा ०६ गुण

प्रश्न ५ वा वस्तुनिष्ठ प्रश्न (वरील चार घटकांवर आधारित) १६ गुण

संदर्भग्रंथ - आचार्य भामह विरचित काव्यलंकार, चौखम्भा प्रकाशन, वाराणसी

आनंदवर्धनकृत ध्वन्यालोक :- जगन्नाथ पाठक, चौखम्भा प्रकाशन वाराणसी

वामनकृत काव्यलंकार सूत्रवृत्ती - डॉ.जी.एन.झा.

शास्त्रत्रिदलम् - डॉ.के.रा.जोशी विश्वभारती प्रकाशन, नागपूर.

अंतर्गत मूल्यामापन - २० गुण (स्वाध्याय लेखन)

वाङ्.मय पारंगत भाग-२
 प्रश्नपत्रिका-२ (सत्र ३रे)
 नाट्यशास्त्र आणि नाटक

एकूण गुण ८०

अंतर्गत -२०

Unit – I	दशरूपक प्रकाश-१	१६ गुण
Unit – II	दशरूपक प्रकाश-२	१६ गुण
Unit – III	दशरूपक प्रकाश-३	१६ गुण
Unit – IV	दशरूपक प्रकाश-४	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला

अ) ४ पैकी २ कारिकांचे सानुवाद स्पष्टीकरण १० गुण

ब) ४ पैकी २ वर टिपणे ०६ गुण

प्रश्न २ रा अ) ४ पैकी २ कारिकांचे सानुवाद स्पष्टीकरण १० गुण

ब) ४ पैकी २ वर टिपणे लिहा ०६ गुण

प्रश्न ३ रा अ) २ पैकी १ दीर्घोत्तरी प्रश्न १० गुण

ब) टिपा २ पैकी १ ०६ गुण

प्रश्न ४ था अ) २ पैकी १ दीर्घोत्तरी प्रश्न १० गुण

ब) टिपा २ पैकी १ ०६ गुण

प्रश्न ५ वा वस्तुनिष्ठ प्रश्न २० पैकी १६

(वरील चार घटकांवर आधारित)

संदर्भ ग्रंथ सूची — दशरूपक — डॉ.सुधाकर मालविय, कृष्णदास अकादमी वाराणसी
 दशरूपक — डॉ.भोलाशंकर व्यास, चौखम्बा प्रकाशन, वाराणसी
 तीरे संस्कृताची गहने — डॉ.के.रा. जोशी, विश्वभारती प्रकाशन, नागपूर.
 अंतर्गत गुण २० सेमिनार

वाङ्.मय पारंगत भाग-२

**प्रश्नपत्रिका-२ (सत्र ४थे)
 नाट्यशास्त्र आणि नाटक**

एकूण गुण ८०
 अंतर्गत -20

Unit – I	भवभूतिकृत उत्तरामचरितम् अंक १ व २	१६ गुण
Unit – II	भवभूतिकृत उत्तरामचरितम् अंक ३ व ४	१६ गुण
Unit – III	भवभूतिकृत उत्तरामचरितम् अंक ५ व ७	१६ गुण
Unit – IV	भरतमुनींचे नाट्यशास्त्र अध्याय-२	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला		
अ) ४ पैकी २ श्लोकांचा अनुवाद करा		१० गुण
ब) ४ पैकी २ वाक्यांचे संदर्भासह स्पष्टीकरण		०६ गुण
प्रश्न २ रा	अ) ४ पैकी २ श्लोकांचा अनुवाद करा	१० गुण
	ब) ४ पैकी २ वाक्यांचे संदर्भासह स्पष्टीकरण	०६ गुण
प्रश्न ३ रा	अ) दीर्घोत्तरी प्रश्न २ पैकी १	१० गुण
	ब) टिपा ४ पैकी २	०६ गुण
प्रश्न ४ था	अ) ३ पैकी २ श्लोकांचे स्पष्टीकरण	१० गुण
	ब) ४ पैकी २ वर टिपा	०६ गुण
प्रश्न ५ वा	वस्तुनिष्ठ प्रश्न २० पैकी १६ (वरील चार घटकांवर आधारित)	१६ गुण

संदर्भ ग्रंथ सूची — भवभूति — आर.डी.करमरकर
 नाट्यशास्त्र अध्याय-२ प्रा.डॉ.छाया पालकर (गिरी) मंगेश प्रकाशन, नागपूर.
 भरतमुनींचे नाट्यशास्त्र- गोदावरी केतकर, पॉप्युलर प्रकाशन, मुंबई
 नाट्यशास्त्रम् अध्याय-२ श्री सत्यप्रकाश शर्मा चौखम्बा सुरभारती प्रकाशन, वाराणसी

अंतर्गत मूल्यमापन - सेमिनार

वाङ्.मय पारंगत भाग-२

**संस्कृत साहित्य आणि अलंकार (वर्ग घ)
 प्रश्नपत्रिका-३ (सत्र ३रे)**

एकूण गुण ८०
 अंतर्गत - 20

गद्य आणि महाकाव्य

Unit – I	बाणभट्टकृत कादम्बरी महाश्वेतावृत्तान्त अथगीतावसाने ते निष्पन्दमतिष्ठम्	१६ गुण
Unit – II	बाणभट्टकृत कादम्बरी महाश्वेतावृत्तान्त अथताम्बूल करड. वाहिनी ते तस्मादप्रासाद शिखरादवातरम्	१६ गुण
Unit – III	बाणभट्टकृत कादम्बरी महाश्वेता वृत्तान्त अवतीर्यच उच्चे साडरोदित्	१६ गुण
Unit – IV	बाणभट्टकृत कादम्बरी महाश्वेता वृत्तान्त	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला	अ) दोन पैकी एका परिच्छेदाचा अनुवाद	१० गुण
	ब) टिपा ४ पैकी २	०६ गुण
प्रश्न २ रा	अ) दोन पैकी एका परिच्छेदाचा अनुवाद	१० गुण
	ब) टिपा ४ पैकी २	०६ गुण
प्रश्न ३ रा	अ) दीर्घोत्तरी प्रश्न २ पैकी १	१० गुण
	ब) संदर्भासह स्पष्टीकरण ४ पैकी २	०६ गुण
प्रश्न ४ था	अ) ४ पैकी २ परिच्छेदाचा अनुवाद करा	१० गुण
	ब) दीर्घोत्तरी प्रश्न २ पैकी १	०६ गुण
प्रश्न ५ वा	वस्तुनिष्ठ प्रश्न (वरील चार घटकांवर आधारित)	१६ गुण

संदर्भ ग्रंथ :-

बाणभट्ट एवं कादम्बरी — एक आलोचनात्मक अध्ययन- महेशचंद्र भरती चौखम्बा प्रकाशन, वाराणसी
बाणभट्टका साहित्यिक अध्ययन - अमरनाथ पंडे चौखम्बा प्रकाशन, वाराणसी
बाणाची कादंबरी भाग-१ व २ — वरदा प्रकाशन, पुणे भाग-२ रसमयी
अंतर्गत गुण २० (सेमिनार)

वाङ्.मय पारंगत भाग-२
संस्कृत साहित्य आणि अलंकार (वर्ग घ)
प्रश्नपत्रिका-३ (सत्र ४ थे)

		एकूण गुण ८०
	गद्य आणि महाकाव्य	अंतर्गत - 20
Unit – I	महाकविकालिदासकृत रघुवंशम् सर्ग १ ला	१६ गुण
Unit – II	महाकविकालिदासकृत कुमारसंभवम् सर्ग ५ वा	१६ गुण
Unit – III	भारविकृत किरातार्जुनीयम् सर्ग १ ला	१६ गुण
Unit – IV	नैषधीय चरितम् सर्ग १ ला	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला (Unit – I) अ) दीर्घोत्तरी प्रश्न २ पैकी १	१० गुण
ब) टिपणे ४ पैकी २	०६ गुण
प्रश्न २ रा (Unit – II) अ) ४ पैकी २ श्लोकांचा अनुवाद	१० गुण
ब) दीर्घोत्तरी प्रश्न २ पैकी १	०६ गुण
प्रश्न ३ रा (Unit – III) अ) दीर्घोत्तरी प्रश्न २ पैकी १	१० गुण
ब) टिपणे ४ पैकी २	०६ गुण
प्रश्न ४ था (Unit – IV) अ) श्लोकांचा अनुवाद ४ पैकी २	१० गुण
ब) टिपणे ४ पैकी २	०६ गुण
प्रश्न ५ वा वस्तुनिष्ठ प्रश्न (वरील चार घटकांवर आधारित)	१६ गुण

संदर्भ ग्रंथ :-

रघुवंशम् — विदर्भमराठवाडा प्रकाशन
कुमारसंभवम् — चौखम्बा प्रकाशन
नैषधीयचरितम् — प्रसाद प्रकाशन, पुणे
किरातार्जुनीयम् — प्रसाद प्रकाशन, पुणे
अंतर्गत — २० (सेमिनार)

वाङ्.मय पारंगत भाग-२
संस्कृत साहित्य आणि अलंकार (वर्ग घ)
प्रश्नपत्रिका-४ (सत्र ३ रे)
सर्वसाधारण

		एकूण गुण ८०
		अंतर्गत - 20
Unit – I	संस्कृत निबंध	१६ गुण
Unit – II	संस्कृत पत्रलेखन	१६ गुण
Unit – III	अपठित गद्य	१६ गुण
Unit – IV	अपठित पद्य	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न (२० पैकी १६)	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला		
अ) चारपैकी कोणत्याही एका विषयावर संस्कृतात निबंध लिहा	१६ गुण	
प्रश्न २ रा	अ) अभिनंदन पर पत्र अथवा शुभेच्छा देणारे पत्र लिहा (संस्कृतातुन)	८ गुण
	ब) अर्ज किंवा मागणी पत्र (संस्कृतातुन)	८ गुण
प्रश्न ३ रा	दोन पैकी एक गद्य उतायाचा अनुवाद	१६ गुण
प्रश्न ४ था	आठ पैकी कोणत्याही चार पद्यांचा अनुवाद	१६ गुण
प्रश्न ५ वा	वस्तुनिष्ठ प्रश्न (२० पैकी १६)	
	(वरील चार घटकांवर आधारित)	१६ गुण

संदर्भ ग्रंथ :- मज्जूषा डॉ.उदयशंकर सा.

संस्कृतनिबन्ध चौखम्बा सुरभारती प्रकाशन, वाराणसी
संदेश संस्कृतम् संस्कृत भारती प्रकाशन, नवी दिल्ली
संस्कृत निबन्ध रत्नावली — डॉ.रामचन्द्र वर्मा शास्त्री
अशोक प्रकाशन, दिल्ली

अंतर्गत गुण २० प्रकल्पलेखन (अभ्यासक्रमावर आधारित)

वाङ्.मय पारंगत भाग-२
संस्कृत साहित्य आणि अलंकार (वर्ग घ)
प्रश्नपत्रिका-४ (सत्र ४ थे)
सर्वसाधारण

एकूण गुण ८०
अंतर्गत - 20

Unit – I	संस्कृत साहित्याचा इतिहास (संस्कृत महाकाव्य खंडकाव्य)	१६ गुण
Unit – II	संस्कृत साहित्याचा इतिहास (स्तोत्रवाङ्.मय, शतककाव्य)	१६ गुण
Unit – III	संस्कृत साहित्याचा इतिहास (गद्यकाव्य, चम्पूवाङ्.मय)	१६ गुण
Unit – IV	संस्कृत साहित्याचा इतिहास (कथावाङ्.मय, नाट्यवाङ्.मय)	१६ गुण
Unit – V	वस्तुनिष्ठ प्रश्न	१६ गुण

प्रश्नपत्रिकेचे स्वरूप

प्रश्न १ ला अ)	२ पैकी १ दीर्घोत्तरी प्रश्न	१० गुण
	ब) टिपा ४ पैकी २	०६ गुण
प्रश्न २ रा	अ) २ पैकी १ दीर्घोत्तरी प्रश्न	१० गुण
	ब) टिपा ४ पैकी २	०६ गुण
प्रश्न ३ रा	अ) २ पैकी १ दीर्घोत्तरी प्रश्न	१० गुण
	ब) टिपा ४ पैकी २	०६ गुण
प्रश्न ४ था	अ) २ पैकी १ दीर्घोत्तरी प्रश्न	१० गुण
	ब) टिपा लिहा ४ पैकी २	०६ गुण
प्रश्न ५ वा	वस्तुनिष्ठ प्रश्न २० पैकी १६	१६ गुण

संदर्भ ग्रंथ :- संस्कृत साहित्यका इतिहास - आचार्य बलदेव उपाध्याय.

संस्कृत साहित्याचा सोपपत्तिक इतिहास – करंबेळकर, शारदा प्रकाशन नागपूर

संस्कृत त्रिदलम् – डॉ.के.रा.जोशी, भारती प्रकाशन, वंजारी नगर, नागपूर.

Nom History of Classical Sanskrit Literature – Dasgupta and De.

अंतर्गत गुण २० प्रकल्पलेखन (अभ्यासक्रमावर आधारित)

Appendix-F

M.A. PART - II (URDU)

PAPER - I (Modern Prose and Poetry)

SEMESTER - III

Time : 3 Hours

Max. Marks: 80

TEXT PRESCRIBED :

- ۱۔ مقدمہ شعر و شاعری - خواجہ الطاف حسین حالی
- ۲۔ اردو شاعری پر ایک نظر - کلیم الدین احمد
- ۳۔ آتش گل - جگر مراد آبادی
- ۴۔ کلیات - حسرت موہانی

DISTRIBUTION OF MARKS

Question No. 1 : There shall be ONE long answer Type question based on the author's literary works (حالی) out of TWO of 16 marks

OR

Question No. 1.: There S'hall be ONE long Answer type question based on book (مقدمہ شعر و شاعری) prescribed out of TWO of 16 marks

Question No. 2 : There shall be ONE long answer Type question based on the author's literary works (کلیم الدین احمد) out of TWO of 16marks

OR

Question No. 2.: There S'hall be ONE long Answer type question based on book prescribed (اردو شاعری پر ایک نظر) out of TWO of 16 marks

Question No. 3 : There shall be ONE long answer Type question based on the poets style and literary works (جگر مراد آبادی) of 16 marks

OR

Question No. 3.: There S'hall be ONE long Answer type question based on book (آتش گل) of 16 marks

Question No. 4 : There shall be ONE long answer Type question based on the poets style and literary works (حسرت موہانی) of 16marks

OR

Question No. 4.: There S'hall be ONE long Answer type question based on book prescribed (کلیات حسرت موہانی) of 16 marks

Question No. 5 : (A) Explain TWO Passages based on the prescribed book (اردو شاعری پر ایک نظر) out of FOUR of 4 marks Each

Question No. 5 : (A) Explain TWO Poetry Passages based on the prescribed book (آتش گل - کلیات حسرت موہانی) out of FOUR of 4 marks Each

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
- ii) Written Test carrying 10 marks

M.A. PART - II (URDU)

PAPER - I (Modern Prose and Poetry)

SEMESTER - III

Time : 3 Hours

Max. Marks: 80

TEXT PRESCRIBED :

- ۱۔ مقالات شیلی۔ شیلی نهمانی
۲۔ غبارِ خاطر۔ مولانا ابوالکلام آزاد
۳۔ شعلہ و شہنم۔ جوش ملیح آبادی
۴۔ نقش فریادی۔ فیض احمد فیض

DISTRIBUTION OF MARKS

Question No. 1 : There shall be ONE long answer Type question based on the author's literary works (شیلی نهمانی) of 16 marks

OR

Question No. 1.: There S'hall be ONE long Answer type question based on book (مقالات شیلی) of TWO of 16 marks

Question No. 2 : There shall be ONE long answer Type question based on the author's literary works (ابوالکلام آزاد) of 16marks

OR

Question No. 2.: There S'hall be ONE long Answer type question based on book prescribed(غبارِ خاطر) of 16 marks

Question No. 3 : There shall be ONE long answer Type question based on the poets style and literary works (جوش ملیح آبادی) of 16 marks

OR

Question No. 3.: There S'hall be ONE long Answer type question based on book (شعلہ و شہنم) of 16 marks

Question No. 4 : There shall be ONE long answer Type question based on the poets style and literary works (فیض احمد فیض) of 16marks

OR

Question No. 4.: There S'hall be ONE long Answer type question based on book prescribed(نقش فریادی) of 16 marks

Question No. 5 : (A) Explain TWO Passages based on the prescribed book (مقالات شیلی۔ غبارِ خاطر) out of FOUR of 4 marks Each

Question No. 5 : (A) Explain TWO Poetry Passages based on the prescribed book (شعلہ و شہنم۔ نقش فریادی) out of FOUR of 4 marks Each

Internal Assesment based on Syllabus

- Oral Test carrying 10 marks
- Written Test carrying 10 marks

M.A. PART - II (URDU)

PAPER - II (Literary Criticism in Urdu)

(تنقید - تنقید کی قسمیں - تاکرے - تنقیدی تعلق - تحریکیں - رجحانات)

SEMESTTER - III

Time : 3 Hours

Max. Marks: 80

DISTRIBUTION OF MARKS

Question No. 1 : There shall be FIVE long answer Type question based on above topics out of TEN of 16 marks

Reference Books :

1. Fun - E - Tanqeed Aur Urdu Tanqeed Nigari - Noorul Hasan Naqvi
2. Muqaddama Sher O Shairi - Altaf Husain Hali
3. Aab - e - Hayat Mohd. Husain Azad
4. Hamari Shairi Masood Hasan Rizvi Adeeb
5. Jadeed Urdu Tanqeed, Usool Nazariyat Sharib Rudulvi
6. Tanqeedi Nazariyat (Awwal O Duam) Ehtesham Husain
7. Mashriqi Sheriyat Aur Urdu Tanqeed ki Riwayat Abul Kalam Kasmī
8. Tassur Na keh Tanqeed Siddiqur Rahman
9. Adabi Tanqeed Aur Aslubiyat Gopichand Narang

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
- ii) Written Test carrying 10 marks

M.A. PART - II (URDU)

PAPER - II (Literary Criticism in Urdu)

(اردو کے اہم تنقید نگار اور ان کی تنقید نگاری)

(حالی - ہلی - محمد حسین آزاد - مسعود حسن رضوی - احتشام حسین - کلیم الدین احمد - آل احمد سرور - مجوں گور کھپوری - شمس الرحمن فاروقی - خلیل الرحمن عظیمی - عنوان چشتی - گوپی چند نارنگ)

SEMESTTER - III

Time : 3 Hours

Max. Marks: 80

DISTRIBUTION OF MARKS

Question No. 1 : There shall be FIVE long answer Type question based on above topics out of TEN of 16 marks

Reference Books :

1. Fun - E - Tanqeed Aur Urdu Tanqeed Nigari - Noorul Hasan Naqvi
2. Muqaddama Sher O Shairi - Altaf Husain Hali
3. Aab - e - Hayat Mohd. Husain Azad
4. Hamari Shairi Masood Hasan Rizvi Adeeb
5. Urdu Tanqeed Par Ek Nazar Kalimuddin Ahmad
6. Jadeed Urdu Tanqeed, Usool Nazariyat Sharib Rudulvi
7. Tanqeedi Nazariyat (Awwal O Duam) Ehtesham Husain
8. Mashriqi Sheriyat Aur Urdu Tanqeed ki Riwayat Abul Kalam Kasmī
9. Tassur Na keh Tanqeed Siddiqur Rahman
10. Adabi Tanqeed Aur Aslubiyat Gopichand Narang

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
- ii) Written Test carrying 10 marks

M.A. PART - II (URDU)
PAPER - III (Study of the Special Author)
(MIR TAQI MEER)
SEMESTTER - III

Time : 3 Hours

Max. Marks: 80

- میر تقی میر
۱۔ میر کے حالات زندگی۔ میر کی شخصیت۔ عہد۔ سیاسی۔ سماجی و ادبی ماحول
۲۔ میر کا فن
۳۔ میر کا تصور غم۔ تصور عشق۔ تصور انسان
۴۔ میر کی غزل گوئی
۵۔ درج ذیل غزلوں کا خصوصی مطالعہ
۱۔ منہ نکالی کرے ہے جس تس کا
۵۔ میر کی مثنوی نگاری
۶۔ اردو شاعری میں میر کا مقام
۷۔ اردو شعراء پر میر کی شاعری کے اثرات

Books Recommended:

- | | |
|-------------------------------|----------------------|
| 1. Mir Ki Ghazal Goi Ek Jaiza | Rashid Aazar |
| 2. Mir ki Aapbiti | Nisar Ahmad Farooqui |
| 3. Kulliyat e Mir | Mir Taqi Mir |

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
ii) Written Test carrying 10 marks

M.A. PART - II (URDU)
PAPER - III (Study of the Special Author)
(Dr. Sir Mohammad IQBAL)
SEMESTTER - III

Time : 3 Hours

Max. Marks: 80

Books Recommended :

- | | | | |
|-----------------------|---|----------------------------|-----|
| یوسف حسین خاں | : | روح اقبال | ۱۔ |
| انجمن ترقی اردو، دہلی | : | اقبال | ۲۔ |
| جامعہ ملیہ، دہلی | : | جوہر اقبال | ۳۔ |
| سید نظیر نیازی | : | اقبال کا مطالعہ | ۴۔ |
| عبدالمالک | : | ڈاکٹر اقبال | ۵۔ |
| خلیفہ عبدالکلیم | : | فکر اقبال | ۶۔ |
| عبدالسلام ندوی | : | اقبال کا مہل | ۷۔ |
| سید محمد عبد اللہ | : | مقامات اقبال | ۸۔ |
| نگینہ تھیر آزاد | : | محمد اقبال: ای۔ ادبی سوانح | ۹۔ |
| رفیع الدین ہاشمی | : | خطوط اقبال | ۱۰۔ |
| کلیم الدین احمد | : | اقبال: مطالعہ | ۱۱۔ |
| عبادت: ی | : | اقبال کی اردو | ۱۲۔ |

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
ii) Written Test carrying 10 marks

M.A. PART - II (URDU)

PAPER - IV (Essay on a Literary Subject)

SEMESTTER - II

Time : 3 Hours

Max. Marks: 80

Books Recommnded : :

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
- ii) Written Test carrying 10 marks

M.A. PART - II (URDU)

PAPER - IV (Essay on a Literary Subject)

SEMESTTER - IV

Time : 3 Hours

Max. Marks: 80

Books Recommnded : :

Internal Assesment based on Syllabus

- i) Oral Test carrying 10 marks
- ii) Written Test carrying 10 marks

Appendix-G

एम.ए.भाग-२
(पाली व प्राकृत)
पालि काव्य साहित्य

पेपर-१

सेमिस्टर-३

वेळ ३ तास			लेखी परीक्षा — ८० अंतर्गत मूल्यमापन -२० एकूण — १००
युनिट १	१) रतनसुत्त २)धम्मचरियसुत्त ३)राहुल सुत्त	(सुत्तनिपात) (सुत्तनिपात) (सुत्तनिपात)	१६ गुण
युनिट-२	१) आनंद थेर २)रटठपाल थेर ३)सोपाक थेर	(थेरगाथा) (थेरगाथा) (थेरगाथा)	१६ गुण
युनिट-३	१) उरगसुत्त २)चुन्दसुत्त ३)पराभव सुत्त	(सुत्तनिपात) (सुत्तनिपात) (सुत्तनिपात)	१६ गुण
युनिट-४	१) उपालिथेर २)सारिपुत्तथेर ३)मोग्गलायन थेर	(थेरगाथा) (थेरगाथा) (थेरगाथा)	१६ गुण
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न		१६ गुण

अंतर्गत मूल्यमापन

- १)स्वाध्याय १० गुण
२)मौखिक १० गुण

२० गुण

संदर्भ ग्रंथ

- १) सुत्तनिपात — डॉ. भिक्षु धर्मरक्षित
२) थेरगाथा — डॉ.विमलकिर्ती
३) पालिसाहित्याचा इतिहास- डॉ.तगारे
४) पालि साहित्याचा इतिहास — डॉ.भरतसिंह उपाध्याय

एम.ए.भाग-२
(पाली व प्राकृत)
पाली काव्य साहित्य

पेपर-१

सेमिस्टर-३

वेळ ३ तास			८० गुण
	प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १	अ) भाषांतर करा (दोन पैकी एक) ब) सामान्य प्रश्न (दोन पैकी एक)		०८ गुण ०८ गुण
प्रश्न २	अ) दीर्घोत्तरी प्रश्न (दोन पैकी एक) ब) सामान्य प्रश्न (दोन पैकी एक)		१० गुण ०६ गुण
प्रश्न ३	अ) सामान्य प्रश्न (तीन पैकी दोन) ब) लघुत्तरी प्रश्न		१६ गुण
प्रश्न ४	अ) लघुत्तरी प्रश्न (दोन पैकी एक) ब) टिपणात्मक प्रश्न सोडवा (तीन पैकी दोन)		०८ गुण ०८ गुण
प्रश्न-५	वस्तुनिष्ठ प्रश्न सोडवा. (१२ पैकी ८)		१६ गुण
अंतर्गत मूल्यमापन —			
१)स्वाध्याय-१०			
२)मौखिक — १०			

एम.ए.भाग-२
(पाली व प्राकृत)
पालि काव्य साहित्य

पेपर-१

सेमिस्टर-४

वेळ ३ तास			लेखी परीक्षा — ८० अंतर्गत मूल्यमापन -२० एकूण — १००
युनिट १	१) चित्तवग्ग (धम्मपद) २)अत्तवग्ग (धम्मपद) ३)यमक वग्ग (धम्मपद)		१६ गुण
युनिट-२	१) पटाचाराथेरी (थेरीगाथा) २) किसानगोतमी (थेरीगाथा) ३)विमलाथेरी (थेरीगाथा)		१६ गुण
युनिट-३	१) पुप्फवग्ग (धम्मपद) २) अर्हत्तवग्ग (धम्मपद) ३)पियवग्ग (धम्मपद)		१६ गुण
युनिट-४	१) खेमाथेरी (थेरीगाथा) २) भद्राकुण्डलकेसाथेरी (थेरीगाथा) ३)धम्मदिना थेरी (थेरीगाथा)		१६ गुण
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न		१६ गुण
अंतर्गत मूल्यमापन			
१)स्वाध्याय	१० गुण		
२)मौखिक	१० गुण		
संदर्भ ग्रंथ			
१) धम्मपद — डॉ.भ.आनंद कौसल्यायन			
२) थेरीगाथा पालि — डॉ. स्वामी द्वारकादास शास्त्री			
३) पालिसाहित्य का इतिहास- भरतसिंह उपाध्याय			
४) थेरिगाथा — डॉ.आर.जे. वानखडे			

एम.ए.भाग-२
(पाली व प्राकृत)
पाली काव्य साहित्य
पेपर-१
सेमिस्टर-४

वेळ ३ तास		८० गुण
प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १ अ) सामान्य प्रश्न (दोन पैकी एक)		०८ गुण
ब) संदर्भासह स्पष्टीकरण (चार पैकी दोन गाथा)		०८ गुण
प्रश्न २ अ) सारांशरूपी प्रश्न (दोन पैकी एक)		१० गुण
ब) सामान्य प्रश्न (दोन पैकी एक)		०६ गुण
प्रश्न ३ अ) सामान्य प्रश्न (तीन पैकी दोन)		१६ गुण
प्रश्न ४ अ) लघुत्तरी प्रश्न (दोन पैकी एक)		०८ गुण
ब) टिपणात्मक प्रश्न सोडवा (तीन पैकी दोन)		०८ गुण
प्रश्न-५ वस्तुनिष्ठ प्रश्न सोडवा. (१२ पैकी ८)		१६ गुण
अंतर्गत मूल्यमापन —		
१)स्वाध्याय-१०		
२)मौखिक — १०		

एम.ए.भाग-२
(पाली व प्राकृत)
पालि गद्य साहित्य

पेपर-२

सेमिस्टर-३

वेळ ३ तास

लेखी परीक्षा — ८०
अंतर्गत मूल्यमापन -२०
एकूण — १००

युनिट १	१) अप्पणकजातक (जातककथा) २) तित्तरजातक (जातककथा) ३) मक्कटजातक (जातककथा)	१६ गुण
युनिट-२	१) रोहीणीजातक (जातककथा) २) बोवरुजातक (जातककथा) ३) वेसन्तर जातक (जातककथा)	१६ गुण
युनिट-३	१) महापदानसुत्त (दिद्यनिकाय) २) जनवसभसुत्त (दिद्यनिकाय) ३) सुभसुत्त (दिद्यनिकाय)	१६ गुण
युनिट-४	१) महागोविदसुत्त (दिद्यनिकाय) २) महासुदस्सनसुत्त (दिद्यनिकाय) ३) जालिय सुत्त (दिद्यनिकाय)	१६ गुण
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न	१६ गुण

अंतर्गत मूल्यमापन

- १)स्वाध्याय १० गुण
२)मौखिक १० गुण

संदर्भ ग्रंथ

- १) दिद्यनिकाय —नालंदा संस्करण, इगतपुरी
२) जातकग्रंथ —(ना.स.)
३) सुत्तपिटक - भदन्त तिस्सवंस्स
४) History of Pali Literature – Prof. B.C.Low.

एम.ए.भाग-२
(पाली व प्राकृत)
पाली गद्य साहित्य
पेपर-२
सेमिस्टर-३

वेळ ३ तास

८० गुण

प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १ अ) भाषांतर करा (दोन पैकी एक) ब) सामान्य प्रश्न (दोन पैकी एक)		०८ गुण ०८ गुण
प्रश्न २ अ) दीर्घोत्तरी प्रश्न (दोन पैकी एक) ब) लघुत्तरी प्रश्न (दोन पैकी एक)		१० गुण ०६ गुण
प्रश्न ३ अ) लघुत्तरी प्रश्न (दोन पैकी एक) ब) टिपा लिहा (तीन पैकी दोन)		०८ गुण ०८ गुण
प्रश्न ४ अ)सारांशरूपी दीर्घोत्तरी प्रश्न (दोन पैकी एक)		१६ गुण
प्रश्न-५ वस्तुनिष्ठ प्रश्न (१२ पैकी ८)		१६ गुण
मूल्यमापन — १)स्वाध्याय-१० २)मौखिक — १०		अंतर्गत

एम.ए.भाग-२
(पाली व प्राकृत)
पालि गद्य साहित्य
पेपर-२
सेमिस्टर-४

वेळ ३ तास			लेखी परीक्षा — ८० अंतर्गत मूल्यमापन -२० एकूण — १००
युनिट १	१) एकक निपात २) सुत्त १ ते १०	(इतिवृत्तक)	१६ गुण
युनिट-२	१) बोधिवग्ग २) सुत्त १ ते १०	(उदानपाली)	१६ गुण
युनिट-३	१) मुलपरियायसुत्त २) भयभेखसुत्त ३) अनुमान सुत्त	(मज्झिमनिकाय) (मज्झिमनिकाय) (मज्झिमनिकाय)	१६ गुण
युनिट-४	१) सल्लेखसुत्त २) सम्मादिट्ठीसुत्त ३) मधुपिण्डक सुत्त	(मज्झिमनिकाय) (मज्झिमनिकाय) (मज्झिमनिकाय)	१६ गुण
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न		१६ गुण
अंतर्गत मूल्यमापन			
१)स्वाध्याय	१० गुण		
२)मौखिक	१० गुण		
संदर्भ ग्रंथ			
१) इतिवृत्तकपालि—	स्वामीद्वारिकादास शास्त्री		
२) उदानपाली	—स्वामीद्वारिकादास शास्त्री		
३) मज्झिमनिकाय पालि	- इगतपुरी प्रकाशन नालंदा संस्करण		

एम.ए.भाग-२
(पाली व प्राकृत)
पाली गद्य साहित्य
पेपर-२
सेमिस्टर-४

वेळ ३ तास			८० गुण
	प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १	अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक) ब) सामान्य प्रश्न सोडवा (दोन पैकी एक)		१० गुण ०६ गुण
प्रश्न २	अ) लघुत्तरी प्रश्न सोडवा (दोन पैकी एक) ब) टिपा लिहा (तीन पैकी दोन)		०८ गुण ०८ गुण
प्रश्न ३	अ) भाषांतर करा (दोन पैकी एक) ब) लघुत्तरी प्रश्न सोडवा (दोन पैकी एक)		०८ गुण ०८ गुण
प्रश्न ४	अ) सविस्तर प्रश्न सोडवा (दोन पैकी एक)		१६ गुण
प्रश्न-५	वस्तुनिष्ठ प्रश्न (१२ पैकी ८)		१६ गुण
अंतर्गत मूल्यमापन —			
१)स्वाध्याय-१०			
२)मौखिक — १०			

एम.ए.भाग-२
(पाली व प्राकृत)
पालि शिलालेख व निबंध
पेपर-३
सेमिस्टर-३

वेळ ३ तास
लेखी परीक्षा - ८०
अंतर्गत मूल्यमापन -२०
एकूण - १००

युनिट १	१) अशोकाचे शिलालेख (१ ते ४)	१६ गुण
युनिट-२	१) अशोकाचे शिलालेख (५ ते ७)	१६ गुण
युनिट-३	१) पालि निबंध	१६ गुण
युनिट-४	१) अशोकाच्या शिलालेखाचा इतिहास	१६ गुण
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न	१६ गुण

अंतर्गत मूल्यमापन

- १)स्वाध्याय १० गुण
२)मौखिक १० गुण

संदर्भ ग्रंथ

- १) प्राचिन अभिलेख संग्रह -डॉ.श्रीराम गोयल
२) अशोकाचे अभिलेख - डॉ.य.ना.मेश्राम
३) पालिनिबंधावली - डॉ.हरिशंकर शुक्ल
४) अशोक के धर्मलेख -
५) अशोका - डॉ.रोमिला थापर
६) भाव्दो शिलालेख - डॉ.निरज बोधि
७) पाली साहित्याचा इतिहास - डॉ.भरतसिंह उपाध्याय

एम.ए.भाग-२
(पाली व प्राकृत)
पाली शिलालेख व निबंध
पेपर-३
सेमिस्टर-३

वेळ ३ तास		८० गुण
प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १ अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक)		१६ गुण
प्रश्न २ अ) सामान्य प्रश्न सोडवा (दोन पैकी एक)		०८ गुण
ब) लघुत्तरी प्रश्न सोडवा (दोन पैकी एक)		०८ गुण
प्रश्न ३ अ) निबंध लिहा (तीन पैकी एक)		१६ गुण
प्रश्न ४ अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक)		१० गुण
ब) टिपा लिहा (तीन पैकी दोन)		०६ गुण
प्रश्न-५ अ) वस्तुनिष्ठ प्रश्न (१२ पैकी ८)		१६ गुण

अंतर्गत मूल्यमापन -

- १)स्वाध्याय-१०
२)मौखिक - १०

एम.ए.भाग-२
(पाली व प्राकृत)
पालि शिलालेख व निबंध
पेपर-३
सेमिस्टर-४

वेळ ३ तास		लेखी परीक्षा — ८० अंतर्गत मूल्यमापन -२० एकूण — १००
युनिट १	१) अशोकाचे शिलालेख (८ ते १०)	१६ गुण
युनिट-२	१) अशोकाचे शिलालेख (११ ते १४)	१६ गुण
युनिट-३	१) पालि निबंध	१६ गुण
युनिट-४	१) राजा अशोकाचे जिवनचरित्र	१६ गुण
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न	१६ गुण
अंतर्गत मूल्यमापन		
१)स्वाध्याय	१० गुण	
२)मौखिक	१० गुण	

संदर्भ ग्रंथ

- १) पालि निबंध — डॉ.हरीशंकर शुक्ल
- २) अशोका — डॉ.रोमिला थापर
- ३) प्राचिन अभिलेख संग्रह — डॉ. श्रीराम गोयल
- ४) अशोकाचे अभिलेख— डॉ.य.ना.मेश्राम
- ५) अशोकाचे शिलालेख — डॉ.वामन गवई

एम.ए.भाग-२
(पाली व प्राकृत)
पाली शिलालेख व निबंध
पेपर-३
सेमिस्टर-४

वेळ ३ तास		८० गुण
प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १ अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक)		१० गुण
ब) लघुत्तरी प्रश्न (दोन पैकी एक)		०६ गुण
प्रश्न २ अ) सामान्य प्रश्न सोडवा (चार पैकी दोन)		१६ गुण
प्रश्न ३ अ) निबंध लिहा (तीन पैकी एक)		१६ गुण
प्रश्न-४ अ) दीर्घोत्तरी प्रश्न सोडवा(दोन पैकी एक)		१६ गुण
प्रश्न ५ अ) वस्तुनिष्ठ प्रश्न सोडवा (१२ पैकी ८)		१६ गुण
अंतर्गत मूल्यमापन —		
१)स्वाध्याय-१०		
२)मौखिक — १०		

एम.ए.भाग-२
(पाली व प्राकृत)
पालि साहित्य संस्कृती व तत्वज्ञानाचा इतिहास
पेपर-४
सेमिस्टर-३

वेळ ३ तास		लेखी परीक्षा — ८० अंतर्गत मूल्यांकन -२० एकूण — १००
युनिट १	१) पिटक साहित्य २)अनुपिटक साहित्य	१६ गुण
युनिट-२	१) वस्तु कला २)शिल्पकला ३) चित्र कला	१६ गुण

युनिट-३	बौद्ध विद्यापीठ १) महाविहार २) तक्षशिला ३) नालंदा	१६ गुण
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युनिट-४	१) चार आर्यसत्य २)प्रतित्य समुत्पाद	१६ गुण
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युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न	१६ गुण
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अंतर्गत मूल्यमापन

१)स्वाध्याय - १० गुण

२)मौखिक - १० गुण

संदर्भ ग्रंथ

१) पालि साहित्य का इतिहास — डॉ.भरतसिंह उपाध्याय

२) History of Pali Literature – Prof. B.C.Low.

३) प्राचीन भारतीय संस्कृति - बी.एन.लुनिया

४) बौद्ध दर्शन - राहुल सांकृत्यायन

5) The Budha and His Dhamma : Dr.B,R,Ambedkar

6) Revival of Buddhism : Dr.D.L.Ramteke

एम.ए.भाग-२

(पाली व प्राकृत)

पालि साहित्य संस्कृती व तत्वज्ञानाचा इतिहास

पेपर-४

सेमिस्टर-३

वेळ ३ तास	प्रश्नपत्रिकेचे स्वरूप	८० गुण
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प्रश्न १ अ) दीर्घोत्तरी प्रश्न सोडवा (दोन पैकी एक)		१६ गुण
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प्रश्न २ अ) सामान्य प्रश्न सोडवा (दोन पैकी एक)		१० गुण
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ब) लघुत्तरी प्रश्न (दोन पैकी एक)		०६ गुण
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प्रश्न ३ अ) सामान्य प्रश्न सोडवा (दोन पैकी एक)		०८ गुण
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ब) लघुत्तरी प्रश्न (दोन पैकी एक)		०८ गुण
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प्रश्न-४ अ) दीर्घोत्तरी प्रश्न सोडवा(दोन पैकी एक)		१० गुण
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ब) टिपा लिहा (कोणत्याही दोन)		०६ गुण
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प्रश्न ५ अ) वस्तुनिष्ठ प्रश्न सोडवा (१२ पैकी ८)		१६ गुण
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अंतर्गत मूल्यमापन —

१)स्वाध्याय-१०

२)मौखिक — १०

एम.ए.भाग-२

(पाली व प्राकृत)

पालि साहित्य संस्कृती व तत्वज्ञानाचा इतिहास

पेपर-४

सेमिस्टर-४

वेळ ३ तास	लेखी परीक्षा — ८० अंतर्गत मूल्यमापन -२० एकूण — १००
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युनिट १	१) मिलिन्द प्रश्न २)वंससाहित्य ३) अड्डकथा	१६ गुण
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युनिट-२	बौद्ध विद्यापीठ १)विक्रमशिला २) औदन्तपूरी	१६ गुण
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युनिट-३	१) अनित्यवाद २)अनिश्वरवाद	१६ गुण
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	३) कम्मसिद्धान्त	
	४) निब्बाण	
युनिट-४	१) अनागरीक धर्मपाल	१६ गुण
	२) बाबासाहेब आंबेडकर	
	३) राहुल सांकृत्यायन	
	४) आनंद कौसल्यायन	
युनिट-५	युनिट १ ते ४ वर वस्तुनिष्ठ प्रश्न	१६ गुण
	अंतर्गत मूल्यमापन	
	१) स्वाध्याय १० गुण	
	२) मौखिक १० गुण	
	संदर्भ ग्रंथ	
	१) पालि साहित्य का इतिहास — डॉ.धर्मरक्षित	
	२) मिलिन्दपत्रो - राहुलसांकृत्यायन	
	३) बौद्धधर्म के विकास मे डॉ.बी.आर.आंबेडकर का योगदान	
	४) बौद्ध दर्शन - राहुल सांकृत्यायन	
	५) प्राचीन भारतीय - संस्कृती - बी.एन.लुनिया	
	६) The Budha and His Dhamma : Dr.B,R,Ambedkar	
	७) पालि साहित्य व साहित्यकार — डॉ.मालती साखरे	
	८) पाली साहित्य व तत्वज्ञान — प्रा.डॉ.रेखा पर्वतकर	

एम.ए.भाग-२

(पाली व प्राकृत)

पालि साहित्य संस्कृती व तत्वज्ञानाचा इतिहास

पेपर-४

सेमिस्टर-४

वेळ ३ तास		८० गुण
प्रश्नपत्रिकेचे स्वरूप		
प्रश्न १ अ) दीर्घोत्तरी प्रश्न सोडवा (कोणतेही एक)		१६ गुण
प्रश्न २ अ) सामान्य प्रश्न सोडवा (दोन पैकी एक)		१० गुण
ब) लघुत्तरी प्रश्न (दोन पैकी एक)		०६ गुण
प्रश्न ३ अ) सामान्य प्रश्न सोडवा (दोन पैकी एक)		०८ गुण
ब) टिपा लिहा (कोणत्याही दोन)		०८ गुण
प्रश्न-४ अ) दीर्घोत्तरी प्रश्न सोडवा(दोन पैकी एक)		१० गुण
ब) टिपा लिहा (कोणत्याही दोन)		०६ गुण
प्रश्न ५ अ) वस्तुनिष्ठ प्रश्न सोडवा (१२ पैकी ८)		१६ गुण

Appendix-H

एम.ए.सेमिस्टर-३

प्रायोगिक - मौखिक (Viva)

प्रश्नपत्र — ९

(संगीताचे क्रियात्मक शास्त्र आणि सांगीतिक रचना)

वेळ — १ तास	पूर्णांक — १००
	बाह्य मूल्यांकन — ८०
	अंतर्गत मूल्यांकन - २०

१) रागज्ञान

अ) पाठ्यक्रमातील राग

विभाग अ

विभाग ब

विभाग क

i) मियाँ की तोडी

i) दरबारी कानडा

i) कोमलरिषभ आसावरी

ii) गुजरी तोडी

ii) आभोगी कानडा

ii) सालगवराळी

iii) भुपाल तोडी

iii) शहाणा कानडा

iii) ललित

iv) बिलासखानी तोडी

iv) नायकी कानडा

iv) देवगांधार

v) देसी तोडी

v) कौशिक कानडा

v) परमेश्वरी

ब) वरील प्रत्येक विभागातील किमान दोन राग करणे आवश्यक.

क) पाठ्यक्रमातील कोणत्याही दोन रागांमध्ये विलंबित ख्याल तसेच मध्यलयीतील बंदिश विस्तृत गायकीसह

ड) पाठ्यक्रमातील कोणत्याही दोन रागांमध्ये (विस्तृत गायकीचे राग सोडून) विलंबित ख्यालातील फक्त बंदिशी

इ) विलंबित ख्यालासाठी निवडलेल्या रागांव्यतिरिक्त पाठ्यक्रमातील कोणत्याही चार रागातील

छोट्याख्यालाच्या बंदिशी गायकीसह.

३) वरील रागांपैकी कोणत्याही रागात एक धमार व एक तराना (गायकी व विविध लयकारीसह)

क्रियात्मक अंतर्गत गुण :	अ) प्रात्यक्षिक वही तयार करणे (सादरीकरणप्रमाणे)	-०५ गुण
	ब) घटक / वार्षिक चाचणी परीक्षा	- ०५ गुण
	क) श्रवण आणि सादरीकरण	१० गुण
		एकूण २० गुण

एम.ए.सेमिस्टर ३
प्रायोगिक - मंच प्रदर्शन (Stage Performance)
प्रश्नपत्र १०

वेळ- ४० मिनिट	पूर्णांक - १००	
	बाह्य मूल्यांकन - ८०	
	अंतर्गत मूल्यांकन - २०	
१) पाठ्यक्रमातील कोणत्याही एका रागाची ऐच्छिक निवड करून विलंबित ख्याल व छोटाख्याल गायकीसह प्रस्तुत करणे.		४० गुण
२) अ) परीक्षकांनी सुचविलेल्या तीन रागांपैकी एका रागात छोटाख्याल गायकीसह प्रस्तुत करणे		२० गुण
ब) उपशास्त्रीय गीतप्रकार - कजरी व झुला		२० गुण
क्रियात्मक अंतर्गत गुण :	अ) तबला ठेका वाजविणे	१० गुण
	ब) तानपूरा लावणे	- १० गुण
		एकूण २० गुण

एम.ए.सेमिस्टर-३
गायन / स्वरवाद्य पाठ्यक्रम
प्रश्नपत्र -११
(शास्त्रीय संगीताचे क्रियात्मक सिध्दांत)

वेळ ३ तास	पूर्णांक - १००	
	बाह्य मूल्यांकन - ८०	
	अंतर्गत मूल्यांकन - २०	
घटक-१ अ) पाठ्यक्रमातील रागांचे शास्त्रीय विवेचन आलाप तानासहीत		
ब) पाठ्यक्रमातील गीतप्रकार लिपीबध्द करणे.		१६ गुण
घटक-२ अ) रागरागीणी वर्गीकरणाचे उदाहरणासहित विस्तृत अध्ययन		
ब) तोडी व कानडा रागांगांचे उदाहरणासहित विश्लेषण		१६ गुण
घटक-३ दिलेल्या पद्यरचनेला योग्य राग व तालात निबध्द करून स्वरलिपीबध्द करणे		१६ गुण
घटक-४ अ) अंकाच्या आधारे विभिन्न लयकारी लिपीबध्द करणे		१६ गुण
ब) प्रचलित तालाची दीडपट, (२ मध्ये ३) पाऊणपट (चार मध्ये ३) व सव्वापट (४ मध्ये ५) या लयकारी लिपीबध्द करण्याचा अभ्यास		
क) पाश्चात्य संगीताचे प्रमुख तत्व आणि स्टाफ नोटेशन पध्दतीचा अभ्यास.		
घटक-५ संपूर्ण पाठ्यक्रमावर आधारित वस्तुनिष्ठ प्रश्न		१६ गुण
सैध्दांतिक अंतर्गत गुण :	अ) स्वरचित बंदिशीचे सादरीकरण	-१० गुण
	ब) वरील अभ्यासक्रमावर आधारित प्रकल्प व त्याचे सादरीकरण	१० गुण
		एकूण २० गुण

एम.ए.सेमिस्टर-३
गायन / स्वरवाद्य पाठ्यक्रम
प्रश्नपत्र -१२
आधुनिक भारतीय संगीताचा इतिहास व शास्त्र
(१८ वी शताब्दी पासून वर्तमानकाळा पर्यंत)

वेळ ३ तास	पूर्णांक - १००	
	बाह्य मूल्यांकन - ८०	
	अंतर्गत मूल्यांकन - २०	
घटक-१ अ) घराणे या शब्दाचा अर्थ आणि घराण्याचे महत्व. तसेच ख्याल गायनाचे दिल्ली, ग्वाल्हेर, आग्रा, जयपुर, किराना व पतियाळा या घराण्याचा परिचय व त्या घराण्याच्या गायन शैलीचे अध्ययन		१६ गुण
घटक-२ अ) धृपद शैलीचा ख्याल व वादन शैलीवर झालेला परिणाम		
ब) धृपदाच्या वर्तमान काळातील परंपरांचे अध्ययन (दरभंगा, डागर, विष्णूपूर, हवेली)		१६ गुण

घटक-३ अ) पं.रातंजनकर, पं. त्यागराज,डॉ.प्रेमलता शर्मा, किशोरी आमोणकर पं.बलवंतराय भट्ट, (भावरंग) आचार्य कैलाशचंद्र बृहस्पती, केसरबाई केरकर, पं.रामनारायण यांच्या सांगीतिक कार्याचा संक्षिप्त परिचय. १६ गुण ब) सदारंग- अदारंग यांच्या बंदिशीचे विश्लेषणात्मक अध्ययन.	
घटक-४ मंच प्रस्तुतीकरणासाठी आवश्यक असलेल्या ध्वनी उपकरणांची माहिती (माईक, अॅम्प्लीफायर, मिक्सर, स्पीकर रिहब)	१६ गुण
घटक-५ संपूर्ण पाठ्यक्रमावर आधारित वस्तुनिष्ठ प्रश्न	१६ गुण
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सैध्दांतिक अंतर्गत गुण : अ) शोधपत्र लेखन	-१० गुण
ब) परिसंवादात सहभाग	१० गुण
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एकूण २० गुण	

संदर्भग्रंथ सूची

- १) हिंदुस्थानी संगीत क्रमिक पुस्तक मालिका भाग १ ते ६ पं. वि.ना.भातखंडे संगीत प्रकाशक कार्यालय, हातरस
- २) अभिनव गितांजली, भाग १ ते ५ पं. रामश्रय झा.संगीत सदन, इलाहबाद
- ३) शास्त्र परिचय, भाग १ ते ५ हरिश्चंद्र श्रीवास्तव, संगीत सदन इलाहबाद.
- ४) भातखंडे संगीत शास्त्र पं.वि.ना.भातखंडे संगीत कार्यालय, हातरस.
- ५) संगीत परिभाषा- विवेचन पं.श्रीकृष्ण रतंजनकर, आचार्य, एस एन.रतंजनकर फौंडेशन मुंबई
- ६) राग विज्ञान, विनायकबुवा पटवर्धन.
- ७) संगीत शास्त्र दर्पण, शांती गवर्धन, संगीत कार्यालय, हातरस.
- ८) संगीत शास्त्र विजयनी - पं.नारायण मंगरुळकर, स्वर संपदा केंद्र कोस्टीपुरा मार्ग सिताबर्डी नागपूर.
- ९) संपूर्ण विशारद शास्त्र (तबला) समीर जगताप, मधुराज पब्लिकेशन, पुणे.
- १०) संगीत शास्त्र विज्ञान डॉ.सुचिता बिडकर, संस्कार प्रकाशन, ६-४०० अभयदनगर, काळा चौक मुंबई
- ११) संगीत प्रवीण दर्शिका पं. नारायण लक्ष्मण गुणे, साधना गुणे ५८ पुरा ठाकुर किटगंज इलाहबाद
- १२) गुरतुर गा ले राग, प्रो.गुणवंत माधवलाल व्यास, वैभव प्रकाशन, नागपूर.
- १३) वसंत सुधा, डॉ.धनश्री पांडे, विद्या विकास प्रकाशन, नागपूर.
- १४) संगीत विशारद वसंत संगीत कार्यालय, हातरस.
- १५) स्वकिया पं.गुणवंत माधवलाल व्यास, व्यासमुनी संस्थान, रायपूर.
- १६) बंदिशीच्या बंदिशी पं.देवीदासपंत काळे गुरुजी प्रा.कमल भोंडे अमरावती.
- १७) नादकमल प्रा.कमल मु भोंडे मुरलीधर अ भोंडे, अमरावती.
- १८) संगीत समाधान डॉ.मधू शुक्ला, पाठक पब्लिकेशन इलाहबाद.
- १९) भारतीय संगीत (गायन) शास्त्र (सैध्दांतिक) प्रा.डॉ.सौ.मानिक ना. मेहरे राघव डिस्ट्रीब्युटर नागपूर.
- २०) अनुपरागविलास भाग १, २ कुमार गंधर्व मौज प्रकाशन, मुंबई.
- २१) कहत गुणिजन, डॉ.साधना शिलेदार, विजय प्रकाशन नागपूर.
- २२) पं.वि.ना.भातखंडे यांचे संगीतशास्त्र आणि बंदिशीची मिमांसा, डॉ.भोजराज बी. चौधरी, मेघ प्रकाशन, अमरावती.
- २३) संगीतार्जन, डॉ.अर्चना अंभोर अमेय पब्लिकेशन, अकोला.
- २४) ग्वाल्हेर घराण्याचे शिलेदार पं.राजभैरव तथा पं.बाळासाहेब पुछवाले डॉ.राजेन्द्र देशमुख
- २५) संगीत चिंतन डॉ.भोजराज बी चौधरी नभ प्रकाशन, अमरावती .
- २६) संगीत सरिता,रमा सराफ विद्यानिधी प्रकाशन, दिल्ली.
- २७) भारतीय संगीत का इतिहास उमेश जोशी संगीत कार्यालय, हातरस.
- २८) भारतीय संगीत का इतिहास, ठाकुर जयदेव सिंह संगीत कार्यालय, हातरस.
- २९) भारतीय संगीत का इतिहास शरदचंद्र परांजपे, संगीत कार्यालय, हातरस.
- ३०) संगीत चिकित्सा डॉ.सतीश वर्मा, राधा प्रकाशन, नई दिल्ली.
- ३१) संगीत के घरानो की चर्चा, सुशीलकुमार चौबे.
- ३२) घरानी आणि चरित्रे डॉ.नारायण मंगरुळकर कोस्टीपुरा सीताबर्डी नागपूर.
- ३३) घरंदाज गायकी, वा.ह.देशपांडे
- ३४) धृपद वर्षीकांक के विभिन्न अंक, विद्यामंदिर न्यास, रामनगर, वाराणसी.
- ३५) हमारे संगीत रत्न लक्ष्मीनारायण गर्ग संगीत कार्यालय, हातरस
- ३६) संगीत जिज्ञासा और समाधान, तेजसिंह हाट, बेकश आलमी फौंडेशन, लखनौ.
- ३७) संगीत बोध शरदचंद्र परांजपे, मध्यप्रदेश हिंदी ग्रंथ अकादमी भोपाल.
- ३८) संगीत मेनुअल डॉ.मृत्युनजय शर्मा, एच.जी प्रकाशन दिल्ली.
- ३९) स्वराथरामणी, गानसरस्वती किशोरी आमोणकर, राजहंस प्रकाशन, पुणे.
- ४०) निबंध संगीत, लक्ष्मी नारायण गर्ग, संगीत कार्यालय, हातरस.

एम.ए.सेमिस्टर-४
प्रायोगिक - मौखिक (Viva)

प्रश्नपत्र - १३
(संगीताचे क्रियात्मक शास्त्र आणि सांगीतिक रचना)

वेळ - १ तास

पूर्णांक - १००

बाह्य मूल्यांकन - ८०

अंतर्गत मूल्यांकन - २०

१) रागज्ञान

अ) पाठ्यक्रमातील राग

विभाग अ

i) मियाँ मल्हार

ii) सूरमल्हार

iii) गौडमल्हार

iv) रामदासी मल्हार

v) जयंतमल्हार

विभाग ब

i) मारवा

ii) सोहनी

iii) श्री

iv) भटियार

v) जयत

विभाग क

i) पूर्वी

ii) सरस्वती

iii) वसंतबहार

iv) गौरी

v) भिन्न षड्ज

ब) वरील प्रत्येक विभागातील किमान दोन राग करणे आवश्यक.

क) पाठ्यक्रमातील कोणत्याही दोन रागांमध्ये विलंबित ख्याल तसेच मध्यलयीतील बंदिश विस्तृत गायकीसह

ड) पाठ्यक्रमातील कोणत्याही दोन रागांमध्ये (विस्तृत गायकीचे राग सोडून) विलंबित ख्यालातील फक्त बंदिशी

इ) विलंबित ख्यालासाठी निवडलेल्या रागांव्यतिरिक्त पाठ्यक्रमातील कोणत्याही चार रागातील

छोटाख्यालाच्या बंदिशी गायकीसह.

२) वरील रागांपैकी कोणत्याही रागात एक धमार (गायकी व विविध लयकारीसह) व एक तराना. गायकीसह.

क्रियात्मक अंतर्गत गुण : अ) प्रात्यक्षिक वही तयार करणे (सादरीकरणप्रमाणे)

-०५ गुण

ब) घटक / वार्षिक चाचणी परीक्षा

- ०५ गुण

क) वरील अभ्यासक्रमावर आधारित घेतलेला प्रकल्प व त्याचे सादरीकरण

-१० गुण

एकूण २० गुण

एम.ए.सेमिस्टर ४

प्रायोगिक - मंच प्रदर्शन (Stage Performance)

प्रश्नपत्र १४

वेळ- ४० मिनिट

पूर्णांक - १००

बाह्य मूल्यांकन - ८०

अंतर्गत मूल्यांकन - २०

१) पाठ्यक्रमातील कोणत्याही एका रागाची ऐच्छिक निवड करून विलंबित ख्याल व छोटाख्याल गायकीसह प्रस्तुत करणे.

४० गुण

२) अ)परीक्षकांच्या सुचविलेल्या तीन रागांपैकी एका रागात छोटाख्याल गायकीसह प्रस्तुत करणे

२० गुण

ब) उपशास्त्रीय गीतप्रकार - तुमरी व दादरा

२० गुण

क्रियात्मक अंतर्गत गुण : अ) श्रवण आणि सादरीकरण

-१० गुण

ब) गीतांचे सादरीकरण (With Music Track)

- १० गुण

एकूण २० गुण

एम.ए.सेमिस्टर-४

गायन / स्वरवाद्य पाठ्यक्रम

प्रश्नपत्र -१५

शास्त्रीय संगीताचे क्रियात्मक सिध्दांत

वेळ ३ तास

पूर्णांक - १००

बाह्य मूल्यांकन - ८०

अंतर्गत मूल्यांकन - २०

घटक-१ अ) पाठ्यक्रमातील रागांचे शास्त्रीय विवेचन आलाप तानांसहीत

ब) पाठ्यक्रमातील गीतप्रकार लिपीबद्ध करणे

१६ गुण

घटक-२ मल्हार व मारवा रागांमधील अध्ययन

१६ गुण

घटक-३ शिक्षक, मंचकलाकार, संगीत निर्देशक, समीक्षक, रेकॉर्डिस्ट, कंपोजर या कलाकारांच्या निर्माती

प्रक्रियेत संगीताची रोजगाराभिमुख दिशा

१६ गुण

घटक-४ कमीतकमी ६०० शब्दांमध्ये संगीत विषयावर निबंध	१६ गुण
घटक-५ संपूर्ण पाठ्यक्रमावर आधारित वस्तुनिष्ठ प्रश्न	१६ गुण

सैध्दांतिक अंतर्गत गुण : अ) संगीत अध्यापन पध्दती पाठ (किमान पाच पाठ)	-१० गुण
ब) सांगीतिक कार्यक्रमाचे समीक्षण करणे	१० गुण

एकूण २० गुण

एम.ए.सेमिस्टर-४

गायन / स्वरवाद्य पाठ्यक्रम

प्रश्नपत्र -१६

सौंदर्यशास्त्र आणि संशोधन पध्दती

वेळ ३ तास

पूर्णांक — १००

बाह्य मूल्यांकन — ८०

अंतर्गत मूल्यांकन — २०

घटक-१ सौंदर्यशास्त्राचा परिचय, विश्लेषण आणि परिक्षेत्र व सौंदर्यानुभूती प्रक्रिया व घटक	१६ गुण
घटक-२ कलेची परिभाषा, कलेचे वर्गीकरण, कलेचे माध्यम व विषयवस्तु	१६ गुण
घटक-३ 'रस'परिभाषा व त्यातील भेदांचे सामान्य अध्ययन तसेच 'संगीत' आणि 'रस' यांचा परस्पर संबंध	१६ गुण
घटक-४ अ) संशोधनाची परिभाषा व प्रक्रिया तसेच भारतीय संगीतामधील संशोधनाच्या दिशा ब) संशोधनातील विषयांची निवड, विषयाची रूपरेषा, व संदर्भ ग्रंथ सूची	१६ गुण
घटक-५ संपूर्ण पाठ्यक्रमावर आधारित वस्तुनिष्ठ प्रश्न	१६ गुण

सैध्दांतिक अंतर्गत गुण : **Dissertation**

-२० गुण

संदर्भग्रंथ सूची

- १) हिंदुस्थानी संगीत क्रमिक पुस्तक मालिका भाग १ ते ६ पं. वि.ना.भातखंडे संगीत प्रकाशक कार्यालय, हातरस
- २) अभिनव गितांजली, भाग १ ते ५ पं. रामश्रय झा.संगीत सदन, इलाहबाद
- ३) शास्त्र परिचय, भाग १ ते ५ हरिश्चंद्र श्रीवास्तव, संगीत सदन इलाहबाद.
- ४) भातखंडे संगीत शास्त्र पं.वि.ना.भातखंडे संगीत कार्यालय, हातरस.
- ५) संगीत परिभाषा- विवेचन पं.श्रीकृष्ण रतंजनकर, आचार्य, एस एन.रतंजनकर फौंडेशन मुंबई
- ६) राग विज्ञान, विनायकबुवा पटवर्धन.
- ७) संगीत शास्त्र दर्पण, शांती गवर्धन, संगीत कार्यालय, हातरस.
- ८) संगीत शास्त्र विजयनी — पं.नारायण मंगरुळकर, स्वर संपदा केंद्र कोस्टीपुरा मार्ग सिताबर्डी नागपूर.
- ९) संपूर्ण विशारद शास्त्र (तबला) समीर जगताप, मधुराज पब्लिकेशन, पुणे.
- १०) संगीत शास्त्र विज्ञान डॉ.सुचिता बिडकर, संस्कार प्रकाशन, ६-४०० अभ्यदनगर, काळा चौक मुंबई
- ११) संगीत प्रवीण दर्शिका पं. नारायण लक्ष्मण गुणे, साधना गुणे ५८ पुरा ठाकुर किटगंज इलाहबाद
- १२) गुरतुर गा ले राग, प्रो.गुणवंत माधवलाल व्यास, वैभव प्रकाशन, नागपूर.
- १३) वसंत सुधा, डॉ.धनश्री पांडे, विद्या विकास प्रकाशन, नागपूर.
- १४) संगीत विशारद वसंत संगीत कार्यालय, हातरस.
- १५) स्वकिया पं.गुणवंत माधवलाल व्यास, व्यासमुनी संस्थान, रायपूर.
- १६) बंदीशीच्या बंदीशी पं.देवीदासपंत काळे गुरुजी प्रा.कमल भोंडे अमरावती.
- १७) नादकमल प्रा.कमल मु भोंडे मुरलीधर अ भोंडे, अमरावती.
- १८) संगीत समाधान डॉ.मधू शुक्ला, पाठक पब्लिकेशन इलाहबाद.
- १९) भारतीय संगीत (गायन) शास्त्र (सैध्दांतिक) प्रा.डॉ.सौ.मानिक ना. मेहरे राघव डिस्ट्रीब्युटर नागपूर.
- २०) अनुपरागविलास भाग १, २ कुमार गंधर्व मौज प्रकाशन, मुंबई.
- २१) कहत गुणिजन, डॉ.साधना शिलेदार, विजय प्रकाशन नागपूर.
- २२) पं.वि.ना.भातखंडे यांचे संगीतशास्त्र आणि बंदिशीची मिमांसा, डॉ.भोजराज बी. चौधरी, मेघ प्रकाशन, अमरावती.
- २३) संगीतार्जन, डॉ.अर्चना अंभोर अमेय पब्लिकेशन, अकोला.
- २४) ग्वाल्हेर घराण्याचे शिलेदार पं.राजभैर्या तथा पं.बाळासाहेब पुछवाले डॉ.राजेन्द्र देशमुख
- २५) संगीत चिंतन डॉ.भोजराज बी चौधरी नभ प्रकाशन, अमरावती .
- २६) संगीत सरिता,रमा सराफ विद्यानिधी प्रकाशन, दिल्ली.
- २७) भारतीय संगीत का इतिहास उमेश जोशी संगीत कार्यालय, हातरस.
- २८) भारतीय संगीत का इतिहास, ठाकुर जयदेव सिंह संगीत कार्यालय, हातरस.
- २९) भारतीय संगीत का इतिहास शरदचंद्र परांजपे, संगीत कार्यालय, हातरस.
- ३०) संगीत चिकित्सा डॉ.सतीश वर्मा, राधा प्रकाशन, नई दिल्ली.
- ३१) भारतीय संगीत शास्त्र और सौन्दर्यशास्त्र, अनुपम महाराज हिंदी ग्रंथ अकादमी पंचकुला, हरियाणा.
- ३२) भारतीय संगीत मे अनुसंधान प्रक्रिया मनोरमा शर्मा, हरियाणा हिंदी ग्रंथ अकादमी, पंचकुला हरियाणा.
- ३३) रविंद्र संगीत डॉ.अनिता सेन
- ३४) संगीत मेनुअल डॉ.मृत्यूनजय शर्मा, एच.जी प्रकाशन दिल्ली.
- ३५) स्वराथारामणी, गानसरस्वती किशोरी आमोणकर, राजहंस प्रकाशन, पुणे.
- ३६) निबंध संगीत, लक्ष्मी नारायण गर्ग, संगीत कार्यालय, हातरस.

M.C.A.
II & III Year

Prospectus No. 121718

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SANT GADGE BABA AMRAVATI UNIVERSITY
(FACULTY OF ENGINEERING & TECHNOLOGY)

PROSPECTUS

Prescribed for

MASTER IN COMPUTER APPLICATION

Second Year Examination 2011-2012 &

Third Year Examination 2012-2013

CREDIT GRADE SYSTEM



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**SYLLABUS PRESCRIBED FOR THREE YEAR P.G. COURSE IN
MASTER IN COMPUTER APPLICATION
CREDIT GRADE SYSTEM**

**SECOND YEAR
SEMESTER : FIRST**

3MCA 1**OPERATING SYSTEMS**

- Unit-I: Introduction: Operating System(OS) definition, OS Evolution, OS Components and Services. Process Concept, Process Scheduling, Operations on Processes, Cooperating Processes, Interprocess Communication, Threads Overview, Multithreading Models, Threading Issues, Java Threads.
- Unit-II: CPU Scheduling Concepts, Scheduling Criteria and Algorithms. Process Synchronization: The Critical-Section Problem, Synchronization Hardware, Semaphores, Monitors. Deadlocks: Definition & Characterization, Deadlocks Prevention, Avoidance, Detection and Recovery from Deadlock.
- Unit-III: Memory Management Background, Swapping, Contiguous Memory Allocation Schemes, Paging, Segmentation. Virtual Memory Management: Background, Demand Paging scheme, Process Creation, Page Replacement Policies, Allocation of Frames, Thrashing.
- Unit-IV: File-System Interface; Directory Structure, File-System Mounting, File Sharing & Protection. File-System Structure, File-System Implementation. Directory Implementation, Allocation Methods, Free-Space Management. File Recovery.
- Unit-V: I/O Systems :Overview, I/O Hardware, Application I/O Interface, and Kernel I/O Subsystem. Transforming I/O to Hardware Operations. Disk Scheduling, Disk Management, Swap-Space Management, RAID Structure.
- Unit-VI: The Linux System; History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Interprocess Communication, Network Structure & Security in Linux.

Text Book:

Avi Silberschatz , P.B.Galvin, G. Gagne : “Operating System Concepts” (Sixth Edition) John Wiley & Sons Publication.

References:

- i. A.S Tanenbaum “Modern Operating Systems” Pearson Education.

- ii. William Stallings “Operating Systems” Prentice-Hall.
- iii. D M Dhamdhare “Operating Systems” Tata McGraw-Hill.
- iv. M Milankovic “Operating Systems” McGraw-Hill.

3MCA 2**FILE STRUCTURES & DATA PROCESSING**

- UNIT I. Introduction : File structure design, File processing operations : open, close, read, write, seek. Unix directory structure. Secondary storage devices: disks, tapes, CD-ROM. Buffer management. I/O in Unix.
- UNIT II. File Structure Concepts : Field & record organization, Using classes to manipulate buffers, Record access, Record structures. File access & file organization. Abstract data models for file access. Metadata. Extensibility, Portability & standardization.
- UNIT III. Data Compression, Reclaiming spaces in files, Introduction to internal sorting and Binary searching. Keysorting. Indexing concepts. Object I/O. Multiple keys indexing., Inverted lists, Selective indexes, Binding.
- UNIT IV. Cosequential processing : Object-Oriented model, its application. Internal sorting : a second look. File Merging : Sorting of large files on disks. Sorting files on tapes. Sort-merge packages. Sorting and Cosequential processing in Unix.
- UNIT V. Multilevel indexing : Indexing using Binary Search trees. OOP based B-trees. B-tree methods Search, Insert and others. Deletion, merging & redistribution. B*trees. Virtual B-trees. VL records & keys. Indexed sequential file access and Prefix B-trees.
- UNIT VI. Hashing : Introduction, a simple hashing algorithm. Hashing functions and record distributions. Collision resolution. Buckets. Making deletions. Pattern of record access. External hashing. Implementation. Deletion. Performance. Alternative approaches.

Textbook :

Michael J.Folk, Bill Zoellick, Greg Riccard : File Structures : An Object-Oriented Approach using C++. (Addison-Wesley) (LPE)

References :

1. M.Loomis : Data Management & File Processing (PHI)
2. O.Hanson : Design of Computer Data Files McGraw-Hill (IE).
3. D. E. Knuth : “The Art of Computer Programming” Volume-3. Addison Wesley Pub.

3MCA 3**JAVAPROGRAMMING**

- Unit I: Java Basics: Program Components, Compilation cycle. Introduction to Applet and Application, Data types and Variables, Operators: Arithmetic, relational, Assignment operators. Control statement: Selection statement: if, nested if, switch statement. Repetition statements: while, do-while, for, nested loops.
- Unit II: Introducing classes, class fundamentals, declaring objects, methods, class data, & instance data, constructor, this keyword, access control, Inheritance, Polymorphism, Abstract classes and Interface, Packages. Introduction to String and String Buffer classes, Math class. Arrays: Basics, One - & Multi-dimensional, Array of Objects, Passing array to methods.
- Unit-III: Exception handling: Exception types, uncaught Exceptions, using try and catch, throw, throws, finally clauses, multiple catch clauses, Built-in Exceptions. Multithreaded programming: Java thread model, creating a thread, creating multiple threads, thread priorities & synchronization.
- Unit IV: Java I/O: Stream classes, Byte Stream & Character Streams: Input stream, Output stream, File Input stream, File Output stream, Data Input stream, Data Output stream, PrintWriter, The Applet class and its various methods, Passing parameters to applets. transient & volatile modifiers, using instanceof, using assert.
- Unit-V: Event handling: Event handling mechanisms, Delegation Event model, Event, Event sources & EventListeners, Event Classes, Event Listener Interfaces., Using delegation Event model: Handling mouse events, handling Keyboard events, Adapter classes, Inner classes, anonymous inner classes.
- Unit-VI: Introduction to AWT, AWT classes, Window fundamentals, working with frame windows, Button, TextField, Label. Working with Graphics, Working with colors, AWT controls, Fundamentals: Adding and removing controls, responding to controls. Layout managers.

TEXT BOOK:

Herbert Schildt: The Complete Reference Java 2 (5/e) (Tata-McGraw Hill)

3MCA7 JAVA Programming Lab.

REFERENCES

- 1) Liang "A Text Book of Java Programming" 2/e (PHI).

- 2) Dietel & Dietel "Java How to Program" Pearson Education.
- 3) Horstmann & Cornell "Core Java 2" Vol-1. Sun Microsystems.
- 4) S. Chavan "Programming in Java" Shroff Pub.

3MCA 4**COMPUTER NETWORKS**

- UNIT – I Introduction: Brief history of computer networks & Internet, Layered architecture, Internet protocol stack, Network entities & layers, Application layer: Principles of protocols, HTTP, FTP, SMTP and DNS protocols.
- UNIT – II Transport layer: services & principles, multiplexing & demultiplexing applications, UDP, principles of reliable data transfer, TCP details, principles of congestion control, TCP congestion control.
- UNIT – III Network layer: network service model, routing principles, hierarchical routing, Internet Protocol (IP) & ICMP details, Routing in the Internet, Router internals, IPV6.
- UNIT – IV Link layer: Introduction, services, multiple access protocol, LAN addresses & Address Resolution Protocol, Carrier Sense Multiple Access / CD, Point-to-Point Protocol details.
- UNIT – V Network security issues, principles of cryptography, authentication & authentication protocol, version, integrity: digital signatures, message digests, hash function algorithm, key distribution & certification, secure e- mail.
- UNIT – VI Network Management: Basic principles, infrastructure for network management, The Internet Network –management framework: SMI, MIB, SNMP details, security and administration, ASN 1, Firewalls: Packet filtering and Application gateway.

TEXT BOOK:

1. James F. Kurose & K W Ross: Computer Networking, Pearson Education (LPE)

REFERENCES:

1. Douglas E. Comer: Computer Network & Internet, Addison Wesley.
2. Andrew S. Tanenbaum : Computer Networks, PHI (5E)
3. Leon Garcia & Widjaja: Communication Networks, TMH
4. William Stallings: Data & Computer Communication, Pearson Education.

3MCA 5 COMPUTER ORIENTED OPTIMIZATION TECHNIQUES

- Unit I: Introduction, Classification of problems, OR mathematical modeling, Dynamic programming, Investment problem, Equipment replacement, stage coach.
- Unit II: Linear Programming: Introduction, concept of linear programming model, development of LP model, simplex method, Big M method, Duality theory, dual simplex method, Two phase method.
- Unit III: Transportation & Assignment problem: Introduction to transportation problem, mathematical model, types of transportation problem, Optimization techniques for transportation problem, methods to find basic solution, Northwest Corner cell method, Least cost cell method, Vogel Approximation method, optimizing the basic feasible solution using U-V method. Assignment Problem: Introduction, zero-one programming model for Assignment problems, type of assignment problems.
- Unit IV: Introduction to sequencing problem, Two machine, N job three machine sequencing problem, Introduction to Integer Programming, cutting plan Algorithm, branch & bound techniques, zero-one Implicit enumeration algorithm.
- Unit V: Probability OR Model: Basic probability statistical concepts, Introduction to decision theory-minimax decision procedure, Bayes decision procedure with & without data, Regret function versus loss function
- Unit VI: Introduction to Game Theory: minimax, maximum, pure strategies, mixed strategies & expected payoff, solution of 2x4 games, mx2 games, Brown's Algorithm. Introduction to PERT Network, ET, TE, TL, SE, critical path, probability of completing events on schedule.

TEXT BOOKS :

1. B.E Gillett, Introduction to Operation Research TMH Edition
2. R.Panneerselvam "Operation Research" PHI.

References :

1. J.K. Sharma "Operation Research" (2/e) Macmillan.
2. S.S. Rao Optimization Theory & Application Wiley
- 3 Tata Hamdy, "Operations Research- An Introduction" (5/e), PHI.
4. Taha H. A. "Operation Research" Macmillan.

3MCA 6 F.S.D.P. - Lab

Laboratory : Programing project as given in the textbook should be implemented for each unit, and a project report (journal) should be submitted. Programming project should span over Chapters 1,2,4,6,7,8,9,10 and 12. This lab should be preferably based on Unix/Linux system.

3MCA7 JAVA PROGRAMMING LAB**LIST OF PROGRAMS**

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

S. No Name of Program

- | | | |
|----|---|------------------------------|
| 1 | Write a Java application to print a given format | * * * *
* * *
* *
* |
| 2 | Design an Applet to Draw a String inside a Pentagon with specified font and color | |
| 3 | Write an Java application for Loan Calculator | |
| 4 | Write an Applet that accepts the user name via Text Field object. When user presses the Enter Key the Applet displays a "Welcome <user name>" with <user name> replaced with actual name entered by user. | |
| 5 | Write an Applet that displays a BMI of a person given his or her weight in Kilogram and height in Meters . | |
| 6 | Write an Application program in Java using Switch statement to print A-Z, a-z, 0-9 by inputting ASCII value of first character | |
| 7 | Write an application in Java which reads a string from user as a command line argument and checks the string for vowels, and when the vowel encounters it append the word "egg" before each vowel | |
| 8. | Write an application in Java to design "Simple Calculator" | |
| 9 | Write an application in Java which creates an AddressBook class which manages collection of Person object and allows programmer to add, delete, search a Person object in the Address Book | |
| 10 | Write an application in Java which reads and writes User defined Byte Array from and to a file using Low Level File I/O. | |
| 11 | Write an application in Java which creates a File menu on Frame with menuItem "DialogBox".
When user clicks on menu Item one Dialog Box will appear on the Frame with one TextField and two Buttons "OK" and "CANCEL". | |

After entering the data in the TextField and clicking the OK Button Dialog Box closes and data will appear on a Frame Window and when presses CANCEL Button Dialog Box closes and control comes back on Frame Window

- 12 Write an application in Java which return current x,y coordinates when any mouse button is Pressed and draws freehand drawing when mouse is Dragged.

3MCA 8 C.O.O. T-Lab Based on 3MCA5

3MCA 9 COMPUTERLAB-III

This laboratory is based on Operating systems. The laboratory may be based either on Windows or Linux.

Minimum Eight (08) of the following laboratory assignments should be completed and submitted in the form of journal. The external examination shall be based on the programming assignment of any of these modules with via-voce.

- i. Managing multiple processes/tasks.
- ii. Writing Multithreaded Software.
- iii. Manipulating Kernel Objects.
- iv. Thread Synchronization.
- v. Interprocess Communication.
- vi. Memory Management.
- vii. File Systems & Directories
- viii. File Accessing
- ix. Network Programming
- x. I/O Programming & Device Drivers.

Text-books:

- i. Gary Nutt: "Operating System Projects Using Windows-NT" (Pearson Education)
- ii. D.P.Bovet & M. Cesati "Understanding the LINUX Kernel" (3/e) O'Reilly, Shroff Publishers.

SECOND YEAR

SEMESTER : SECOND

4MCA 1

DATABASE MANAGEMENT SYSTEMS

- Unit-I: Database System Applications, Database Systems versus File Systems, View of Data, Data Models, Database Languages, Database Users and Administrators, Transaction Management, Database System Structure, Application architectures, History of Database Systems. Entity-Relationship Model, Basic Concepts, Constraints, Keys, Design Issues, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R Features, Design of an E-R Database Schema, Reduction of an E-R Schema to Tables.
- Unit-II: Relational Model: Structure of Relational Databases, The Relational Algebra, Extended Relational-Algebra Operations, Modification of the Database, Views, The Tuple Relational Calculus, The Domain Relational Calculus, SQL: Basic Structure, Set Operations, Aggregate Functions, Null Values, Nested Subqueries, Views.
- Unit-III: Integrity and Security, Domain Constraints, Referential Integrity, Assertions, Triggers, Security and Authorization, Authorization in SQL, Encryption and Authentication, Relational-Database Design:, First Normal Form, Pitfalls in Relational-Database, Design, Functional Dependencies, Decomposition, BCNF, Third, Fourth and more Normal Forms, Overall Database Design Process.
- Unit-IV: Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions, Query Optimization: Overview, Estimating Statistics of Expression Results, Transformation of Relational Expressions, Choice of Evaluation Plans, Materialized Views.
- Unit-V: TRANSACTIONMANAGEMENT: Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Execution, Serializability, Recoverability, Implementation of Isolation, Transaction Definition in SQL, Testing for Serializability.
- Unit-VI: Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols, Validation-Based Protocols, Multiple Granularities, Multiversion Schemes, Deadlock Handling, Insert and Delete Operations Weak Levels of Consistency, Concurrency in Index Structures. Recovery System, issues & solutions.

TEXT BOOK:

Korth, Sudarshan : Database System Concepts , McGraw Hill, 4th Edition

REFERENCES:

1. Raghu Ramkrishnan :Database System (TMH)
2. C.J.Date : Database System, 7th ed.,(Pearson Education)
3. Connolly & Begg, : Database System, Low Price Ed. (Pearson Education)
4. Navathe & Elmars, Fundamentals of Database Systems. 4/e (Pearson Education).

4MCA 2**CLIENT SERVER COMPUTING**

- UNIT-I Networking in Java: Basics, Socket Overview, Client/Server concepts, Proxy servers, Internet addressing, Java Networking classes & interfaces, InetAddress, TCP/IP Client sockets, URLConnection, TCP/IP Server sockets. Creating TCP client/server.
- UNIT-II Java Database Connectivity, JDBC Concepts, JDBC API, DriverManager, Connection, Statement and ResultSet classes with relevant methods. Prepared & callable statements, Handling queries, inserts, deletes and updates to database. Displaying the query results.
- UNIT III Introduction to XML; Writing XML, Well-formed XML documents, creating a DTD, Elements, Attributes & Entities definitions. Validation of documents, XML schema. Defining simple & complex types. Namespaces, schemas and validation. DOM & SAX programming models, Cascading Style Sheets (CSS) & XML.
- UNIT IV Servlets in Java; Servlet structure & lifecycle. Servlet API basics, Various classes & interfaces. Servlet requirements, writing. Running and debugging of Servlets, Concepts of Cookies, Servlets & cookies. State and session management with Servlet API. Server side includes and request forwarding. Servlet chaining. Jdbc Servlets.
- UNIT V Remote Method Invocation (RMI): Object serialization in Java, Concept of remote object, Architecture of RMI application, Java RMI package, classes & Interfaces, Client/Server application using RMI, RMI Servlets, RMI-JDBC Servlets.
- UNIT VI Introduction to JSP; Simple JSP concepts, Request-time expressions. Advanced JSPs: Scripts. conditionals, loops, Try/Catch. Concept of Beans, Properties, Bean instances &

serialization; Bean Scopes, Writing Beans, Introspection, Beans & Scriptlets..

Books:

1. Dustin R Callaway: Inside Servlets Pearson Education (LPE)
2. XML Related Technologies and Programming in Java by IBM EEE (PHI).
3. Larne Pekowasky: Java Server Pages, Pearson Education (LPE)
4. Dietel & Dietel: WWW: How To Program, Pearson Education (LPE)
5. Dietel, Nieto, Lin, Sadhu : XML: How to Program, Pearson Education.
6. Horstmann & Cornell "Core Java 2" Vol-1 & Vol. II., Sun Microsystems.

4MCA 3**MULTIMEDIA TECHNOLOGIES**

- UNIT I. Multimedia Authoring and Data Representations: Introduction. Components of Multimedia. Hypermedia and Multimedia. Overview of Multimedia Software Tools, Multimedia Authoring, VRM. Graphics and Image Data Representations: 1- Bit Images, 8-Bit Gray-Level Images, 24-Bit Color Images, 8-Bit Color Images, Color Lookup Tables, Popular Image File Formats.
- UNIT II. Color in Image and Video Color Science, Color Models in Images, Color Models in Video. Fundamental Concepts in Video: Types of Video Signals, Component Video, Composite Video, S-Video, Analog Video, NTSC Video, PAL Video, SECAM Video, Digital Video.
- UNIT III. Basics of Digital Audio: Digitization of Sound, Digitization, Nyquist Theorem, Signal-to-Noise Ratio (SNR), Signal-to-Quantization-Noise Ratio (SQNR), MIDI: Musical Instrument Digital Interface. Hardware Aspects of MIDI, Structure of MIDI Messages, General MIDI, MIDI-to-WAV Conversion.
- UNIT IV. Multimedia Data Compression: Lossless Compression Algorithms: Basics of Information Theory, Run-Length Coding, Variable-Length Coding, Dictionary-Based Coding, Arithmetic Coding, Lossy Compression Algorithms: Introduction, Distortion Measures, Quantization, Uniform Scalar Quantization, No uniform Scalar Quantization, Image Compression Standard: The JPEG Standard.
- UNIT V. Basic Video Compression Techniques: Introduction, Video Compression Based on Motion Compensation, Search for

Motion Vectors, H.261 Encoder and Decoder, MPEG-1, Motion Compression in MPEG-1, MPEG-2, Supporting Interlaced Video, MPEG-2 Scalabilities, Other Major Differences from MPEG-1.

UNIT VI. Basic Audio Compression Techniques: ADPCM in Speech Coding, Vocoders, Phase Insensitivity, Channel Vocoder, Format Vocoder, Linear Predictive Coding. Audio Compression: Psychoacoustics, Equal-Loudness Relations, Frequency Masking, Temporal Masking, MPEG Audio, MPEG Layers, MPEG Audio Strategy, MPEG Audio Compression Algorithm.

Text Book:

Ze-Nian, Li, Mark S. Drew “Fundamentals of Multimedia” (Pearson Education)

References:

1. Rajan Parekh “Principles of Multimedia “ (Tata McGraw-Hill)
2. S.J. Gobbs & D.C. Tsichritzis “Multimedia Programming”. Addison Wesley 1995
3. P.W. Agnew & A.S. Kellerman “Distributed Multimedia”. , Addison Wesley 1996
4. F. Fluckiger,” Understanding Networked Multimedia”. Prentice-Hall 1995

4MCA 4

ELECTRONIC COMMERCE

UNIT-I History of e-commerce, Advantages & disadvantages of e-commerce, Indian business context, IT Act 2000, E-business models: based on the relationship of transaction Parties & Transaction Types. Examples of various e-business models in practice.

UNIT-II Enabling technologies of the WWW, Internet client/server applications, Networks & Internet, Software agents, ISPs, E-Marketing: Identifying Web Presence Goals, Browsing Behavior Model, Online marketing, E-advertising, E-branding, Marketing strategies.

UNIT-III E-security: security on the Internet, E-business risk management issues,. E-Payment systems: digital payment requirements, digital-token-based e-payment systems,classification of new payment systems,properties of E-cash, Cheque paymentsystem, risk & e-payment system, Designing of e-payment system, digital signature.

UNIT-IV E-customer relationship management, E-CRM solutions, E-CRM toolkit, Typical business touchpoints, CRM & workflow automation. E-Supply chain management: supply chain, E-logistics, examples of smart chains, ways to reduce inventory, E-SCM advantage & benefits, E-Supply chain components, architecture and trends in E-SCM.

UNIT-V E-Strategy: Information & Strategy, Virtual value chain, seven dimensions of e-commerce strategy, Value chain & E-strategy, Planning the e-commerce project, E-commerce strategy & knowledge management. E-business strategies,data warehousing and data mining.

UNIT-VI Mobile commerce: Growth & success, wireless applications. Technologies for mobile commerce, origin of WAP, WAP programming model, Wireless technologies, Different generations in wireless technologies, security issues to cellular technologies, M-Commerce in India.

Text Book:

P.T .Joseph, S.J. “E-Commerce: An Indian Perspective” (2/e) (PHI)

Reference Books

1. Trepper C. “E-commerce Strategies” Prentice-Hall.
2. Thakkar M. “E-commerce Applications using Oracle8 & Java” Prentice-Hall.
3. Bill Brogden & Chris Minnick “Java Developers’ Guide to E- Commerce with XML & JSP” (BPB).
4. D. Minoli & E. Minoli: Web Commerce Technology Hand Book (TMH).

4MCA 5

**ELECTIVE -I
(1) COMPUTER GRAPHICS**

Unit I: An overview of Computer Graphics and Graphics System : Video display devices, Raster-Scan systems, Random-Scan systems, Graphics monitors and workstations, input devices, hard copy devices, Graphics software..

Unit II : Output primitives : Point and Lines, Line drawing algorithms, loading the frame buffer, line function, circle and ellipse generating algorithms, curves, parallel curves algorithms, Pixel addressing, filled-area primitives , functions, Cell array, character generation.

Unit III: Attributes of output primitives : Line and curve attributes, color and grayscale levels, area fill attributes. Character attributes, bundled attributes, antialiasing.

- Unit IV: 2-D geometric transformations : basic transformations, matrix representations, composite transformations, other transformations, transformations between coordinate systems, affine transformations, transformation functions, Raster methods for transformations. Two-Dimensional viewing : viewing coordinates, Window-to-viewport coordinate transformation, viewing functions, clipping : point, line, polygon, curve, text, exterior.
- Unit V : Structures and hierarchical modeling : concepts, editing structures, basic modeling concepts, hierarchical modeling, GUI and interactive input methods : the user dialogue, input of graphical data, functions, initial values for input device parameters, interactive picture - construction techniques, virtual reality environments.
- Unit VI: Three dimensional concepts : display methods, graphics, Bezier curves and surfaces, B-spline curves and surfaces, Beta-splines, three dimensional geometric and modeling transformations : translation, rotation, scaling, three dimensional viewing : viewing pipeline, viewing coordinates, projections.

TEXT BOOK :

D. Hearn, M.P.Baker : Computer Graphics, II edition (Pearson Education)

REFERENCES:

- 1) F.S.Hill : Computer Graphics Using Open GL, II edition (Pearson Education)
- 2) W.M.Newman & R.F.Sproul : Principles of Interactive Computer Graphics, 2/e, (McGraw Hill)
- 3) F.S.Hill : Computer Graphics (Macmillan)
- 4) Harington : Computer Graphics (McGraw Hill)

4MCA 5**ELECTIVE-I****(2) MODELING & SIMULATION**

- UNIT – I System Models and System studies: Basic concepts of systems and system modeling static and dynamic/physical and mathematical models-principles used in modeling-corporate models- analysis, design and postulation of system.
- UNIT – II Basic Concepts and continuous system : Techniques used-distributed log models and cobweb models continuous system Model- Analytical equations and methods of

- obtaining solutions –analog and hybrid computers and simulations CSSLS examples of different continuous system
- UNIT – III System dynamics, probability concepts and basic principles of discrete simulation Growth and decay models system dynamics diagrams examples-stochastic Process-probability functions and their evaluation-random number generation–rejection method-comparison of Monte-Carlo method and stochastic simulation-examples.
- UNIT – IV Simulation of Queuing System and PERT Network
Simulation of Queuing system: Rudiments of queuing theory, simulation of a single server queue, simulation of a two server queue, simulation of more general queues. Simulation of a PERT Network: Network model of a project, Analysis of an activity network, critical path
- UNIT – V Simulation of Inventory Control & Forecasting Design and Evaluation of Simulation Experiments Inventory Control and Forecasting: Elements of inventory theory, more Complex inventory models, simulation example=1, Generation of Poisson and Erlanger variates, Simulation example- 2, Forecasting and regression Analysis. Design and Evaluation of simulation Experiments: Length of Simulation runs, variance reduction techniques, Experimental layout, Validation, summary and conclusion.
- UNIT – VI Simulation of Languages and Introduction to GPSS
Different special purpose languages used for continuous and discrete systems and comparison –factors affecting the selection of discrete system simulation languages-comparison of GPSS and SIMSCRIPT. A detailed study of GPSS with examples.

TEXT BOOKS:

1. Geoffrey Gordon “System Simulation”, II Edition, PHI Pvt.Ltd., New Delhi- 1987.
2. Narsingh Deo, “System Simulation with Digital Computers” PHI Pvt.Ltd., New Delhi.

REFERENCES:

1. Shannon R.E., “System Simulation: The Art of Science” Prentice Hall, Englewood Cliffs, NY, 1975.
2. Hugh j. Watson, John H. Blackstone, Jr., “Computer Simulation” 2nd Edition, John Wiley & Sons.
3. James A. Payne “Introduction to Simulation: Programming Techniques and Methods of Analysis” McGraw Hill.

4MCA 6 DATABASE MANAGEMENT SYSTEMS LABORATORY

The sample list of programs based on ORACLE or MY SQL is given below. Aim of the list is to inform about minimum expected outcomes.

1. Consider the employee database, where the primary keys are underlined & Write the Queries using following clauses & also retrieve the data from the given database.
Employee (employee-name,street,city)
Works (employee-name,company-name,salary)
Company (company-name,city)
Manages(employee-name,manager-name)
I) Order By II) Between III) Group By IV) Having
2. Consider the above database & perform the different Join Operations which are as follows.
I) Inner Join II) Left Outer Join III) Right Outer Join IV) Full Outer Join
3. Consider the above database & Perform the different Set Operations Which are as follows.
I) Union II) Intersect III) Except/Minus
4. Consider the above database & perform the all Aggregate Functions.
5. Write an assertion for the bank database to ensure that the assets value for the 'perryridge' branch is equal to the sum of all amounts lent by the 'perryridge' branch.
Customer(customer-name, customer-street, customer-city)
Branch(branch-name, branch-city, asstes)
Loan(loan-number,branch-name,amount)
Borrower(customer-name,loan-number)
Depositor(customer-name, account-number)
Account(account-number,branch-name,balance)
6. Write an SQL trigger to carry out the following action: On delete of an account, for each owner of the account, check if the owner has any remaining accounts, and if she does not, delete her from the depositor relation.
7. Consider the above Bank database & write the SQL queries for the following views:
i) A view containing the account numbers the customer names for all accounts at the deer park branch. ii) A view containing the names and addresses of all customers who have an account with the bank, but do not have a loan.
8. Mini Project Using Oracle 9i & VB6 / VB.Net.

4MCA 7 CLIENT SERVER COMPUTING LAB**LIST OF PROGRAMS**

The sample list of program is given below. This list can be used as guide line for problem statements but the scope of the laboratory should not be limited to the same. Aim of the list is to inform about minimum expected outcomes.

1. Write programs to study concept of client-Server system, working of Client, working of Server and kinds of Client- Server using Java Sockets.
2. Write programs to study concept of JDBC, connect to database, insert a row into a table through JDBC, query the table(s), and display the result of query through JDBC.
3. a) Introduction to Servlet that describe the Servlet Life cycle with various Http methods, Advantages of Servlet user CGI.
b) Write a simple Servlet oriented program to print "Hello World" on a client machine. Repeat this with RMI-servlet.
4. Write a program to create cookies that accepts Personal information in a Form from the user and whenever the user clicks "Submit" button cookie will be sent and when the user retrieves cookie from his site the values sent in the cookie should be display on the HTML page
5. (a) Write a program to design and implement customer Registration system which allows you (Customers) to register them with your site. The data is captured by Servlet and stored in the database using JDBC.
(b) Repeat this exercise with RMI.
6. (a) Write a program using Session that selects the programming language and when Submit button is clicked a page with Session information gets displayed along with the information for selecting another language and other to get recommended books which displays the requested page when clicked.
(b) Repeat this exercise with RMI.
7. Write programs to create a DTD for Library System, DTD for e-commerce application.
8. Write a program to create a Bean that will create a Rectangle with color property in it and set its various properties like Height, width etc.
9. Write a program to implement the program for Quiz using JSP.
10. Implement one mini Project using Servlets, Cookies, JDBC, JSP.

4MCA 8 MULTIMEDIA TECHNOLOGIES LABORATORY:

Minimum Eight experiments/programming assignments must be completed based on the respective syllabus covering each of the units.

4 MCA 9 E Commerce Laboratory: The lab shall be based on the following programming-cum-development assignments:

- i. A catalog in XML. ii. Presenting the catalog online. iii. Filling a shopping cart.
- iv. Billing & Order confirmation. v. Online catalog upkeep.
- vi. Using surveys to know the customers. vii. News on the e-commerce sites.

Text-book for 4MCA 9 labs is:

Bill Brogden & Chris Minnick “Java Developers’ Guide to E-Commerce with XML & JSP” (BPB).

4MCA 10 Seminar

The seminar should be based on the recent trends in computing and the applications. Each student should carry out the literature survey through Internet to identify the current trends in computer applications. The survey should culminate into an application that truly reflects the use of computing in that domain. The seminar report should be prepared based on the technical aspects of the application rather than the description of application.

The candidate shall deliver the seminar for minimum fifteen minutes followed by the question answer session. The marks distribution for the seminar shall be as follows:

Seminar Report			Seminar Presentation			
Contents	Format	Topic Coverage	English Communi- cation	Presentation Style	Question Answer Session	Atten- dance in all the seminar sessions
05	05	05	05	05	15	10

THIRD YEAR

SEMESTER : FIRST

ARTIFICIAL INTELLIGENCE

5MCA1

UNIT I.

Introduction to Artificial Intelligence: Overview of Artificial Intelligence. Knowledge : General concept, Introduction to LISP : Syntax and numerical functions. Basic list manipulation function in LISP. Functions, predicates and conditional Input, output and local variables, iteration and recursion. Property list and arrays.

UNIT II.

Knowledge representation - I: Syntax and semantics for propositional logic. Syntax and semantics for FOPL. Properties of Wffs. Conversion to clausal form. Inference rules. The resolution principle, Nondeductive inference methods. Representation using rules.

UNIT III.

Knowledge representation - II: Truth maintenance system. Default reasoning and closed world assumption. Predicate completion and circumscription, model and temporal logics. Overview of object oriented systems, object classes messages and methods, simulation examples using OOS program.

UNIT IV.

Knowledge organization and manipulation: Preliminary concept, Examples of search problems, Uniformed and blind search. Informed search. Searching AND-OR graphs, structure used in matching. Measures for matching: distance matrices, qualitative measures, similarity measures. Partial matching, Indexing and retrieval technique, Integrating knowledge in memory. Memory organization system.

UNIT V.

Knowledge Acquisition : General concept in knowledge acquisition, Learning by induction. Analogical and explanation based learning : Analogical learning and reasoning, Explanation and learning.

UNIT VI.

Expert system : Expert system architectures : Introduction, Rules based system architecture. Nonproductive system architecture, Dealing with uncertainty. Knowledge acquisition and validation. Knowledge system building tools.

Text Book:

1. Patterson D.W.; “Artificial Intelligence and Expert Systems”, PHI

Reference Books :

1. P.H.Winston, “Artificial Intelligence,” Addison- Wesley Publication Company II Edition, 1984.

2. F.Holtz, "LISP-The language of Artificial Intelligence," TAB Books Inc. Blue Ridge Summit. PA17214, 1985.
3. Peter Jackson, "Introduction to expert systems," Addison-Wesley Publishing Company, 1986.
4. D.W.Rolston, "Principles of Artificial Intelligence and Expert Systems Development," McGraw Hill International Edition, 1988.
5. E.Rich, K.K.Knight, "Artificial Intelligence," Tata McGraw Hill, New Delhi, 1991.

5MCA2 SOFTWARE PROJECT MANAGEMENT

- UNIT I.** Evolving role of Software. Software crises & myths. Software Engineering. Software process & process models : Linear sequential, prototyping, RAD, Evolutionary Product & Process. Project management concepts : People, Product, Process, Project. WSHH principle, critical practice.
- UNIT II.** Measures, Metrics & Indicators. Metrics in process & project domains-software measurement, Metrics for software quality, small organization. Software projects Planning : Scope, resources, estimation, decomposition technique, Tools. Software risks : identification, risk projection, refinement & RMMM plan.
- UNIT III.** Project Scheduling : Concepts. Peoples Efforts. Task set, Task network. Scheduling. EV analysis, Project Plan. Software quality concepts. SQ Assurance, Software reviews, technical reviews, software reliability, ISO 900 L, SQA Plan. SCM process. Version control. SCM standard.
- UNIT IV.** System engineering : Hierarchy, Business Process & Product engineering : Overviews. Requirement engineering, System modeling. Requirement analysis. Analysis principles. Software prototyping. Specification. Design Process. Design Principles & Concepts. Effective modular design. Design model & documentation.
- UNIT V.** Software architecture, Data Design, Architectural styles, Requirement mapping. Transform & Transaction mappings. User-interface design : Golden Rule. UTD, Task analysis & modeling, ID activities, Tools, design evaluation. Component level design : Structure programming, Comparison of design notation.
- UNIT VI.** Software testing fundamentals ; test case design, Whitebox testing. Basis path, control structure-, Blackbox-Testing, & for specialized environments. Strategic approach to S/W testing. Unit testing, integration testing, validation testing, system testing. Debugging. Technical metrics for software.

Textbook :

Pressman Roger. S. : Software Engineering, A Practitioner's Approach TMH.

References :

1. Somerville : Software Engineering (Addison-Wesley) (5/e)
2. Fairly R. : Software Engineering (McGraw Hill)
3. Davis A. : Principles of Software Development (McGraw Hill)
4. Shooman, M.L. : Software Engineering (McGraw-Hill)

5MCA3 SYSTEM ADMINISTRATION AND SECURITY

- UNIT I.** Introduction to network security, passive and active attacks, authentication, integrity, access control, The model of internetwork security, internet standards : the internet society and RFC publications (Request for comments.)
- UNIT II.** Cryptography : Encryption principles and various algorithms, standardization process, key distribution, public key cryptography and message authentication, digital signature.
- UNIT III.** Network security applications : Kerberos, X.509 directory authentication services, e-mail security PGP (Pretty Good Privacy) operational description. MIME (Multipurpose Internet Mail Extensions), S MIME (Security/Multipurpose internet mail extensions) functionality.
- UNIT IV.** IP Security : Overview, IP security architecture, Authentication header, Web Security : Web security requirements, secure socket layer SSL, Transport layer security TLS, Secure electronic transactions TES.
- UNIT V.** Network Management Security : Basic concepts of SNMP, Network management architecture and protocol architectures, proxies, services, SNMPv1 authentication service, access policy and proxy service, SNMPv2 architecture, message processing and user security model, view based access control.
- UNIT VI.** System Security : Intruders, Intrusion technologies, password protection, password selection strategies, Intrusion detection, viruses and related threats : Nature of viruses, types, micro viruses and various antivirus approaches. Firewall : Characteristics, types of fire walls, Firewall configuration, Trusted systems, data access control, the concept of the trusted systems.

Text Book :

Network Security Essentials - William Stallings (Pearson Edu. Asia)

Reference Books :

1. Security for Telecommunication and Network management by Moshe Rozenbit (PHI)
2. Internet Security Protocols - Protecting IP Traffic, by Uyless Black (Pearson Edu. Asia)

5MCA4 MANAGEMENT INFORMATION SYSTEMS

- UNIT-I MIS concepts, definition, Role, Impact of MIS, MIS and computers, MIS and academics, MIS support to Management, Role and importance of management. MIS and process of management MIS in orgn structure and strategic management business.
- UNIT-II Basics of MIS : Decision making, Decision methods, behavioral concepts, organizational decision making, MIS and decision making concepts, Information; concepts and classification, Methods of data and information collection: value of information, organization and information. Human as an information processor. Development of MIS and choice of IT.
- UNIT-III Applications of MIS : Applications in manufacturing sector, applications in service sector, Introduction to service, sector, Creating a destructive services, MIS applications in service industries and role of MIS in source industries. DSS: Concepts and philosophy, deterministic systems and knowledge based expert systems. MIS and role of DSS. MIS in Enterprise Management System.
- UNIT-IV Technology in MIS : Data processing, Transaction processing, Application processing, Information System processing, TQM of IS. DBMS: Object Oriented Technologies, client Server Arch. And MIS.
- UNIT-V MIS and Networks : Network Topology, LAN, Data Communication, ATM Technology, Business Process Reengineering: Introduction BP, Process Model of organization, Value stream model, Delays in BP, Relevance of IT, MIS and BPR.
- UNIT-VI MIS and Datawarehouse : Architecture, Design and Justification of datawarehouse, organization. Management and implementation of data -warehousing, E-Business: Models, WWW, E-payment, security in E-business, MIS and E-business.

Text Book :

W. S. Jawadekar : Management Information System (II Edition), (TMH)

Reference Book :

Kenneth C. Landon & J. P. Landon.: Management Information System, 8th Ed. Pearson Education.

5MCA5**ELECTIVE-II****(1) DATA WAREHOUSING AND DATA MINING**

- UNIT I: Introduction, Data mining, Data mining functions, classification and major issues. Data Preprocessing: Data cleaning, data integration and transformation, data reduction, discretisation & concept hierarchy generation.
- UNIT II: Data mining primitives: Data mining primitives, data mining query language. Concept description: concept description, data generalization, Analytical characterization, mining class comparison.
- UNIT III: Application and trends in data mining : data mining applications, data mining systems and research prototypes, additional themes on data mining, trends in data mining .
- UNIT IV: Data ware house and OLAP Technology for data mining: What is data ware house, multidimensional data model, data ware house architecture, data ware house implementation.
- UNIT V: Data Staging: overview, plan effectively, dimension table staging, fact table loads and ware house operations, data quality and cleansing, miscellaneous issues.
- UNIT VI: Building end user applications : role of end user application, application specification, end user application development, maintaining and growing data ware house : manage the existing data ware house environment, prepare for growth and evaluation.

Text Books :

1. J. Han and M.Kamber: Data Mining Concepts and Techniques, Elsevier Pub. Indian Reprint, 2004.
2. R. Kimball: The Data Ware House Life Cycle Tool Kit, Wiley Press, (John Wiley and Sons ASIA) Pvt. Ltd.

Reference Books :

1. Berson : Data Ware Housing, Data Mining and OLAP, Tata McGraw Hill.
2. Arun K. Pujari : Data Mining Techniques, University Press (Orient Longman)

5MCA5**ELECTIVE-II
(2) BIOINFORMATICS**

- UNIT I: Introduction to Bioinformatics: Branches, Aim, Scope/ Research Areas, Sequence File Formats, Sequence Conversion Tools, Molecular File Formats, Molecular File Formats Conversion.
- UNIT II: Biological databases, Classification Schema of Biological Databases, Biological Database Retrieval Systems, Tools and Databases of NCBI, Database Retrieval Tool, Nucleotide Database, Literature Database, Protein Database, Chemical Database, EMBL Nucleotide Sequence Database, Curation , Sequence Analysis Tools, DNA Data Bank of Japan.
- UNIT III: Protein Information Resource (PIR) , resources, Data retrieval, Databases, Protein 3D Structure and Classification Databases : Introduction , Data Deposition Tools, Molecular Modeling Database (MMDB), Retrieval of Structural Data from MMDB, Conserved Domain Database (CCD), E-MSD, 3D- genomics, Gene3D, Protein Structural Classification Databases, CATH, SCOP.
- UNIT IV: Sequence Alignments, Concepts, Scoring Matrices, PAM, BLOSUM, Alignment of Pairs of Sequences, Alignment Algorithms, Heuristic Methods, Multiple Sequence Alignment (MSA). Gene Prediction Methods, Overview, Computational methods, methods
- UNIT V: Protein Structure and Modeling : Introduction , Levels of Protein Structure, Conformation Parameters of Secondary Structure of a Protein, Secondary structure Types, Secondary Structure Prediction, Software of Secondary Structure Prediction, Limitations, Protein Modeling, Homology or Comparative Modelling, Model refinement, Evaluation of the Model, hands on in Comparative Modeling using Swiss-model, Threading or Fold Recognition.
- UNIT VI: Bioinformatics in Computer-aided Drug Design : Drug Discovery Process , Structural Bioinformatics in Drug Discovery, SAR and QSAR Techniques in Drug Design, Graph Theory, Molecular Docking, Recent Upcoming, Modeling Dynamics and Simulations, Monte Carlo methods, Molecular Dynamics, Energy Minimization, Leading MD Simulation Packages.

Text Books:

1. Zhumur Ghosh, Bibekanand Mallick ; Bioinformatics – Principles and Applications – Oxford Higher Education Pub

Reference Books:

1. Hooman H. Rashidi and Lukas K. Buehler: Applications in Biological Science and Medicine , CAC Press 2000
2. David Mount; Bioinformatics. 2000. CSH Publications
3. Stephen Misener, Stephen A. Krawetz; Bioinformatics- Methods and Protocols-Human Press
4. Harshawardhan P. Bal; Bioinformatics – Principles and Applications, TATA MCGRAW-HILL.

5MCA6 Artificial Intelligence Lab.

At least Twelve experiments must be performed which will include at least one experiment on each Unit. Use of LISP/PROLOG is suggested.

5MCA7 SPM Laboratory ; Based on above syllabus, at least one

software development project involving all phases of SDLC.

The case studies from the textbook and from reference book

3 may be considered as examples.

5MCA8 System Ad and Security Lab.

PRACTICALS : Minimum 8 experiments based on above syllabus.

5MCA9 Mini Project

THIRD YEAR

SEMESTER : SECOND

6 MCA 1 PROJECT & DISSERTATION FULL TIME

Appendix-E Evaluation of Project and Seminar

Project :

Each candidate shall carry out a group project related to software/hardware development. The maximum size of the project batch shall be three candidates and minimum individual candidate.

The major objective of the project is to expose the students to teamwork, system analysis and design in practice. The project shall be selected looking at the market need and it should not be a mere academic formality. Hence, a feasibility study along with the market requirements and then design, develop and test the hardware/software product.

Each candidate shall a project reports containing the following details :

- Introduction
- System Analysis
- System Design
- System Implementation and testing
- Conclusion.

Evaluation of the Project work is based on Internal and External examiners. The final marks will be allotted on the average of both the examiners that will be as follows.

Project evaluation 50 marks for each examiners and project viva 25 marks for each examiners. Minimum passing marks in project work will be 50% which will be average of both the internal and external examiners.

(Seminar will be the part of project report.)

Seminar :

Topic of Seminar is to be selected by every student based on current topics. A student will prepare a report and present it before the class, where there shall be two minimum teachers. And this will be evaluated internally. The distribution of marks will be as follows.

30 Marks for contents of seminar report.

20 Marks for presentation.

M.H.R.D. Exam. -2014
(Semester Pattern)

Prospectus No.20141527

संत गाडगे बाबा अमरावती विद्यापीठ

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वाणिज्य विद्याशाखा
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अभ्यासक्रमिका
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PROSPECTUS

OF
Master of Human Resource Development
Semester -I Exam. Winter -2014
Semester -II Exam. Summer -2015
Semester -III Exam. Winter -2015
Semester -IV Exam. Summer -2016



2014

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Dineshkumar Joshi
Registrar
Sant Gadge Baba
Amravati University
Amravati -444 602

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SANT GADGE BABA AMRAVATI UNIVERSITY AMRAVATI**SPECIAL NOTE FOR INFORMATION OF THE STUDENTS**

- (1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.
- (2) Be it known to all the students desirous to take examinations for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinances Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

Ordinance No. 1	:	Enrolment of Students.
Ordinance No. 2	:	Admission of Students
Ordinance No. 4	:	National cadet corps
Ordinance No. 6	:	Examinations in General (relevant extracts)
Ordinance No. 18/2001	:	An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute NO.18, Ordinance 2001.
Ordinance No. 9	:	Conduct of Examinations (relevant extracts)
Ordinance No. 10	:	Providing for Exemptions and Compartments
Ordinance No. 19	:	Admission of Candidates to Degrees.
Ordinance No. 109	:	Recording of a change of name of a University student in the records of the University.

Ordinance No. 6/2008	:	For improvement of Division/Grade.
Ordinance No.19/2001	:	An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba Amravati University

PATTERN OF QUESTION PAPER ON THE UNIT SYSTEM

The pattern of question paper as per unit system will be broadly based on the following pattern.

- (1) Syllabus has been divided into units equal to the number of question to be answered in the paper. On each unit there will be a question either a long answer type or a short answer type.
- (2) Number of question will be in accordance with the unit prescribed in the syllabi for each paper i.e. there will be one question on each unit.
- (3) For every question long answer type or short answer type there will be an alternative choice from the same unit. However, there will be no internal choice in a question.
- (4) Division of marks between long answer and short answer type question will be in the ratio of 40 and 60.
- (5) Each short answer type question shall contain 4 to 8 short sub question with no internal choice.

DIRECTION**No.17 /2014****Date : 1/7/2014**

Subject : Examinations leading to the Degree of Master of Human Resource Development (मानव संसाधन विकास पारंगत) (Semester Pattern-Two Years Degree Course) Direction 2014

Whereas, Ordinance No. 11 of 2001 in respect of Examinations leading to the Degree of Master of Industrial Relations & Personnel Management (Semester Pattern – Two Years Degree Course) Ordinance, 2001 is in existence in the University.

AND

Whereas, the Academic Council in its meeting held on 28/5/2010 vide Item No. 39 was resolved to change the nomenclature of the M.I.R.P.M. degree as Master of Human Resource Development (M.H.R.D.) as suggested by the U.G.C.

AND

Whereas, the Management Council in its meeting held on 16/8/2010 vide Item No. 364 was approved the change in nomenclature of Post Graduate Degree in M.I.R.P.M. as Master of Human Resource Development (M.H.R.D.) and directed that all relevant changes be made by the respective Authorities / Bodies at the earliest.

AND

Whereas, the Academic Council in its meeting held on 17/2/2014 vide Item No. 22(3) F) has resolved to accept the Scheme of Examinations, syllabi and others provisions of Master of Human Resource Development (M.H.R.D.) course to be implemented from the session 2014-2015.

AND

Whereas, the Academic Council in its meeting held on 17/2/2014 vide Item No. 22(3) F) has resolved to refer the matter to the Ordinance Committee.

AND

Whereas, making respective Ordinance is time consuming process.

AND

Whereas, the Master of Human Resource Development (M.H.R.D.) course is to be implemented from the academic session 2014-2015.

AND

Whereas, the scheme of examinations and syllabi of M.H.R.D. Semester-I & II course are to be made available for the academic session 2014-2015.

Now therefore, I Dr. J.A. Tidke, Vice Chancellor, Sant Gadge Baba Amravati University in exercise of the powers conferred upon me under

sub-section (8) of section 14 of the Maharashtra Universities Act, 1994, do hereby direct as under –

1. This Direction may be called “Examinations leading to the Degree of Master of Human Resource Development (मानव संसाधन विकास पारंगत) (Semester Pattern-Two Years Degree Course) Direction 2014
2. This Direction shall come into force from –
 - (i) The Academic Session 2014-2015 for M.H.R.D. Semester-I & II
 - (ii) The Academic Session 2015-2016 for M.H.R.D. Semester-III & IV
3. I. The Examinations leading to the Master of Human Resource Development course shall be held at such places and on such dates as may be appointed by the Board of Examinations.
 - II. The M.H.R.D. degree course shall be of two years duration i.e. Semester-I,II,III & IV.
 - III. The course shall be conducted in two Semesters in each academic year.
 - IV. Subject to their compliance with the provisions of this Direction and of any other Ordinances (Pertaining to Examinations in General) in force from time to time, the applicant for admission to the Semester-I Examination of the Master of Human Resource Development course shall have-
 - i) Passed the Bachelor’s Degree of this University in any faculty or of any other Statutory University.
 - ii) Prosecuted a regular course of study for not less than one Academic Year in a college or department recognised for this purpose by the University.
 - iii). Eligibility for admission’s to Semester-II,III & IV of M.H.R.D. course shall be as given in the table.

Eligibility Table

Sr. No.	Name of the Exams	The Students should have completed the term satisfactorily	The Students should have passed in the subjects of the Examinations of
1	2	3	4
1	MHRD. Semester-I	MHRD Semester-I	—
2	MHRD. Semester-II	MHRD Semester-II	—
3	MHRD. Semester-III	MHRD Semester-III	2/3 Papers of M.H.R.D. Semester-I & II taken together.
4	MHRD. Semester-IV	MHRD Semester-IV	—

4. Without prejudice to the other provisions of Ordinance No.6 relating to examinations in general, the provisions of Paragraphs 5,8,10,27 and 32 of the said Ordinance shall apply to every candidate.
5. The fees for each semester examinations shall be as prescribed by the University from time to time.
6. An applicant for the examination prosecuting a regular course of study to the Degree of Master of Human Resource Development shall not seek admission to any other academic course in this or any other University.
 - I. The Scope of the Subjects shall be as indicated in the Syllabus.
 - II. Schemes of the Examinations for each Semester shall be as indicated in Appendices A,B,C,D & E appended with this Direction.
 - III. Medium of Instructions and examinations shall be English.
8. In order to pass at the Semester I,II,III & IV Examinations, an Examinee shall obtain not less than 40% Marks in each paper, that is to say, separately in the Written Examination, and in sessional not less than 50% of the prescribed Marks. The Examinee shall have to obtain 50% Marks of the aggregate marks in all the papers taken together as given in appendices A,B,C,D & E.
9. An Examinee who is unsuccessful at the examination shall be eligible for admission to the Examination on payment of a fresh Fee prescribed for the Examination together with an Ex-Student Fee.
10. An Examinee who has failed at the sessional Examination, Internal Assessment or Project Viva-Voce only shall be required to register himself afresh for the same in the Department/college in the subject or subjects in which he so failed on payment of a fresh annual sessional Fee. The Head of the Department/College shall, on being satisfied about the completion of the sessional work/ Internal Assessment or Project of such a candidate, send the fresh sessional Marks/Grades to the University.
11.
 - i) There shall be no classification of successful examinees at the Semester-II Examination.
 - ii) Successful examinees obtaining 60% or more Marks in the aggregate of Semester I,II,III & IV Examinations taken together shall be placed in the First Division, those who have obtaining less than 60% but not less than 55% marks in Higher Second Division, and those obtaining less than 55% marks in the Second Division.
12. Provisions of Ordinance No.18 of 2001, relating to an Ordinance to provide grace marks for passing in a head of passing and improvement of division (Higher Class) and getting distinction in the subject and

- condonation of deficiency of marks in subject in all the faculties prescribed by the Statute No. 18, and of Ordinance No. 10 relating to Exemptions and Compartments shall apply to the examinations under this Direction.
13. The provision of Ordinance No. 6 of 2008 relating to improvement of division shall apply to the examination of this course.
 14. Notwithstanding anything to the contrary in this Direction, no person shall be admitted to this Examination, if he has already passed the same Examination or an equivalent Examination of any other statutory University.
 15. Examinees successful at the Master of Human Resource Development (M.H.R.D.) Semester I, II, III & IV Examinations shall, on payment of the prescribed fee, receive a Degree in the prescribed form signed by the Vice-Chancellor.

Amravati.
Date : 20/5/2014

Sd/-
(J.A. Tidke)
Vice-Chancellor

Appendix - A

Master of Human Resource Development (MHRD)

Semester - I - Examination

Sr. No.	Paper No.	Subject	Duration of Exam Hrs.	Periods per week	Theory / Sessional	Maximum Marks	Minimum Marks	Maximum Aggregate Marks
1	101	Principles and Practices of Management	3	3	Theory / Sessional	80 20	32 10	300
2	102	Organizational Behaviour	3	3	Theory / Sessional	80 20	32 10	
3	103	Managerial Skills Development	3	3	Theory / Sessional	80 20	32 10	
4	104	Managerial Economics	3	3	Theory / Sessional	80 20	32 10	
5	105	Business Ethics	3	3	Theory / Sessional	80 20	32 10	
6	106	Quantitative Techniques	3	3	Theory / Sessional	80 20	32 10	
7	107	Industrial Visit Short Tour	-	2	Internal Assessment			

Scheme for Internal Assessment

(For 20 Marks)

- Two Home Assignment (5 marks each) ... 10 Marks
- Two Classroom Test (5 marks each) ... 10 Marks

Appendix - B

Master of Human Resource Development (MHRD)

Semester - II - Examination

Sr. No.	Paper No.	Subject	Duration of Exam Hrs.	Periods per week	Theory / Sessional	Maximum Marks	Minimum Marks	Maximum Aggregate Marks
1	201	Management of Training and Development	3	3	Theory / Sessional	80 20	32 10	300
2	202	Industrial Psychology and Sociology	3	3	Theory / Sessional	80 20	32 10	
3	203	Strategic Human Resource Management	3	3	Theory / Sessional	80 20	32 10	
4	204	Computer Applications in Human Resource Management-I	3	3	Theory / Sessional	80 20	32 10	
5	205	Business Legislations	3	3	Theory / Sessional	80 20	32 10	
6	206	Research Methodology	3	3	Theory / Sessional	80 20	32 10	
7	207	Industrial Visit Long Tour	-	2	Internal Assessment			

Scheme for Internal Assessment

(For 20 Marks)

- Two Home Assignment (5 marks each) ... 10 Marks
- Two Classroom Test (5 marks each) ... 10 Marks

Appendix - C

Master of Human Resource Development (MHRD)

Semester - III - Examination

Sr. No.	Paper No.	Subject	Duration of Exam Hrs.	Periods per week	Theory / Sessional	Maximum Marks	Minimum Marks	Maximum Aggregate Marks
1	301	Functional Areas in Management - I	3	3	Theory / Sessional	80 20	32 10	300
2	302	Labour Legislations	3	3	Theory / Sessional	80 20	32 10	
3	303	International Human Resource Management	3	3	Theory / Sessional	80 20	32 10	
4	304	Knowledge Management	3	3	Theory / Sessional	80 20	32 10	
5	305	Management of Industrial Relations	3	3	Theory / Sessional	80 20	32 10	
6	306	Computer Applications in Human Resource Management - II	3	3	Theory / Sessional	80 20	32 10	
7	307	Project	-	2	Graduation Paper			

Scheme for Internal Assessment

(For 20 Marks)

- Two Home Assignment (5 marks each) ... 10 Marks
- Two Classroom Test (5 marks each) ... 10 Marks

Appendix - D

Master of Human Resource Development (MHRD)

Semester - IV - Examination

Sr. No.	Paper No.	Subject	Duration of Exam Hrs.	Periods per week	Theory / Sessional	Maximum Marks	Minimum Marks	Maximum Aggregate Marks
1	401	Dynamics of Human Resource Development	3	3	Theory / Sessional	80 20	32 10	300
2	402	Wage and Salary Administration	3	3	Theory / Sessional	80 20	32 10	
3	403	Employees Empowerment	3	3	Theory / Sessional	80 20	32 10	
4	404	Functional Areas in Management - II	3	3	Theory / Sessional	80 20	32 10	
5	405	Corporate Planning & Strategy	3	3	Theory / Sessional	80 20	32 10	
6	406	Human Resource Accounting and Audit	3	3	Theory / Sessional	80 20	32 10	
7	407	Project	-	2	Graduation Paper			

Scheme for Internal Assessment

(For 20 Marks)

- Two Home Assignment (5 marks each) ... 10 Marks
- Two Classroom Test (5 marks each) ... 10 Marks

Appendix – E

Master of Human Resource Development (MHRD)

Semester Pattern

(1) Scheme of Assessment of MHRD-107 Industrial Visit.

Visit	-	50 Marks
Report	-	30 Marks
Seminars	-	20 Marks

There shall be two short visits within 100 Km. Area. The Report & Seminar will be based on actual visits.

(2) Scheme of Assessment of MHRD-207 Industrial Visit.

Visit	-	50 Marks
Report	-	30 Marks
Seminars	-	20 Marks

There shall be one long visit beyond 100 Km. The Report & Seminar will be based on actual visit.

The marks obtained in papers MHRD-107, 207, 307 & 407 shall be counted in Grades as follows.

Marks	Grade
80% and above	O
70% and above but below 80%	A
60% and above but below 70%	B
50% and above but below 60%	C
40% and above but below 50%	D

To pass in Internal Assessment/Graduation paper candidate must obtain minimum 'C' grade.

Syllabi prescribed for

MASTER OF HUMAN RESOURCE DEVELOPMENT (M.H.R.D)

(Effective from the Session 2014-2015 for Sem.I&II)

Semester-I

MHRD.101-PRINCIPLES AND PRACTICES OF
MANAGEMENT

- Unit-I** : **BASIC CONCEPTS** : Basic Concepts of Management, Role and Importance of Management in Modern Society, Management as a Social System, The Operational Concept of Management, Other Approaches to Management.
- Unit-II** : **MANAGEMENT DEVELOPMENT** : The Development of Management, Management in Antiquity, Industrial Revolution and its impact, Emergence of Scientific Management Movement, Contribution of Taylor, Fayol and Bernard to Management Science, Emergence of Modern Management Thought and Contribution of Behavioural Science.
- Unit-III** : **THE PROCESS OF MANAGEMENT** : The Process of Management Planning, Organizing Staffing, Directing, Controlling, Nature, Purpose and Principles of Management, Decision-making, Managerial Development, Leading, Control Techniques.
- Unit-IV** : **MANAGEMENT CONCEPTS** : Important Concepts in Management, Co-Operation and co-Ordination, Managerial Authority and Responsibility, Delegation and Decentralization, Line and Staff concepts, Committees, Policies and Strategies, Performance Appraisal.
- Unit-V** : **PROFESSIONAL MANAGEMENT** : Management as Profession Practice and Need, Social Responsibility of Business, Management by Objective, Top Management Functions.

Reference Books :

1. Tripathy, Reddy. Principles of Management.
2. Mrityanjay Banerjee Business Administration.
3. Koontz & O'Donnel Management A contingency and Systems analysis.
4. James A.F. Stoner Management.
5. Monday, Sharplin, Holmes & Filippo Management Concept & practices.

MHRD.102-ORGANIZATIONAL BEHAVIOUR

- Unit-I** : Understanding Organisation, Significance of Scientific Study of Human Behaviour, Hawthorn Studies its importance & implication, Approaches-Cognitive, Behaviouristic & Social learning framework Human Need, theory, Maslow & Herzberg Motivation Process.
- Unit-II** : Perspectives of Organisation, Perception & Impression, Personality & Attitudes, Learning Values.
- Unit-III** : Group Dynamics, Group formation, Group interaction, Conflict Management, Team Management “Morale”
- Unit-IV** : Leadership- Managerial styles Managerial effectiveness, Indian Manager & His effectiveness, Delegation, Decision Making.
- Unit-V** : Organisation Change & Development, Process of Organisation Change, Approaches to planned change. Lewis three step model, O.D. Values & Interventions.

Reference Books :

1. Keith Devis Human Behaviour at Work.
2. Kundson & Fleeror Management of Organizational Behaviour.
3. Korman A.K. Organizational Behaviour.
4. Prasad Organisation Theory & Behaviour.
5. Uma Sekharan Organizational Behaviour.
6. K. Aswathappa, Organizational Behaviour. Himalaya Publication, Delhi.

MHRD.103-MANAGERIAL SKILLS DEVELOPMENT

- Objective:** The course is aimed at equipping the students with the necessary techniques & skills of communication and presentation. It enables in developing confidence among students to perform better as professionals.
- Unit-I** : Managerial Skills- Nature & Concepts, objectives, significance, Employability Skills, Soft Skills and Technical Skills.
- Unit-II** : Importance & Nature of communication, Verbal and Non Verbal, Talking and Speaking, Principles of effective

communication, Process of communication, Barriers of Communication, Types of Communication.

- Unit-III** : Do's and Don'ts of Business Writing, Business correspondence, Report Writing, e-communication, Resume Writing, C.V. Writing.
- Unit-IV** : Listening Skills, Body Language and Public Speaking, Negotiation Skills.
- Unit-V** : Interview Techniques, Group Discussions, Presentation skills, Meetings, Case Analysis, Brain Storming, Paper Writing and Presentation.

Reference Books :

1. Bowman, Joel P and Branchaw, Bemadine : Business Communication from Process to Product. Dryden Press, Chicago
2. Hatch Richard : Communicating in Business, Science Research Associates, Chicago
3. Murphy, Herta A and Peck, Charries E : Effective Business Communications. 2nd ed., Tata McGraw Hill, New Delhi.
4. Pearce. C. Glenn etc. : Business Communications, Principles and Applications. 2nd ed. John Wiley, New York.

MHRD.104-MANAGERIAL ECONOMICS

- Unit-I** : Introduction to Managerial Economics, Nature, Scope, Definition of Managerial Economics, Relationship of Managerial Economics with applied Economics and Sciences, Significance of Managerial Economics, Fundamentals Concepts-Demand, Supply, Price, Competition Monopoly, Production, Cost, Distribution, Consumption, Profit-Total, Average & Marginal.
- Unit-II** : Demand Define, characteristics of Demand, schedule, Law of Demand, Exceptions, Elasticity of Demand Forecasting the Demand.
- Unit-III** : Price Theory: Price Determination Under Perfect competition, Pricing under monopoly, Pricing under monopolistic Competition & Oligopoly.
- Unit-IV** : Cost Analysis & B.E.P, Fixed cost & Variable cost, Direct cost Indirect cost, Past & Future cost, Short run & Long run

cost, Book & Cash cost, Controllable & Sunk cost Urgent & Postponable cost, Explicit & Implicit cost, Private & Social cost, Break even Analysis.

Unit-V : Economic Fluctuations and Pricing Policies- Trade cycle, Meaning, features, implications. National Income, Concepts & Importance, Industrial Policies Since 1991.

Reference Books:

1. Joel Dean- Managerial Economics.
2. William Hynes & other - Managerial Economics.
3. P.L.Mehta- Managerial Economics.
4. V.M.Sultanchan Managerial Economics.

MHRD.105-BUSINESS ETHICS

Objective: To acquaint the students with ethical values and practices with emphasis on Indian Values and Culture

Unit -I : Indian Management – Principles, Models & Theory of Karma, Theory and Practices of Holistic Management and its relevance

Unit -II : Ethics – Meaning, Objectives and Sources of Ethics, Types of Business Ethics, Factors influencing Business Ethics, Ethics V/s Morals and Values

Unit -III: Managing Ethics – Theories of Ethics, Ethical Dilemma, Codes of Ethics, Normative Ethics in Management, Need and Values of Ethics in Global Change Behavioral Aspects of Ethics and Values

Unit -IV: Indian Values in Management – Secular and Spiritual Values, Science and Human Values, Lessons from Ancient Indian Educational System

Unit -V : Stress Management – Stress, Eustress, Distress, Indian Perspective of Stress Management, Reasons for stress at workplace, Coping with a stress

Reference Books :

1. Murthy, C.S.V. : Business Ethics – Text and Cases, Himalaya Publishing House Pvt. Ltd., 2nd Edition.
2. Wills, Joseph N. : Business Ethics – A Stakeholder and Issues Management Approach, South Western Cengage Learning.

3. Chakraborty, S.K. : Foundations of Managerial Work-Contributions from Indian Thought, Himalaya Publishing House Delhi.
4. Kumar, S and N.K. Uberoi : Managing Secularism in the New Millennium Excel Books 2000.
5. Gandhi, M.K. : The story of My Experiment with Truth, Navjivan Publishing House, Ahmedabad.
6. Sharma Suhas : Eastern Door Western Windows, New Age Publications.

MHRD.106-QUANTITATIVE TECHNIQUES

Unit -I : Arithmetic Progression, Geometric Progression, Harmonic Progression. Matrices, Determinants & Matrices.

Unit -II : Central Tendency, Measures of Dispersion, Probability theory and probability Distribution.

Unit -III : Correlation & Regression Analysis, Time Series Analysis.

Unit -IV : Linear Programming : Concept, Model Formulation, Methods ; Graphical Association of Attributes.

Unit - V : Networking, CPM & PERT, Decision Tree.

Reference Books :

1. Srivastava U.K., Shenoy G.V., Sharma S.C. : Quantitative Techniques for Managerial Decisions-New Age International Ltd. New Delhi.
2. Andrew Varsonji, Herbert F.Spirer : Quantitative Analysis for Business, Prentice Hall India Private Limited, New Delhi.
3. Anderson, Sweeney, Williams : Quantitative Methods for Business- West Publishing Company.

MHRD.107-INDUSTRIAL VISIT SHORT TOUR

Semester-II

MHRD.201-MANAGEMENT OF TRAINING & DEVELOPMENT

Unit - I : Overview

Training-Concept, Meaning & definition, Scope, Nature, Objective of Training & Development, Importance & advantages.

Unit -II: Climate of Training

Developing the conducive climate, Training policy, learning process, Designing of Training module, Sensitivity training, Training coverage.

Unit -III: Training needs & function

Training functions, Needs, Assessment, Role of Training Manager, Managerial function, Knowledge & skills, Challenges to Training Manager.

Unit -IV : Training methodologies & Process

Training methods, Techniques & pedagogy, Training process, Employee Competency Development, Evaluation of Training System, Training Scenario.

Unit -V : Training feedback & Development Programme

Training feedback & Evaluation, Administration of management development, Programme, Goal, Concept, Training Budget, Training Audit, Training & Development in India.

Reference Books :

1. A.M.Sarma: Personal & HR Management - Himalaya publishing house, 6th revised edition 2009.
2. Price, n Personnel : Human Resource Management.
3. Major R.F. : Preparing industrial objective 2nd edition.
4. Ewing, David w. : The knowledge of Executive in the Educational Development Service

MHRD.202-INDUSTRIAL PSYCHOLOGY AND SOCIOLOGY

Unit-I: Introduction to Industrial Psychology, Definition & Scope, Major influences on Industrial Psychology, Organization Moral & leadership, Industrial Psychology in India.

Unit-II: Individual at work place: Motivation & Job satisfaction, Stress Management, Organizational culture.

Unit-III: Industrial Sociology :Introduction, Industrial Sociology process, obstacles & influences on socialization. Industrial social system: Definition, Concept, Modern Socio-technical system & changes : Features, Effect on productivity, Industrial climate, Group & group cohesion.

Unit-IV: Social responsibility of Business : Concept, Rationale, Changing trend in Social responsibility of Indian business, Social responsibility of Indian businessmen.

Unit-V: Business Ethics: Meaning, objectives, Principle, Ethics, unethical practices in Industry; code of business ethics; Need & value of ethics in global change; behavioral aspects in ethics.

Reference Books :

1. Miner J.B. : Industrial/ Organizational Psychology, McGraw Hill.
2. Blum & Naylor : Industrial Psychology, CBS Publication
3. Aamodt M.G.: Industrial/ Organizational Psychology an Applied Approach, Belmont, C.A.
4. GisbertPascal : Fundamentals of Industrial Sociology, Tata McGraw Hill, Delhi.
5. Scheider EgnoV :Industrial Sociology 2nd edition, McGraw Hill, Delhi.
6. Sinha G.P. &P.R.N.Sinha : Industrial Relation &Labour Legislations, Oxford & IBH Publishing Co.
7. Ashathappa K. : Human resource Management, Tata McGraw Hill, New Delhi.

MHRD.203-STRATEGIC HUMAN RESOURCE MANAGEMENT

Unit-I: STRATEGIC HUMAN RESOURCE MANAGEMENT : AN OVERVIEW-

Introduction to strategic HRM, People as strategic Assets, The process of strategic Management, Challenges for HRM.

ALIGNING HUMAN RESOURCES WITH STRATEGY- HR'S emerging Role in the formulation and Implementation of strategy, Models Integrating strategy and HR, Economic Indications of HRM, Investment perspective of HR, Factors affecting Investment – Oriented organizations , Human capital Accounting, Sources of employee value , Adding value through rewards and benefits , Adding value through alteration & recruitment .

Unit-II: HR & ORGANISATIONAL STRATEGIES-

HR & corporate Strategy, Human Resource strategy, Framework, External Environment Scan, Internal Capital Assessment, Strategy Formulation. Job Analysis & Job Design, Designing & Redesigning work system, Organizational Structure, enacting strategy for Structure, Emerging Issues in organizational Redesigning.

Unit-III: HUMAN RESOURCE FORECASTING –

Human Resource Forecasting – An Introduction, Strategic Issues in Forecasting Human Resource Supply – Utilization of supply Forecasting Techniques, Techniques for Forecasting the Demand for Human Resources, Strategic Issues in Demand Forecasting. Strategic acquisition of Human Resources and Strategic staffing – Strategic Recruitment, Strategic selection, Strategic approach to Issues in staffing, Importance of technology and staffing.

Unit-IV: STRATEGIC ISSUES IN TRAINING & DEVELOPMENT –

Integrating Training with Performance Management, Integrating Training with compensation, Linking Training to organizational strategy, Need assessment is done at three levels, Shift from Training to learning, Developing a learning organization, Use of Technology in Training.

PERFORMANCE MANAGEMENT AND EVALUATION –

Overview of performance appraisal, Strategic dimension of performance appraisal, From performance appraisal to performance Management, Organizational Appraisal – Balance scorecard, Economic Value Added.

Unit-V: COMPENSATION & STRATEGIC HUMAN RESOURCE MANAGEMENT :

Introduction, Objectives of compensation system, Organizational strategy, Goals and compensation of Employees, Elements, Types. Compensation groups, Strategic Industrial relations, Labour Management-Union relations strategies.

CAREER MANAGEMENT – Corporate career Management. Concept of Downsizing Turnover, Outsourcing knowledge Management and Human Resources.

New Trends : International HRM, Strategic International HRM, Strategic HRM and Multinationals.

Reference Books :

1. Michael Armstrong : Strategic Human Resource Management, Kogan Page India Pvt. Ltd. 4th Edition.

2. Anuradha Sharma, Aradhana Khandekar : “Strategic Human Resource Management” An Indian perspective, Response Books.
3. V.S. Ramaswamy, S. Namakumari : Marketing Management, Planning, implementation and control, McMillan, 3rd Edition.
4. Arunkumar, N. Meenakshi : Marketing Management, Vikas Publishing House, 2nd Edition.

MHRD.204-COMPUTER APPLICATIONS IN H.R.M. – I

Unit-I : Computer in Management : An Introduction, Computer Generation, Basic functional units of Computer, Personal Computer and its uses, Types of Memory, CPU, I/O devices, Hardware, Software and its application.

Unit-II : Managerial Application of Computers, Computer and Management Functions, Computer based Financial System, Computer based Inventory Systems, IT Applications in Human Resource Management, Role of IT In Sales & Marketing, Computer based Accounting Packages, Preparation of Vouchers, Invoice and Salary Statement.

Unit-III : HR and Technology, Link between HR and Technology, Impact of IT on HRM, Introduction to Human Resource Information System (HRIS), Operational HRIS, Tactical HRIS, Strategic HRIS, Packages of HRM.

Unit-IV : History of Operating System. Objectives of Operating System, Types of OS, Components, Operating System Functions, Example of Operating System : Unix, Linux, Windows, MAC, Android and Windows Phone

Unit-V : Data Base Management System : Introduction, Importance, DBMS System Architecture, Structured Query Languages (SQL), Database backup & Recovery, Database Security, Emerging Database Technologies

Reference Books :

1. B. Ram : Computer Fundamentals, PHI.
2. V. Raja Raman : Fundamentals of Computers, TMH
3. G.K. Gupta : Database Management System, Tata Mcgraw-Hill.
4. Ramez Elmasri, Shamkant B. Navathe : Fundamentals of Database System, 5th ED. Pearson Education.
5. P. Mphan : Information Technology & Its application in Business, Himalaya Publishing House, Mumbai.

6. Michael J.Kavanagh, Mohan Thite,RecharD.Johnsone : Human Resource Information Systems, Sage Publications.
7. Rajesh Vishwanathan : Strategic Human Resource Management, Himalaya Publishing House.

MHRD.205- BUSINESS LEGISLATIONS

Course Objective

The objective of this course is to acquire the students with various laws, which are to be observed in performing the day-to-day business. Here the emphasis will be on the different latest provisions of the law and on how these can be used in best interest of the organization.

Unit - I : The Indian Contract Act 1872: Definition, concept of contract, valid contract and its essential elements, Types of contract, Quasi Contract, Discharge of Contract; Breach of contract and its Remedies, Agency, Contract of indemnity and guarantee, Bailment

Unit-II : The Sale of Goods Act 1930: Contract of sale, Agreement to sell, Formation of Contract Conditions and warranties, Hire-Purchase, Passing of property, transfer of property, remedies for breach, Rights of unpaid sellers. Doctrine of Caveat emptor,

Unit-III : The Negotiable Instrument Act 1881: Definition and Characteristics, Nature and Type of Negotiable Instrument, Promissory notes, bills of exchange and cheques, Parties to Negotiable Instrument; Methods of Negotiation of Instruments Endorsement and delivery of a Negotiable instrument, Negotiation by unauthorized parties, Dishonour and Discharge of Negotiable Instrument, Holder in due course

Unit-IV : The Companies Act 1956: Nature and Types of Companies, Formation & Formation Stages of Company, Shareholders and Debenture Holders, Memorandum of Association, Article of Association, Winding-up.

Unit-V : Consumer Protection Act 1986: Definition of Consumer, Rights of consumer, Nature and scope of Remedies available to the consumers, Exploitation of Consumer.

Indian Partnership Act 1932: Definition of Partnership, types of partnership, Formation of Partnership, Registration of partnership, kinds of partners, rights and liabilities of partners, minor's status in a partnership firm, Dissolution of partnership.

Reference Books :

1. AvtarSingh :Mercantile Law, Eastern Book Company.
- 2 Chandra Bose :Business Laws, PHI.
- 3 Bulchandani, :Business Law for Management, Himalaya Publishing House.
4. Kumar : Legal Aspect of Business 1st,edition,Cengage Learning.
5. Taxman's :General and Commercial Laws.
6. M.C. Kuchhal :Business Legislation for Management 2nd edition, Vikas Publishing House.

MHRD.206-RESEARCH METHODOLOGY

Unit -I : Foundation of Research- Meaning Objectives, Motivation, Utility, Concept of theory, Empiricism, Deductive & inductive theory, Characteristics of scientific method .

Understanding language of Research: Concept , Construct, Definition, Variable. Introduction to Research Methodology : Meaning, Concept, Purpose and process of Research.

Unit - II : Importance of Research, Features of a good research design. Exploratory Research Design – Concept, Types and uses. Descriptive Research Design – Concept, Type & uses. Experimental Design : Casual relationships, Concept of Independent & Dependent Variables. Concomitant Variables, extraneous Variable , Problem Identification & Formulation – Research Problem selection & Formulation, Measurement Issues : Hypothesis – qualities of good Hypothesis, Null Hypothesis & Alternative Hypothesis.

Unit -III: (A) Data collection : Data collection, Types of Data Secondary data ; Definition sources , characteristics, Primary Data : Definition , advantage, disadvantage over secondary data, methods, techniques, characteristics, Attitude measurement and scales.

(B) Sampling and Sampling Designs : Concepts of statistical population , Sample, Sampling frame, Sampling Error, Sample size, Non response, characteristics of a good sample. Probability sample–Simple Random sampling, Stratified random, Non probability sample – Judgemental, Convenience, Quota & snowball methods, Determining size of the sample – Practical considerations in sampling & sample size.

Unit-IV : Presentation & Analysis of Data : Data preparation and data processing, Statistical analysis & interpretation of data. Univariate Analysis (Frequency Tables, Bar charts , Pie charts, Percentages) Bivariate Analysis, Cross tabulation and chi-square test Testing of Hypothesis and Association : Logic & importance, Model Building and decision making.

Unit- V : (A) Writing of Research Report : Presentation of report, Formats of reports, Use of Computer and statistical software in research. Research report, qualities of good research report .

(B) Research Paper : Preparation and presentation of research Paper.

Reference Books :

1. Donald & Pamela Schindler : Business Research methods, TMGH 9th Edition .
2. Alan Bryman & Emma Bell : Business Research methods, Oxford University press.
3. C. R. Kothari : Research Methodology, WishwaPrakashan, New Delhi.
4. Willkinson Bhandarkar : Methodology & Techniques of Social Research, Himalaya Publishing.
5. W. J. Good : Method in Social Research.
6. M. R. Cohen & E Nagar : An introduction to Logic & Scientific Methods. A. K. Das Gupta : Methodology of Economic Research.
7. Editor- Prof. C. T. Kurine : Guide of Research Economics, Published for the Madras Institute for Development.
8. S. C. Shrivastava and Sangya Shrivastava : Fundamental of Statistics, Amol Publication, New Delhi.
9. A.K. Das Gupta : Methodology of Economic Research.

MHRD.207-INDUSTRIAL VISIT LONG TOUR

(Effective from the session 2015-2016 for Sem. III & IV)

Semester-III

MHRD.301-FUNCTIONAL AREAS IN MANAGEMENT-I

Unit-I : Marketing : Definition, Nature, Concept, Scope, Marketing Environment, Marketing Research, Consumer Behaviour.

Unit-II : Market segmentation, Product life cycle, Product mix, New product Development.

Unit-III : Promotion Mix: Advertising, Sales promotion, Personal selling, Publicity.

Channel Management : Functions, Structure, Intermediaries.
Marketing channel: Policies, Strategies and systems.

Unit-IV : Financial Management : Definition, Nature, Scope. Cost-Volume-Profit Analysis, Break even Analysis, Fundamentals of Financial Accounting, Ratio Analysis.

Unit-V : Instruments of long term financing , Cost of different sources of raising capital, Working capital Management , Cash & Receivables Management.

Reference Books :

1. Prasanna Chandra : Financial Management Theory & Practice, McGraw Hills, New Delhi, 8th Edition.
2. Eugene F. Brigham : Financial Management Theory & Practice, Halt-Saunders International Editions.
3. Michael, Bruce, William : Marketing, Tata McGraw Hills, 13th Edition.

MHRD.302-LABOUR LEGISLATIONS

Course Objectives:

1. To learn need to Industrial Relations.
2. To learn the importance of Labour welfare.
3. To learn the importance of Labour Legal provisions relationsto wages, working conditions & Labour Welfare.
4. To Learn the importance of Labour Legal provisionsrelations to social security.

Unit- I : **Trade Union Act 1926:** Role and future of Trade Unions, The Trade Union Bill-1950.

Unit-II : Industrial Dispute Act 1947:, Object, Industrial Disputes, Authorities for settlement of Industrial Disputes, Procedure, Power and Duties of Authorities, Strikes, Lock-outs, Lay-off retrenchment, Unfair Labour Practices.

Unit-III: Payment of Wages Act 1936: Minimum Wages Act 1948, Workmen Compensation Act 1952, Payment of Bonus Act 1968.

Unit-IV: Factories Act 1948 (With Amendment of 1987): Objects, Provisions relating to hazardous process health, Safety, Welfare, Working hours, Leave, Power of the authorities under the Act, Penalty Provision.

Unit-V : Contract labour (Regulation and Abolishment) Act 1970 and the Rules, Prohibition of employment of contract labour, Penalties and Procedure, Mines Act 1952, Maternity Benefit Act, 1961, Right to Information Act, 2005.

Reference Books:

- 1 Memoria C.B and Sathismemoria :Dynamics of Industrial Relations, Himalaya publishing.
- 2 Dwivedi R.S : Human Relations & Organizational Behaviour, Macmillon India Ltd.
- 3 Kapoor N.D : Elements of Industrial Law, Sultanchand-1998.
- 4 Srivastava :Industrial Relations and Labour Laws, Vikas -2000.
- 5 Srivastava :Industrial Relations and Labour Laws, Vikas-2000.
- 6 Das Gupta :Maintaining Industrial Disipline, Response Books-2002.

MHRD.303- INTERNATIONAL HUMAN RESOURCE MANAGEMENT

Objective: To make the students well versed with the HR Policies and Strategies in the context of International Business.

Unit-I: International HRM:Concept and Issues,Barriers in Global HRM. Culture, Society and Nations, Cultural Change and Universals, Cultural Sensitivity and Global Business, Cross Cultural Theories.

Unit-II: International Business, EmployeeBehaviour and Cross Culture: Cross Cultural Negotiations, Organizational Culture.

Unit-III: Culture and Organizational performance, International Business and International HRM Approaches, Organizing Multinational Structures.

Unit-IV: International HRM Functions:Recruitment and Selection, Training and Development, Compensation, Employee Performance.

Unit-V: International Projects and HR, Organizational Ethics, Ethics across culture.

Reference Books:

- 1 Gupta S.C :Text book of International HRM, MacMillan Ltd., New Delhi, 2006.
- 2 P.SubbaRao : International Human Resource Management, Himalaya Publication.

MHRD.304-KNOWLEDGE MANAGEMENT

Unit-I: Knowledge Management – Definition, Concept, Meaning. Applications of knowledge Management, Knowledge Management life cycle.

Unit-II: Understanding knowledge types , Expert knowledge, Human thinking and learning, Knowledge transfer, Transfer methods.

Unit-III: Building Knowledge System, Knowledge system life cycle, Various Knowledge Capture Techniques.

Unit-IV: Internet and Knowledge Management, Knowledge Management systems tools-An overview, Data Mining, Data Management , Knowledge Management and Ethical, legal & Managerial Issues.

Unit-V: Managing Knowledge workers, Knowledge worker and work adjustment , Technology & Knowledge Worker, Role of Ergonomics, Managing Knowledge Projects.

Reference Books:

- 1 Sanjay Mohapatra : Knowledge Management, McMillan publishers, India Ltd.

MHRD.305-MANAGEMENT OF INDUSTRIAL RELATIONS

Course Objectives:

- 1 To learn need to Industrial Relations.
- 2 To learn the importance of Labour Legal provisions, to wages, working conditions & Labour Welfare.
- 3 To learn the importance of Labour Legal provisionsrelations to social security.and industrial conflicts

Unit-I: Industrial Relation: Definition, Nature, Scope, Characteristics of Industrial Relation, Functions of IR, Importance of Harmonious IR, Code of Industrial Relation, Condition for Congenial IR, Limitation of Industrial Relation in India.

Unit-II: Historical Perspective: Industrial Relation in India, New trend in India to IR perspective, The Three Actors of IR, Role of Government in Industrial Relation, Role of Management and Trade Union.

Unit-III: Grievance and Discipline: Meaning/Definition of Grievance, The causes of Grievance, Pre-requisites of a Grievance Procedure, Grievance Procedure, Meaning of Disciplinary Action, Disciplinary Procedure, Objectives of Disciplinary Action, Aspects of Disciplinary Procedure, Causes of Indiscipline, Domestic Inquiry, Types of Punishment.

Unit-IV: Industrial Conflicts and Trade Union : Definition of conflicts/ Disputes, Causes of Industrial conflicts, Types of Industrial Conflicts, Consequences of Industrial Conflicts, Prevention of Industrial Conflicts, Settlement of Conflicts, Trade unionism in Industry.

Unit-V : Industrial Relation in India, Collective Bargaining, Union Movement Today and Tomorrow, Participative Management and Co-ownership, Gain Sharing, Profit Sharing,

Reference Books:

1. Prof. M.N.Rudrabasavraj :Dynamic Personnel Administration.
2. P.C.Shejwalkar & S.B.Malegaonkar :Personnel Management and Industrial Relations.
3. K.M. Subramanian : Labour Management Relations in India –Trade Unionism, Myth and Reality, New Delhi, Oxford University Press,1982 Mamkoottam.
4. Niland J. R. :The Future of Industrial Relations, New Delhi Sage,1994.
5. Kochan T.A. & Katz Henry :Collective Bargaining and Industrial, 2nd ed. Homewood, Illinois, Richard D Irish, 1988.
6. Kapoor N.D. :Elements of Industrial Law, Sultanchand,1998.
7. Arun Monappa : Industrial Relations, Tata McGraw Hill.
8. Michael V. P. :HRM and Human Relations, Himalaya Publication.

MHRD.306-COMPUTER APPLICATIONS IN H.R.M. – II

Unit-I : System Analysis and Design, Goals, System, Computer based Business System, Personal traits of System Analyst, System Life Cycle.

Unit-II : Software Project Planning, Objectives, Software Scope, Resources, Software Project Estimation Models, Risk Analysis and Management, Reactive versus Proactive Risk Strategies, Software Risk, Risk Identification.

Unit-III : Concept of Networking and Data Communication : Introduction to LAN and Basic Communication Concepts, OSI 7 layer, Topologies, Protocols, Ethernet, Arcnet, TCP/IP, Introduction to Virus and Vaccines, Applications, Email and Internet.

Unit-IV : Human Resource Information System : Cost justifying HRIS Investment, HRIS Implementation, Change Management in HRIS, HRIS Application, Recruitment & Selection in an Internet Context, Training and Development issues & HRIS Application, Performance Management, Compensation, Benefits, Payroll & HRIS, Emerging Trend in HRM & IT.

Unit-V : Introduction to HTML, Features of HTML, Front Page Editor : Creating and Adding Web Pages, Adding Web Page and Enhancing Web Page, Creating Forms, Frames and Tables.

Reference Books:

1. Jerry Fitzgerald & Alan Dennis :Business Data Communication and Networking.
2. Edwards :System Analysis and Design, Tata McGraw Hill.
3. R.Mall : Fundamentals of Software Engineering, Prentice Hall of India
4. Michel J. Kavanagh, Mohan Thite, Richard D.Johnson : Human Resource Information Systems, Sage Publications.
5. Thomas A.Powell : The complete Reference HTML & CSS 5th ed.
6. Karl Barksdale, E.ShaneTurner : HTML Basics 3rd ed.
7. Rajesh Vishwanathan : Strategic Human Resource Management, Himalaya Publishing House.

MHRD.307- PROJECT

Semester-IV**MHRD.401-DYNAMICS OF HUMAN RESOURCE DEVELOPMENT**

- Unit -I :** HRD - Concept , Definition, Meaning, Scope, Applications , HRD Systems- Concept, Sub Systems of HRD .
- Unit -II :** HRD- Main Issues-
HRD- Training & Development, Performance Appraisal , Compensation Management, HRD & Welfare –Applications.
- Unit -III :** HRD & Career Development- Career Planning & Development. HRD & Participation- Employee Participation & its Applications, HRD Interventions.
- Unit -IV :** HRD & Employee Counselling - The Relationship & it's Implications.
Counselling -Concept , Definition, Relevance, Importance & Need, Counselling Applications. Counselling – Type, Process, Facilitation.
- Unit -V :** Counselling- New Developments, Multidisciplinary Approach, Case Studies in Counselling.

Reference Books:

1. Robbins S.P: Organization Behavior, 7thEdn, New Delhi, Prentice Hall of India .
2. Davis Keith : Newstrom - Organization Behavior At Work.
3. T.V.Rao : Future of HRD, Macmillan India Ltd. V.2012.
4. Udaykumar Haldar forward by Udai Pareek : Human Resource Development, Oxford University Press.

MHRD.402-WAGE & SALARY ADMINISTRATION

- Unit-I :** Concept & Theories, Terminology, Need, Objectives & Principles of Wage & Salary Administration, Mechanism, Wage Theories, Types of Wages, Wage Fixation Institutions in India
- Unit-II :** Wage Differentials, Wage differentials as corollary of factor differentials, Basis for differentials occupation, Industry region, Causes of wage inequality, Organizational wage structure, Social Programming regarding Wages.
- Unit-III :** Wage Determination, Need for Rational Wage Structure, Prerequisites For wage standardization, Wage board constitution and function, Wage and Wage Rate Determinations, Role of trade unions.

Unit-IV : Wage Incentives, Bonus and Fringe Benefits- Objectives, Meaning, Types and Need, Performance Appraisal, Merit Rating Attitudes of workers Unions.

Unit-V : Compensation Policy and Wage & Administration, Performance link System, Indian Experiences regarding Wage and Salary Administration, Compensation, International Practices regarding Wage & Salary Administration together with Compensation.

Reference Books -

1. Edwin B. Flippo : Personnel Management, 6th ed. Tata McGraw Hill International Edition.
2. Arun Monnappa, Mirza Saiyadain : Personnel Management, 2nd ed., Tata McGraw Hill, Delhi.
3. George Strauss, Leonard R. Sayles : Personnel The Human Problems Management, 4th ed., Prentice Hall India, New Delhi.
4. Yoder : Personnel Management & Industrial Relations.
5. Northcott : Personnel Management Principles and Practices.
6. Mitcon, Rock : Hand Book of Wage and Salary Administration.
7. Aswathappa K. : Human Resource & Personnel Management, Tata McGraw Hill, Delhi.
8. Kohli, Uddesh & Sinha, Dharni P : HRD- Global Challenges & Strategies in 2000 A.D. New Delhi, ISTD, 1995.

MHRD.403-EMPLOYEES EMPOWERMENT

- Unit-I :** Concept, Definition, Meaning, Objectives, Nature & Scope of Employee Empowerment, Employee Empowerment Policy making, Support of Management & Trade Unions.
- Unit-II :** Types of Employee Empowerment, Process, Application in Organizational Behavior & Management, Strategy developing Employees Empowerment.
- Unit-III :** Employees Empowerment Process Implementation – Early Preparation, Implementation Strategies, Difficulties & overcoming it, Examples in Indian Context.
- Unit-IV :** Feedbacks from Employees, Forms of feedback, Management Control & Regulation of Employee Empowerment Strategy, Employees Participation & Empowerment.
- Unit-V :** Supportive Processes & Leadership regarding Employee Empowerment, Alternative Ways of Employee Empowerment, Counseling & Empowerment, Mentoring & Empowerment, New issues in Employee Empowerment.

Reference Books:

1. Robbins S.P : Organization Behavior, 7th Ed. New Delhi, Prentice Hall of India.
2. Yoder : Personnel Management & Industrial Relations.
3. Aswathappa K : Human Resource & Personnel Management , Tata McGraw Hill, Delhi
4. Rao, TV.E etc : Alternative Approaches & Strategies of Human Resource Development, Jaiwat Rawat-1988.
5. Pareek, U etc : Managing Transition: The HRD Response, Tata McGraw Hill, New Delhi.
6. John W. Newstrom & Keith Davis : Organization Behavior at work, 10th Ed. Tata McGraw Hill, New Delhi.

MHRD.404-FUNCTIONAL AREAS IN MANAGEMENT -II

Unit-I: Production Management : Definition, Nature & Scope, Manufacturing systems, Plant Location.

Unit-II: Materials Management : Nature and Scope.
Production Planning and control : Nature & Scope, Plant Layout.

Unit-III: Capacity Planning, Aggregate planning.
Work study : Method study, work Measurement , work sampling.

Unit-IV: Transportation Model, Assignment Models.

Unit-V: Simulation, Decision theory : Decision making under uncertainty, Decision Making under risk, in the context of Production function.

Reference Books:

1. Kanishka Bedi : Production & Operation Management, Oxford University Press, 2nd Edition.
2. Everette, Ronald : Production & Operation Management, Concept Model & Behavior, Prentice Hall of India.

MHRD.405-CORPORATE PLANNING & STRATEGY

Unit-I : Introduction to corporate planning; Definition; Need and importance; Corporate environmental Scanning- Mega, Micro & relevant Environment; Corporate Planning System & Practices; Evolution of business policy & strategic Management.

Unit - II : Corporate plan formulation; Corporate plan implementation; Issues in corporate plan implementation.

Unit -III : Corporate plan evaluation & control; Techniques of evaluation & control; Excuses in preparation of Corporate plan; Distribution of Corporate plan.

Unit - IV : Corporate Strategy : Concept & Nature of Corporate strategy, Functions, Level & components of Corporate strategy; Alternatives to Corporate strategies; Significance of Corporate strategy, Kinds of Corporate strategy.

Unit - V : Review of Progress of annual activities plan; Corporate Planning in public sector; Changing role of Corporate planning department.

Reference Books :

1. Azarkazmi : Business Policy, S. Chand & Co. New Delhi.
2. V.S. Ramaswamy, S. Namakumari : Strategic Planning; Formulation of Corporate Strategy, Mcmillan Publishing house Ltd.
3. R.M. Shrivastava : Management Policy & Strategic Management, Himalaya Publication Mumbai.
4. Stephon R. Robinson : Organizational Behavior, PHI New Delhi.

MHRD.406-HUMAN RESOURCE ACCOUNTING AND AUDIT**Unit - I : Overview of Accounting :**

Concept, Scope, Structure, Industrial Objective, Accounting Principles, Historical Development of HR Accounting.

Unit -II : HRD And Audit :

HR Audit, Concept and Component, HR Strategies, Style and culture, Structure, System, Competencies, Auditing Standards.

Unit -III : Measurement And Information Management in HR :

Measurement of HR Accounting, Measurement of Group Value, Reasons of Accounting, Cost in Assessing Human Resource, Difficulties involved in valuating Human Resource.

Unit -IV : Methods And Process of Audit :

HR Audit Methods, Interview, observation, Questionnaire, Stages of Audit, Process of Audit, Challenges of HR Audit, Cost and Management Accounting for human resource.

Unit-V : Audit report & Scoreboard :

Audit report, HR score card, Learning & growth perspective, International practices of HR accounting & Audit, Designing & HRD Audit for Business Improvement.

Reference Books :

1. A.M.Sarma : Personal & HR Management, Himalaya publishing house, 6th revised edition.
2. T.V. Rao : HRD Audit Response Books, A division of Sage Publications, New Delhi, London
3. S.C.Gupta : Advanced Human Resource Management, Strategic Perspective, Ane Books, India.

MHRD.407- PROJECT**PROJECT REPORT & VIVA-VOCE**

Objective: The objective of this course is to provide an understanding to the field work and practical proficiency the students should acquire.

The assessment of paper MHRD-307 & 407 Project shall be done on the basis of Project report submitted at the end of IVth Semester and go through the viva-voce.

The Project report will carry 60 marks and viva-voce will carry 40 marks.

Two copies of Project reports (printed or type written) shall be submitted to the University through the supervisor of the candidate and the Principal/Head of Institution/Department atleast a fortnight prior to the date of commencement of the written examination.

A candidate shall submit with his Project report a certificate from the supervisor and Principal to the effect :-

- (i) That the candidate has satisfactorily conducted research for not less than one academic year (i.e. IIIrd & IVth Semester).
- (ii) That the Project report is the result of the candidates own work and is of sufficiently good standard to warrant its presentation for examination.

Project report shall be prepared by the candidates individually under the supervision of a teacher. A separate committee at the college level of teachers may be constituted as and its member will frame a scheme of analyzing the topic of

Projects and supervision in the beginning of Semester-IIIrd and the Project report shall be submitted by the candidate at the end of the Semester-IV in the college. The Project report shall be assessed by Internal/Supervisor and External examiners in the college itself alongwith viva-voce on the project. The candidate must obtain minimum 24 marks in the project report, 16 marks in viva-voce & 50 marks taken together for passing in the project report.

**B.Tech. (Cosmetics)
Semester-V & VI
Examination**

Prospectus No.20151912

**संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY**

**गृहविज्ञान विद्याशाखा
(FACULTY OF HOME SCIENCE)**

**PROSPECTUS
OF
B.Tech (Cosmetics)
Semester-V, Winter-2014
Semester-VI, Summer-2015
Examinations
(Eight Semester Degree Course)**



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SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

- (1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.
- (2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

- Ordinance No. 1 : Enrolment of Students.
- Ordinance No. 2 : Admission of Students
- Ordinance No. 4 : National cadet corps
- Ordinance No. 6 : Examinations in General (relevent extracts)
- Ordinance No. 18/2001 : An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute No.18, Ordinance 2001.
- Ordinance No. 9 : Conduct of Examinations (relevent extracts)
- Ordinance No. 10 : Providing for Exemptions and Compartments
- Ordinance No. 19 : Admission of Candidates to Degrees.

- Ordinance No. 109 : Recording of a change of name of a University student in the records of the University.
- Ordinance No. 6 of 2008 : For improvement of Division/Grade.
- Ordinance No.19/2001 : An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba Amravati University

DIRECTION

No. : 27 / 2012

Dated :- 29.6.2012

Subject : Examinations Leading to the Degree of Bachelor of Technology (Cosmetics) in the Faculty of Home Science (Eight Semester – Credit Grade Based System Course) Direction, 2012

Whereas, the Degree of Bachelor of Technology (Cosmetics) in the Faculty of Home Science is in existence in the University under Ordinance No.15 of 1998 and Regulation No.43 of 1998 respectively as per annual pattern.

AND

Whereas, the Academic Council in its meeting held on 5.5.2012 while considering item No.53 (3) A) R-1 has resolved to accept the Draft Schemes of Teaching and Examinations, Draft Syllabus and Draft Ordinances for B.Tech. (Cosmetics) alongwith other details as per semester system and credit grade based system, and further resolved to refer the Draft Scheme of Teaching and Examination and Draft Ordinances to the Ordinance Committee for making Ordinances and Regulations.

AND

Whereas, the Honorable Vice-Chancellor has accepted the corrections recommended by Chairman, Ad-hoc Committee in Cos.Tech. & Dean, faculty of Home Science u/s 14(7) of the Maharashtra Universities Act, 1994 on 25.6.2012 on behalf of the authorities of the University.

AND

Whereas, it is necessary to frame an Ordinance/Regulation for B.Tech. (Cosmetics) as per semester pattern and credit grade system.

AND

Whereas, the making of Ordinance/Regulation for B.Tech.(Cosmetics) Semester-I to VIII as per semester pattern and credit grade system, is a time consuming process.

AND

Whereas, the Academic Session is commencing from June 2012 and it is necessary to provide the Schemes of examinations, eligibility criteria along with other details for admission of students in the above pattern.

Now, therefore, I, Dr. Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

- 1) This Direction may be called "Examinations Leading to the Degree of Bachelor of Technology (Cosmetics) in the Faculty of Home Science (Eight Semester Credit Grade Based System Course) Direction, 2012".
- 2) This direction shall come into force from the date of its issuance.
- 3) (a) The following shall be the examinations leading to the Degree of Bachelor of Technology (Cosmetics) in the faculty of Home science.

1.	Bachelor of Technology	Semester-I
2.	Bachelor of Technology	Semester-II
3.	Bachelor of Technology	Semester-III
4.	Bachelor of Technology	Semester-IV
5.	Bachelor of Technology	Semester-V
6.	Bachelor of Technology	Semester-VI
7.	Bachelor of Technology	Semester - VII
8.	Bachelor of Technology	Semester-VIII
- (b) The duration of the Degree Course under this Direction shall be of Eight Semester in four academic years (i.e. two semester per year)
 - 1) B.Tech I & II Semester in First Academic Year
 - 2) B.Tech III & IV Semester in Second Academic Year
 - 3) B.Tech V & VI Semester in Third Academic Year
 - 4) B.Tech VII & VIII Semester in Fourth Academic Year
- (c) The examination specified in the preceding paragraph shall be held twice a year at such places and on such dates as may be appointed by the Board of Examinations.
- 4) Supplementary examinations shall be held for all semesters of B.Tech.(Cosmetics)
- 5) Subject to her/his compliance with the provisions of this Direction and other ordinance in force from time to time, a candidate for admission :-
 - a) To the Bachelor of Technology, Ist Semester Examination, shall have passed twelfth standard examinations of Maharashtra State Board of Secondary & Higher Secondary Education or examination recognised as equivalent thereto with the subjects English, Physics, Chemistry, Biology or Maths or Diploma in Pharmacy.

- 6) Subject to his/her compliance with the provisions of this Direction & other Ordinances pertaining to Examination in force from time to time, the applicant for admission, at the end of the course of study of a particular semester/session, to an Examination specified in column (1) of the table below, shall be eligible to appear if-
- he/she satisfies with the conditions in the table and the provisions thereunder.
 - he/she complies with the provisions of the ordinance pertaining to the Examination in general from time to time.
 - he/she has prosecuted a regular course of study in a college affiliated to the University.
 - he/she has in the opinion of the Principal shown satisfactory progress in his/her studies.

TABLE

Name of the Exam.	The student should have passed the exam. of	The student should have satisfactorily completed the following session/ semester	The student should have passed the following examination
B.Tech. Semester-I	As mentioned in Para 5(a)	ô	ô
B. Tech. Semester-II	ô	B.Tech. Semester-I	ô
B. Tech. Semester-III	ô	B.Tech. Semester-II	2/3 rd Heads of I & II Semester combined together
B. Tech. Semester-IV	ô	B.Tech. Semester-III	-do-
B. Tech. Semester-V	B.Tech.I & II Semester	B.Tech. Semester-IV	2/3 rd Heads of III & IV Semester combined together
B. Tech. Semester-VI	ô	B. Tech. Semester-V	-do-
B. Tech. Semester-VII	B.Tech. III & IV Semester	B. Tech. Semester-VI	2/3 rd Heads of V & VI Semester combined together
B. Tech. Semester-VIII	ô	B. Tech. Semester-VII	-do-

Explanation :

- While calculating 2/3rd heads of passing, fraction if any shall be ignored
 - For considering the heads of passing, every theory and every practical shall be considered as separate head of passing.
 - An examinee who has passed 2/3rd heads of passing shall be allowed to keep term in the next higher class.ô
- Without prejudice to the other provision of the Ordinance No. 6 relating to the Examination in General, the provisions of paragraph 5,7,8,10 and 31 of the said ordinance shall apply to every college candidate.
 - The fees for the examinations shall be as prescribed by the Management Council from time to time whenever any change is made in the fees prescribed for any particular examination that shall be notified through a notification for information of the examinees concerned.
 - The scope of the subjects shall be as indicated in the respective syllabus in force from time to time.
 - Medium of instruction and examination shall be English.
 - The schemes of teaching & credit system, scheme of examination along with other details & features of credit system shall be as given in **Appendices-I to V**.
 - There shall be no classification of examinees successful at the I to VII semester examination.
 - Incentive marks for each semester of B.Tech. examinations shall be as per Ordinance no.1 of 1985 in respect of Ordinance to provide for incentive marks for NSS, NCC, games & sports & other extra-curricular activities.
 - Every student has to undergo Industrial Training for one month after Sixth Semester in any Cosmetic Industry which shall be essential for fulfilment of Degree course.
 - Provision of Ordinance No.18 of 2001 relating to the condonation of Deficiency of marks for passing an Examination and of Ordinance No. 10 relating to Exemptions and Compartments as amended up to date shall apply to the Examinations under this Direction.
 - Cummulative Grade Point Average shall be calculated on the basis of performance of a candidate from Semester-V to VIII.
 - As soon as possible after the examinations, the Board of Examinations shall publish a list of successful examinees and the Merit list shall be prepared as per provision of Ordinance No.6.

- 17) Notwithstanding anything to the contrary in this Direction no person shall be admitted to this examination, if he/she has already passed the same examination or an equivalent examination of other statutory University.
- 18) Successful examinees at the I,II,III,IV, V,VI,VII & VIII semester examination shall be entitled to receive a certificate signed by the Registrar and successful Examinees at the VIII semester examination shall on payment of the prescribed fees receive a Degree in the prescribed form signed by the Honøble Vice-Chancellor.

Amravati
Dated : 28/06/2012

Sd/-
(Dr. M.K. Khedkar)
Vice-Chancellor

Appendix-I
Draft Scheme of teaching & Credit System for B.Tech (Semester wise)
First to Eight Semester

Sub. Code	Subject	Scheme of teaching & Credit System	
		Theory (Credits)	Practical (Credits)
Semester-I			
1.1	Cosmetic Technology I	03 (03)	03 (1.5)
1.2	Cosmetic Chemistry I	03 (03)	03 (1.5)
1.3	Herbal Cosmetics I	03 (03)	03 (1.5)
1.4	Dermatology I	03 (03)	03 (1.5)
1.5	Computer Application	03 (03)	1 hr. demo
1.6	Mathematics & Statistics-I	03 (03)	δ
	Total	18 (18)	12 (06)
Semester-II			
2.1	Cosmetic Technology II	03 (03)	03 (1.5)
2.2	Cosmetic Chemistry II	03 (03)	03 (1.5)
2.3	Herbal Cosmetics II	03 (03)	03 (1.5)
2.4	Dermatology II	03 (03)	03 (1.5)
2.5	Perfume & Colours I	03 (03)	03 (1.5)
2.6	Mathematics & Statistics-II	03 (03)	δ
	Total	18 (18)	15 (7.5)
Semester-III			
3.1	Cosmetic Technology III	03 (03)	03 (1.5)
3.2	Cosmetic Chemistry III	03 (03)	03 (1.5)
3.3	Beauty Culture & Clinical Cosmetic-I	03 (03)	03 (1.5)
3.4	Perfume & Colours II	03 (03)	03 (1.5)
3.5	Cosmetic Engineering-I	03 (03)	03 (1.5)
3.6	Dermatology III	03 (03)	δ
	Total	18 (18)	15 (7.5)
Semester-IV			
4.1	Cosmetic Technology IV	03 (03)	03 (1.5)
4.2	Cosmetic Chemistry IV	03 (03)	03 (1.5)
4.3	Beauty Culture & Clinical Cosmetic-II	03 (03)	03 (1.5)
4.4	Cosmetic Analysis I	03 (03)	03 (1.5)
4.5	Cosmetic Engineering II	03 (03)	03 (1.5)
4.6	Dermatology IV	03 (03)	δ
	Total	18 (18)	15 (7.5)

Semester-V			
5.1	Cosmetic Technology V	03 (03)	03 (1.5)
5.2	Perfume & Colour III	03 (03)	03 (1.5)
5.3	Herbal Cosmetics III	03 (03)	03 (1.5)
5.4	Physical Cosmetics I	03 (03)	03 (1.5)
5.5	Cosmetic Analysis-II	03 (03)	03 (1.5)
5.6	Cosmetic Management -I	03 (03)	ô
	Total	18 (18)	15 (7.5)
Semester-VI			
6.1	Cosmetic Technology VI	03 (03)	03 (1.5)
6.2	Perfume & Colour IV	03 (03)	03 (1.5)
6.3	Herbal Cosmetics IV	03 (03)	03 (1.5)
6.4	Physical Cosmetics II	03 (03)	03 (1.5)
6.5	Cosmetic Analysis III	03 (03)	03 (1.5)
6.6	Cosmetic Management II	03 (03)	ô
	Total	18 (18)	15 (7.5)
Semester-VII			
7.1	Cosmetic Technology VII	03 (03)	03 (1.5)
7.2	Perfume & Colour V	03 (03)	03 (1.5)
7.3	Herbal Cosmetics V	03 (03)	03 (1.5)
7.4	Cosmetic Analysis IV	03 (03)	03 (1.5)
7.5	Cosmetic Engineering-III	03 (03)	03 (1.5)
7.6	Seminar	ô	03 (1.5)
	Total	15 (15)	18 (9)
Semester-VIII			
8.1	Cosmetic Technology VIII	03 (03)	03 (1.5)
8.2	Perfume & Colour VI	03 (03)	03 (1.5)
8.3	Herbal Cosmetics VI	03 (03)	03 (1.5)
8.4	Cosmetic Jurisprudence	03 (03)	ô
8.5	Cosmetic Engineering-IV	03 (03)	03 (1.5)
8.6	Project	ô	03 (1.5)
	Total	15 (15)	15 (7.5)

Appendix-II
Scheme of Examination for B. Tech. (Semester wise)
First to Eight semester

Sub. Code	Subject	Scheme of Examination						Minimum Marks for passing		Total Marks in theory/practical
		Theory		Practical		Theory Int. Marks	Pract. Int. Marks	Theory	Pract.	
Hrs	Marks	Hrs	Marks							
Semester-I										
1.1	Cosmetic I Technology	03	60	04	50	20	30	36	40	80+80
1.2	Cosmetic Chemistry I	03	60	04	50	20	30	36	40	80+80
1.3	Herbal Cosmetics I	03	60	04	50	20	30	36	40	80+80
1.4	Dermatology I	03	60	04	50	20	30	36	40	80+80
1.5	Computer Application	03	60	-	-	20	-	36	-	80
1.6	Mathematics & Statistics-I	03	60	-	-	20	-	36	-	80
Total Marks for the semester										800
Semester-II										
2.1	Cosmetic Technology II	03	60	04	50	20	30	36	40	80+80
2.2	Cosmetic Chemistry II	03	60	04	50	20	30	36	40	80+80
2.3	Herbal Cosmetics II	03	60	04	50	20	30	36	40	80+80
2.4	Dermatology II	03	60	04	50	20	30	36	40	80+80
2.5	Perfume & Colours I	03	60	04	50	20	30	36	40	80+80
2.6	Mathematics & Statistics-II	03	60	-	-	20	-	36	-	80
Total Marks for the semester										880
Semester-III										
3.1	Cosmetic Technology III	03	60	04	50	20	30	36	40	80+80
3.2	Cosmetic Chemistry III	03	60	04	50	20	30	36	40	80+80
3.3	Beauty Culture & Clinical Cosmetic-I	03	60	04	50	20	30	36	40	80+80
3.4	Perfume & Colours II	03	60	04	50	20	30	36	40	80+80
3.5	Cosmetic Engineering-I	03	60	04	50	20	30	36	40	80+80
3.6	Dermatology-III	03	60	-	-	20	-	36	-	80
Total Marks for the semester										880

Semester-IV										
4.1	Cosmetic Technology IV	03	60	04	50	20	30	36	40	80+80
4.2	Cosmetic Chemistry IV	03	60	04	50	20	30	36	40	80+80
4.3	Beauty Culture & Clinical Cosmetic-II	03	60	04	50	20	30	36	40	80+80
4.4	Cosmetic Analysis I	03	60	04	50	20	30	36	40	80+80
4.5	Cosmetic Engineering-II	03	60	04	50	20	30	36	40	80+80
4.6	Dermatology-IV	03	60	-	-	20	-	36	-	80
Total Marks for the semester										880
Semester-V										
5.1	Cosmetic Technology V	03	60	04	50	20	30	36	40	80+80
5.2	Perfume & Colour III	03	60	04	50	20	30	36	40	80+80
5.3	Herbal Cosmetics III	03	60	04	50	20	30	36	40	80+80
5.4	Physical Cosmetics I	03	60	04	50	20	30	36	40	80+80
5.5	Cosmetic Analysis II	03	60	04	50	20	30	36	40	80+80
5.6	Cosmetic Management I	03	60	-	-	20	-	36	-	80
Total Marks for the semester										880
Semester-VI										
6.1	Cosmetic Technology VI	03	60	04	50	20	30	36	40	80+80
6.2	Perfume & Colour IV	03	60	04	50	20	30	36	40	80+80
6.3	Herbal Cosmetics IV	03	60	04	50	20	30	36	40	80+80
6.4	Physical Cosmetics II	03	60	04	50	20	30	36	40	80+80
6.5	Cosmetic Analysis III	03	60	04	50	20	30	36	40	80+80
6.6	Cosmetic Management II	03	60	-	-	20	-	36	-	80
Total Marks for the semester										880
Semester-VII										
7.1	Cosmetic Technology-VII	03	60	04	50	20	30	36	40	80+80
7.2	Perfume & Colour V	03	60	04	50	20	30	36	40	80+80
7.3	Herbal Cosmetics V	03	60	04	50	20	30	36	40	80+80
7.4	Cosmetic Analysis IV	03	60	04	50	20	30	36	40	80+80
7.5	Cosmetic Engineering-III	03	60	04	50	20	30	36	40	80+80
7.6	Seminar	-	-	-	-	-	80	-	40	80
Total Marks for the semester										880

Semester-VIII										
8.1	Cosmetic Technology VIII	03	60	04	50	20	30	36	40	80+80
8.2	Perfume & Colour VI	03	60	04	50	20	30	36	40	80+80
8.3	Herbal Cosmetics VI	03	60	04	50	20	30	36	40	80+80
8.4	Cosmetic Jurisprudence	03	60	04	50	20	30	36	40	80+80
8.5	Cosmetic Engineering-IV	03	60	04	50	20	30	36	40	80+80
8.6	Project	04	04	-	04	04	80	04	40	80
Total Marks for the semester										800

Seminar :-

The topic for the seminar shall be assigned to him/her by the faculty members of Seventh semester & topic should be decided from the syllabus of same semester, with immediate from the date of the commencement of the seventh semester. Evaluation of seminar shall be based on the communication, representation and skill in oral presentation.

Project Report :-

The topic for the project shall be based on the practical work / theoretical/review oriented any topic from current Pharmaceutical development and shall be assigned to him/her by the respective guide from faculty members immediate from the date of the commencement of the sixth semester. Report to be submitted in the institute and examination (seminars on the project report) shall be conducted at the college level. Examination/ Evaluation of the project shall be based on Introduction and information retrieval systems, Organization of material and references in the project report, Representation, Skill in oral presentation, Questioning and defending, and finally on the report.

Appendix – III

Scheme of Marks and Credits subject wise for B. Tech. (Semester wise)

First to Eight Semester

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
1.1	Cosmetic Technology I	80 (03)	80(1.5)	160 (4.5)
1.2	Cosmetic Chemistry I	80 (03)	80(1.5)	160 (4.5)
1.3	Herbal Cosmetics I	80 (03)	80(1.5)	160 (4.5)
1.4	Dermatology I	80 (03)	80(1.5)	160 (4.5)
1.5	Computer Application	80 (03)	-	80 (03)
1.6	Mathematics & Statistics-I	80 (03)	-	80 (03)
Total				800 (24)

Semester-II

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
2.1	Cosmetic Technology II	80 (03)	80(1.5)	160 (4.5)
2.2	Cosmetic Chemistry II	80 (03)	80(1.5)	160 (4.5)
2.3	Herbal Cosmetics II	80 (03)	80(1.5)	160 (4.5)
2.4	Dermatology II	80 (03)	80(1.5)	160 (4.5)
2.5	Perfume & Colours I	80 (03)	80(1.5)	160 (4.5)
2.6	Mathematics & Statistics-II	80 (03)	-	80 (03)
Total				880 (25.5)

Semester-III

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
3.1	Cosmetic Technology III	80 (03)	80(1.5)	160 (4.5)
3.2	Cosmetic Chemistry III	80 (03)	80(1.5)	160 (4.5)
3.3	Beauty Culture & Clinical Cosmetic-I	80 (03)	80(1.5)	160 (4.5)
3.4	Perfume & Colours II	80 (03)	80(1.5)	160 (4.5)
3.5	Cosmetic Engineering-I	80 (03)	80(1.5)	160 (4.5)
3.6	Dermatology III	80 (03)	-	80 (03)
Total				880 (25.5)

Semester-IV

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
4.1	Cosmetic Technology IV	80 (03)	80(1.5)	160 (4.5)
4.2	Cosmetic Chemistry IV	80 (03)	80(1.5)	160 (4.5)
4.3	Beauty Culture & Clinical Cosmetic-II	80 (03)	80(1.5)	160 (4.5)
4.4	Cosmetic Analysis I	80 (03)	80(1.5)	160 (4.5)
4.5	Cosmetic Engineering-II	80 (03)	80(1.5)	160 (4.5)
4.6	Dermatology IV	80 (03)	-	80 (03)
Total				880 (25.5)

Semester-V

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
5.1	Cosmetic Technology V	80 (03)	80(1.5)	160 (4.5)
5.2	Perfume & Colour III	80 (03)	80(1.5)	160 (4.5)
5.3	Herbal Cosmetics III	80 (03)	80(1.5)	160 (4.5)
5.4	Physical Cosmetics I	80 (03)	80(1.5)	160 (4.5)
5.5	Cosmetic Analysis II	80 (03)	80(1.5)	160 (4.5)
5.6	Cosmetic Management -I	80 (03)	-	80 (03)
Total				880 (25.5)

Semester-VI

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
6.1	Cosmetic Technology VI	80 (03)	80(1.5)	160 (4.5)
6.2	Perfume & Colour IV	80 (03)	80(1.5)	160 (4.5)
6.3	Herbal Cosmetics IV	80 (03)	80(1.5)	160 (4.5)
6.4	Physical Cosmetics II	80 (03)	80(1.5)	160 (4.5)
6.5	Cosmetic Analysis III	80 (03)	80(1.5)	160 (4.5)
6.6	Cosmetic Management II	80 (03)	-	80 (03)
Total				880 (25.5)

Semester-VII

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
7.1	Cosmetic Technology VII	80 (03)	80(1.5)	160 (4.5)
7.2	Perfume & Colour V	80 (03)	80(1.5)	160 (4.5)
7.3	Herbal Cosmetics V	80 (03)	80(1.5)	160 (4.5)
7.4	Cosmetic Analysis IV	80 (03)	80(1.5)	160 (4.5)
7.5	Cosmetic Engineering-III	80 (03)	80(1.5)	160 (4.5)
7.6	Seminar	0	80(1.5) (Internal)	80 (1.5)
Total				880 (24)

Semester-VIII

Subject Code	Subject	Maximum Marks (Credits)		Total Marks (Credits)
		Theory	Practical	
8.1	Cosmetic Technology VIII	80 (03)	80(1.5)	160 (4.5)
8.2	Perfume & Colour VI	80 (03)	80(1.5)	160 (4.5)
8.3	Herbal Cosmetics VI	80 (03)	80(1.5)	160 (4.5)
8.4	Cosmetic Jurisprudence	80 (03)	-	80 (3)
8.5	Cosmetic Engineering-IV	80 (03)	80(1.5)	160 (4.5)
8.6	Project	-	80(1.5)	80 (1.5)
Total				800(22.5)

he is mutually permitted on terms mutually agreed to complete the same and be eligible to appear for term end examination.

- 5) Seminar and the project shall be compulsory to each student at the end semester of VIIth and VIIIth Semester.
- 6) Paper setting and assessment for a particular course would be the responsibility of the course In-charge.
- 7) A student who passes the internal tests but fails in Term End Examination of a course shall be given FF grade.
- 8) Student with FF grade in a course would be granted credit for that course but not the grade for that course and shall have to clear the concerned course.
- 9) The evaluation is based on average weightage system. Every subject has credit point based system. Every student is awarded grade point out of maximum 10 points in each subject (based on 10 point scale).
- 10) Grades-Marks for each course would be converted to grades as shown in following Table 1 for theory and table 2 for practical.

Table 1: Final Grade point for Theory

Final grade	Range of Marks obtained out of 100 or equivalent fraction	Grade point
AA	90-100	10
AB	80-89	9
BB	70-79	8
BC	60-69	7
CC	55-59	6
CD	45-54	5
FF	Below 45	0
ZZ	Absent in Examination	

Table 2: Final Grade point for Practical

Final grade	Range of Marks obtained out of 100 or equivalent fraction	Grade point
AA	90-100	10
AB	80-89	9
BB	70-79	8
BC	60-69	7
CC	55-59	6
CD	50-54	5
FF	Below 50	0
ZZ	Absent in Examination	

- 11) Equivalence of the conventional division/class with the CGPA in final semester is in accordance with the following table 3 and Grade Points for SGPA and CGPA of B.Tech. Table-4.

Table-3: Equivalence of Class/Division to CGPA

Sr.No.	CGPA	Class/Division
1.	7.5 or more than 7.5	First Class with Distinction
2.	6.00 or more but less than or equal to 7.49	First Class
3.	5.50 or more but less than or equal to 5.99	Higher Second Class
4.	5.00 or more but less than or equal to 5.49	Second Class

Table-4 : Grade Points for SGPA and CGPA of B.Tech.

Grade Point	Final Grade
9 - 10	AA
8 - 8.99	AB
7 - 7.99	BB
6 - 6.99	BC
5.5 - 5.99	CC
4.5 - 5.49	CD
0 - 4.49	FF
Absent in Examination	ZZ

- 12) Based on the grade point obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed as follows.

13) Computation of SGPA and CGPA

Every student is awarded point out of maximum out of 10 point in each subject (Based on 10 point scale). Based on the Grade point obtained in subject the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) are computed. The computation of SGPA and CGPA is as under.

Semester Grade Point Average (SGPA) is the weightage average of point obtained by a student in a semester and computed as follows.

$$SGPA = \frac{U_1 \times M_1 + U_2 \times M_2 + \dots + U_n \times M_n}{U_1 + U_2 + \dots + U_n}$$

Where U_1, U_2, \dots, U_n are subject credit of the respective course and M_1, M_2, \dots, M_n are the Grade point obtained in the respective subject (out of 10).

The Semester Grade Point Average (SGPA) for all the four semester is also mentioned at the end of every semester.

The Cumulative Point Average (CGPA) is used to describe the overall performance of a student in the course and is computed as under. CGPA shall be calculated on semester V, VI, VII & VIII.

$$CGPA = \frac{\sum_{n=5}^{n=8} SGPA(n)C(n)}{\sum_{n=5}^{n=8} C(n)}$$

Where SGPA (n) is the nth semester SGPA of the student and C_n is the nth semester total credit. The SGPA and CGPA are rounded off to the second place of decimal.

- 14) Degree will be awarded on the basis of the performance of credits from the Semester-V to VIII.

ACADEMIC CALENDAR AND TERMS

The terms and academic activities of the Sant Gadge Baba Amravati University under CGPA shall be as per the dates given below, only the years shall be changed i.e. the dates shall remain same as given below irrespective of the year.

Beginning of First Term (Semester I, III, V and VII)	:	As per University academic calendar
Beginning of Second Term (Semester II, IV, VI and VIII)	:	As per University academic calendar
Vacation	:	As per University academic calendar

Syllabus Prescribed for B.Tech (Cosmetics) Vth Semester Examination (Implemented from the Academic Session 2014-15) 5.1 Cosmetic Technology- V

Theory

- Skin Care cosmetics :-** 1) Skin creams ó Introduction, Classification, of skin creams, Cleansing creams, Night & Massage creams, moisturizing creams, vanishing cream. Hand creams all purpose creams.
- Face packs & Masks –** Introduction, water based systems, Rubber based system, vinyl based system, hydrocolloid based system Earth based system, its formulations and evaluation.
- Gels :** Purposes & Function of Gels, Main ingredients, of Gel, Emulgels
- Ointment and paste** ó Selection of ideal bases, preparation, stability & packing.
- Body Cosmetics :-** Sunscreens, Suntan & Antisunburn, Tannings. Beneficial & Adverse effect of sunlight. Solar radiation & its effects on skin. Protective mechanism of the skin. Sunscreen and suntan Preparations. Introduction Sunscreens and sustain preparations, antiperspirants & anti-oxidant preparations.
- Foot Preparations :** Introduction : Influence of foot wear foot Ailments, Foot Care & Hygiene, Bathing , The feet, Foot Powders, Foot Sprays, Foot Creams, Corn & Cullus preparations, Chillblain preparation, Athlete's Foot preparations.

Practicals :-

- Preparation of Antiperspirant & Antioxidant.
 - Cream
 - Sticks
 - Lotions
- Foot Preparations like foot cream, foot scrub, foot powder.
- Face preparations ó Face masks, face powders.

5.2 Perfume & Colours-III

Theory

- Oderous materials manufactured synthetically by following processes with reaction flow diagrams :-
 - Condensation ó Coumarin, Di-phenyl oxide & cinnamic aldehyde

- b. Esterification of Benzyl Acetate, Benzyl Benzoate.
 - c. Grignard process of Phenyl ethyl alcohol
 - d. Hydrogenation of citronellal from citronellol
 - e. Nitration of Musk of Ambrette, musk of xylene & Musk of ketone.
 - f. Oxidation- Vanillin, heptotropins, anisaldehyde, benzaldehyde
- 2) Flavours :- sources & properties of following ; Vanilla, Rose, pineapple, peppermint, mango, raspberry, orange, lemon, eugenol, citral, nerol.
 - 3) Packaging of perfumes with special emphasis on aerosol products.
 - a. Aerosol :- Principle of mechanism
 - b. Method of preparation , Cold fill method & press fill method
 - c. Packaging components.
 - 4) General formulations :-
 - a. Fixative :- Selection & uses of fixatives.
 - b. Building of perfume & body of the perfumes.
 - c. Synthetic substances, used for formulate different perfumes, their sources, properties & composition of lavenders, Rose, Jasmine, Violet, Orres, Cypre, Amber , Carnation, Magnet , Liliac, Acacid, Classic, Narcissus, Kewra, Mineral water Essences.
 - d. Revision, adaptation of incorporation of perfumes in cosmetic products, like creams , lotions, powders , eye preparations Hair Preparations nail preparations, lip & other preparations, tooth-paste & body preparation, Toilet Soaps.

Practical

- 1) Estimation of fundamentals groups like hydroxy, amino carbonyl, vitro, halogens etc
- 2) Kjeldhals estimation for nitrogen determination.
- 3) Extraction of volatile oils & its identification.

Books recommended

- 1) Perfume flowers & essential oil industries by S.B. Srivastva
- 2) Manufacture of perfumes, cosmetics, & Dekigents by Giriraj Prasad
- 3) Cosmetics of Science & Technology By Sagarin.
- 4) Industrial pharmacy- By Leon Lachman

5.3 Herbal Cosmetics- III

Theory

- 1) **Volatile Oils** : Classification of Terpenes, sources, chemical constituents, properties and uses of following; lemongrass oil, lemon oil, clove oil, cinnamon oil, eucalyptus oil, menthol, camphor , Turpentine oil, Cardamom, Orange oil, rose oil , Sandal wood oil.

- 2) Study of Cosmeceuticals of allergenic extracts.
- 3) **Antioxidants**- Natural Rejuvenators that heal detoxify & provide nourishment. Free radicals, sources of free radicals, major antioxidants, antioxidant properties, herbal antioxidants.
- 4) Various methods of extraction and Isolation of herbal constituents.

Practicals :-

- 1) Organoleptics studies & Identification test of following herbals drugs.
 - a. Aloe b. Brahmi c. Bawachi d. Chandan e. Jatamansi
 - f. Lodhara g. Nagarmotha h. Ritha i. Raktachandan
 - j. Shikakai
- 2) Extraction of Volatile oil from various herbal drugs.
 - a. Lemon grass Oil b. Lemon Oil
 - c. Eucalyptus Oil d. Orange oil
 - e. Clove oil f. Rose Oil
- 3) Practical based on preparations of various cosmetic product using herbal drugs.

Reference

- 1) Trease of Evans : Text Book of Pharmacognosy
- 2) Claus and Tyler : Pharmacognosy
- 3) Nadkarni : Materia Medica
- 4) C.S.I.R. : Wealth of India
- 5) H. Panda : Hand Book of Herbal Cosmetics
- 6) Rakesh K. Sharma & Rajesh Arora Herbal drugs.
- 7) Medicinal Plants : Alice Kurian & N. Asha Sankar
- 8) Herbal Drug Technology ; By S.J. Agrawal , M. Paridhavi
- 9) Pharmacognosy & Phytochemistry Vol 1 & II, Mohammed Ali.

5.4 Physical Cosmetics- I

Theory

- 1) **Interfacial Phenomena** : Spreading coefficient, work of cohesion, work of adhesion. Adsorption at liquid interfaces, Adsorption at solid Interface, adsorption at solid / Gas Interface. Adsorption Isotherms & its types, adsorption at solid - liquid interface, electrical properties at interface.
- 2) **Complexation** :- Metal complexes, organic complexes, molecular complexes, inclusion complexes, methods of analysis of complexes. Applications in cosmetics.

- 3) **Rheology** : Types of Flow behaviour. Thixotropy, Negative Thixotropy. Measurement of Thixotropy. Determination of flow properties, capillary Viscometer. Falling sphere viscometer, cup & Bob viscometer. Cone & plate viscometer.
- 4) **Micromeritics** : Definition, Particle size determination methods, surface area methods , Derived properties of powders, porosity in Powder, Flow Properties of Powders . Applications in cosmetics technology.

Practicals :-

- 1) To determine surface tension of given sample by stalagnometer for atleast 4 samples.
- 2) To determine viscosity by using Ostwald viscometers at room temperature atleast 4 samples.
- 3) To determine interfacial tension of given sample.
- 4) To determine hardness of given sample by complexometric analysis method.
- 5) To study effect of lubricating agent on the flow properties of powder atleast 3 samples.

Reference

- 1) Physical pharmacy by Alfred Martin, James Swarbrick.
- 2) Burger & Lee ó Physical & Technical pharmacy
- 3) Rawlins Bentleyø Text Book of Pharmaceutics
- 4) Shotton & Ridgway : Physical pharmaceutics.

5.5 Cosmetic Analysis-II

Theory

- 1) Miscellaneous methods of analysis ó Diazotization titration, Kjeldhals method for nitrogen determination.
- 2) Theoretical aspects, Basic instrumentation and applications of following methods in cosmetics. Polarimetry, refractometry, potentiometry, pH measurement, conductometry.
- 3) Quality Assurance ISO, ICH Regulatory control, Validation of equipments and analytical instruments.
- 4) Testing of containers and closures.
- 5) Stability aspect of cosmetic preparations

Practical :-

- 1) Analysis of oils and fats used in cosmetics
 - a. Determination of acids values.
 - b. Determination of saponification value
 - c. Determination of iodine value

- 2) Quantitative tests for detection of proteins and amino acids and quantitative estimation of proteins, separation of amino acids by TLC
- 3) Estimation of ascorbic acids
- 4) Identification tests and analysis of lanolin, kaolin and Bentonite.
- 5) Preparation of standard buffers (Citrate, phosphate and carbonates) and measurements of pH.
- 6) Isolation of casein from milk and identification test for protein.

Reference Book

- 1) Practical pharmaceutical chemistry part I & Part II
- 2) Vogel Text Book of practical organic chemistry.
- 3) Instrumental methods of Analysis by Willard Dean, Merit and settle words worth publication co.
- 4) Instrumental methods of analysis of cring.
- 5) Higuchi and Brochmann- Pharmaceutical Analysis
- 6) Indian Pharmacopocia
- 7) British Pharmacopoeia
- 8) USP

References Book (Practicals)

- 1) Practical Pharmaceutical chemistry Part I Beckett & Stanlak.
- 2) Indian Pharmacopoeia
- 3) Practical Inorganic chemistry by Vogel.

5.6 Cosmetic Management-I

Theory

- 1) Management process and Organisational behaviour concepts. Various approaches to management philosophy. Organisational structures, Individual Behaviour and personality, group dynamics, group behaviour.
- 2) Human Resources Management :- Concept & perspective Human resource planning. Career and Succession planning. Training and Development programmes, orientation programmes, performance appraisal & potential evaluation. Employee empowerment.
- 3) Managerial skill development :- Importance & Nature of Communication, principles and process of communications. Barriers and Gateways to communications, types of communications. Commercial letter types, writing business reports. Oral communication, presentation of Reports. Public speaking. Body language and Kinetics/ movements.
- 4) Marketing Management : Nature and Scope of Marketing marketing management. Nature & structure of Indian market, marketing information system. Marketing research, understanding market

segmentation. Product Mix, Product life cycle. New Product development- Modern marketing concepts. Promotion Mix ó advertising, sales promotion sales forecasting.

Reference :-

- 1) Financial Management By S.N. Maheshwari
- 2) Marketing Management By . Sheriekar
- 3) Human Resource Management By K. Ashwathappa.

Syllabus Prescribed for B.Tech (Cosmetic)

Vith Semester Examination

6.1 Cosmetic Technology- VI

Theory

- 1) **Antioxidants** – Introduction, General Oxidative theory, classification of Antioxidants, Choice of Antioxidant.
- 2) **Skin products for Babies** :- Introduction, skin problems in babies, Function, Requirements of baby product safety of baby products example formulation. Fillers used in cosmetics & their definition, classification properties & significance in formulation, like surfactants. Hydrocolloid preservatives, Diluents. paste, bases, preparation.
- 3) **Coloured Cosmetics** :- Manicure preparations, Cuticle Remover, Nail Bleach, Nail Cream, Nail Strengthner, Nail Lacquer- Introduction, ingredients of Nail Lacquer, Formulation, Manufacture of Nail lacquer, Base coats & Top coats, Enamel remover, Nail driver, Plastic fingernails & Elongators, Nail mending coponsitons.
- 4) **Stability of Cosmetics** : Stability of Base Formulation & its Testing , General Preservation Test, General Performance & Effectiveness Test ó Aerosol stability test, Accelerated stability test, stability of Mass produced cosmetics, Stability Based on Usage Environment.
- 5) **Depilatories** : Epilation & Depilation, formulation of depilatories using chemicals like thioglycolates, sulphide, enzymes. Evaluation of depilatories. Formulation of powder, cream, gel type depilatories & their stability aspect.

Practicals :

- 1) Eye Care Preparations : Eye Shadow stick, Eye Liner Evaluation of above products.
- 2) Preparations based on gels
- 3) Preparations of body cosmetics atleast two examples from each category.

- 4) Preparation of sulphide & thioglycolate depilatories.
- 5) Nail preparations ó Nail lackers, nail bleach, cutical remover, enamel remover.

References

- 1) Cosmetic Science and Technology by Sagarin.
- 2) Modern Cosmetics by E.J.Thomson.
- 3) Harryø Cosmetology.

6.2 Perfume & Colour-IV

Theory

- 1) Specially perfumed products :- formulation & proposing of
 - a. Alcoholic fragrance solution
 - b. Emulsified & Solid fragrances
 - c. Solubilised perfumes.
- 2) Colour, Pigment & Dyes :-
 - a. Classification uses & preparation of colours, solution/ dispersions, incorporation
 - b. Detection of colour
- 3) Heterocyclic compounds, chemistry, preparation and properties of some importance systems isoquinoline, acridine, phenothiazines.
- 4) Classification, chemistry and cosmetic properties of cosmeceutically important monoterpenes ó sesquiterpenes, diterpenes and triterpenoids.
- 5) Alkaloide ó General introduction, classifications and importance in cosmetics.

Practicals

- 1) Study of soxlet apparatus and its use for extraction.
- 2) Distillation of alcohol
- 3) Identifications of perfume and flavours.
- 4) Synthesis of odourous materials.

Books recommended

- 1) Perfume flowers & essential oil industries by S.B. Srivastva
- 2) Manufacture of perfumes, cosmetics, & Detergents by Giriraj Prasad
- 3) Cosmetics ó Science & Technology By Sagarin.
- 4) Industrial pharmacy- By Leon Lachman

6.3 Herbal Cosmetics- IV

Theory

- 1) Application of herbs and their constituents in cosmetic formulation; 1) In skin care products. 2) In Hair care products
- 2) Plants for Aromatherapy & Cosmetics:- Introduction plants & Aromatherapy sources & functioning of essential oils, application, elements & therapy, Herbal cosmetics, skin care Tonners, Hands and feet, Hair dyes, Bathing preparations.
- 3) Development and Quality control of Herbal Cosmetics development safety & efficacy evaluation clinical studies of herbals medicines nonclinical studies standardisation and quality control of Ayurvedic & Herbal preparations.

Practicals

- 1) Incorporation of herbal extracts in various herbal cosmetic products
- 2) Herbs used for skin care :-
1) Vasaka 2) Bael 3) Aloe 4) Neem 5) Mustard
6) Papaya 7) Lemon 8) Haldi 9) Tulsi 10) Chiretta 11) Ashwagandha
- 3) Herbs used for Hair care :-
1) Shikakai 2) Mandukaporni 3) Datura 4) Mehandi 5) Jatamansi
6) Amla 7) Ritha 8) Behera 9) Til 10) Fenugreek
- 4) Herbs used for Nail care :- 1) Garlic 2) Sadabahar 3) Haldi 4) Henna
5) Pann. 6) Hop 7) Birch.
- 5) Cosmeceuticals aids & Technical products :- Introduction, various herbal material used in cosmetics formulation :- Spermacity, Kaolin, Colchinal, Shellac, lard, musk, Diatomite, Bentonite, Talc.
- 6) Herbal Colours :- Annatto, Marigold, Ret beat Root, Monascus, Red Poppy Petals, Red Rose petals.

Reference

- 1) Trease of Evans : Text Book of Pharmacognosy
- 2) Claus and Tyler : Pharmacognosy
- 3) Nadkarni : Materia Medica
- 4) C.S.I.R. : Wealth of India
- 5) H. Panda : Hand Book of Herbal Cosmetics
- 6) Rakesh K. Sharma & Rajesh Arora Herbal drugs.
- 7) Medicinal Plants : Alice Kurian & N.Asha Sankar
- 8) Herbal Drug Technology ; By S.J. Agrawal , M. Paridhavi
- 9) Pharmacognosy & Phytochemistry Vol 1 & II, Mohmmmed Ali.

6.4 Physical Cosmetics- II

Theory

- 1) **Colloidal Dispersion** : Classification of colloidal Dispersion, Purification of colloidal dispersion. Stability of collids, sensitization and protective colloidal action. Optical properties, Kinetic properties & Electrical properties of colloids. Applications of colloids.
- 2) **Surface active agents** : Classification Based on chemical nature & HLB scale, Determination of HLB, chemical nature & HLB Scale, determination of HLB, Surface activity, Bulk properties of surfactant solutions, factors affecting micelle formation. Solubilisation, factors affecting solubilisation, application of solubilisation.
- 3) **Emulsion**:- Definition, classification of Emulsions Appearance & Identification. Thermodynamic causes for instability. physical Instability Markers, factors which improve physical stability, phase Inversion, Evaluation of physical stability of emulsions.
- 4) **Suspension** :- Ideal characteristic of suspension, classification of suspension, particle particle, Interaction & Behaviour factors influencing setting physical stability controlled flocculation flocculated suspension flocculation in structured vehicles.
- 5) **Diffusion** : Definition, steady state diffusion Ficks first law, Fick's second Law. Methods and procedures to study diffusion.

Practicals

- 1) To determine critical micellar concentration of given surfactant.
- 2) To determine bulk density, true density & percentage porosity of given powder.
- 3) To determine the HLB value of glyceryl monosterate, Tween 80.
- 4) To determine sedimentation volume of given suspension.
- 5) To determine particle size of given suspension using microscopic method.
- 6) To determine globule size of emulsion by optical microscopy.
- 7) To prepare and carry out, diffusion study of antiageing cream.
- 8) Determination of Zeta potential of using given suspension & emulsion a demonstration.
- 9) Accelerated stability studies on emulsion & suspension.

Reference

- 1) Physical pharmacy by Alfred Martin, James Swarbrick.
- 2) Burger & Lee's Physical & Technical pharmacy
- 3) Rawlins Bentley's Text Book of Pharmaceutics

6.5 Cosmetic Analysis-III

Theory

- 1) Study of UV, Visible spectrophotometry and I.R. Spectrophotometry , UV filter in sunscreens and other cosmetics.
- 2) Chromatography- Principles and techniques involving separation of actives from excipients and its application in cosmetics. TLC, HPLC, GLC, HPTLC, ion exchange chromatography, paper and column chromatography
- 3) Study of Flame photometry and fluorimetry and its application in cosmetics.
- 4) General concept , current legislation of cosmetic in different countries
- 5) ISO its significances, role and importance in cosmetic industry.

Practicals

- 1) Study of Lambert Berrø law and Quantitative estimation of cosmetic formulations by spectrophotometer.
- 2) Quantitative estimation of at least 5 cosmetics formulation by using instrumental techniques.
- 3) Study of rheological properties of semisolids.
- 4) Microbial analysis.

Reference Book

- 1) Chattan, Text Book of Pharmaceutical Chemistry.
- 2) Connors K.A.A. Text Book of Pharmaceutical Analysis
- 3) Vogel
- 4) Bentley and Drivers Text Book of Pharmaceutical Chemistry

6.6 Cosmetic Management II

Theory

- 1) Production Management :- Scope of production facility, location types of manufacturing system and layout. layout planning and analysis. Export promotion. production planning and control, material and handling, principles, stores management. Work environment, industrial safety management.
- 2) Entrepreneurial Development : Process of generating business ideas, Technical and economic feasibility ódeveloping detailed project report for implantation, legal provision, knowledge of laws & bye laws. Legal formalities of import & export license. International Business and entrepreneurship, entrepreneurship development. Role of management education, Total Quality management (TQM) cost befit analysis. PERT & CPM.

- 3) Financial Management : Financial Management objectives , Management of working capital, management of earning, profit planning, corporate planning and Beak Even analysis . Taxation and financial planning and policies Expansion and Diversification strategies, investment portfolio, decisions with reference to financial organizations like Banks., Trusts and insurance companies etc.
- 4) Small scale industries and cottage industries with emphasis on soaps, Detergents and other cosmetics industries . Role of Small scale industries in developing economy of India. Problems of small scale industries. Financial institutions providing assistance to India.

Reference :-

- 1) Financial Management By S.N. Maheshwari
- 2) Marketing Management By . Sheriekar
- 3) Human Resource Management By K. Ashwathappa

Master of Cosmetic Technology
(Cosmetic Technology)
(Semester Pattern)

Prospectus No.20131914

संत गाडगे बाबा अमरावती विद्यापीठ
SANT GADGE BABA AMRAVATI UNIVERSITY

गृहविज्ञान विद्याशाखा
(FACULTY OF HOME SCIENCE)

PROSPECTUS

OF

The Examination for the Degree of Master of
Cosmetic Technology with Specialization in

Cosmetic Technology

Semester-I, Winter-2012

Semester-II, Summer-2013

Semester-III, Winter-2013

Semester-IV, Summer-2014



2012

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(Cosmetic Technology)
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Prospectus No. 20131914

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SANT GADGE BABA AMRAVATI UNIVERSITY

SPECIAL NOTE FOR INFORMATION OF THE STUDENTS

- (1) Notwithstanding anything to the contrary, it is notified for general information and guidance of all concerned that a person, who has passed the qualifying examination and is eligible for admission only to the corresponding next higher examination as an ex-student or an external candidate, shall be examined in accordance with the syllabus of such next higher examination in force at the time of such examination in such subjects papers or combination of papers in which students from University Departments or Colleges are to be examined by the University.
- (2) Be it known to all the students desirous to take examination/s for which this prospectus has been prescribed should, if found necessary for any other information regarding examinations etc., refer the University Ordinance Booklet the various conditions/provisions pertaining to examination as prescribed in the following Ordinances.

- Ordinance No. 1 : Enrolment of Students.
- Ordinance No. 2 : Admission of Students
- Ordinance No. 4 : National cadet corps
- Ordinance No. 6 : Examinations in General (relevent extracts)
- Ordinance No. 18/2001 : An Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in the subject and condonation of defficiency of marks in a subject in all the faculties prescribed by the Statute No.18, Ordinance 2001.
- Ordinance No. 9 : Conduct of Examinations (relevent extracts)
- Ordinance No. 10 : Providing for Exemptions and Compartments
- Ordinance No. 19 : Admission of Candidates to Degrees.

- Ordinance No. 109 : Recording of a change of name of a University student in the records of the University.
- Ordinance No. 6 of 2008 : For improvement of Division/Grade.
- Ordinance No.19/2001 : An Ordinance for Central Assessment Programme, Scheme of Evaluation and Moderation of answerbooks and preparation of results of the examinations, conducted by the University, Ordinance 2001.

Dineshkumar Joshi
Registrar
Sant Gadge Baba Amravati University

DIRECTION

No. : 28/2012

Dated :- 29.6.2012

Subject : Examinations leading to the Degree of Master of Cosmetic Technology in the Faculty of Home Science (Semester Pattern - Credit Grade Based System), Direction, 2012

Whereas, the Degree of Master of Technology (Cosmetics) in the Faculty of Home Science is in existence in the University under Ordinance No.24 of 2004.

AND

Whereas, the Academic Council in its meeting held on 5.5.2012 while considering item No.53 (3) A) R-1 has resolved to accept the Draft Schemes of Teaching and Examinations, Draft Syllabus and Draft Ordinances for M.Tech. (Cosmetics) (All Specializations) along with other details as per semester system and credit grade based system, and further resolved to refer the Draft Scheme of Teaching and Examination and Draft Ordinances to the Ordinance Committee for making Ordinances and Regulations.

AND

Whereas, the Hon'ble Vice-Chancellor has accepted the corrections recommended by Chairman, Ad-hoc Committee in Cos.Tech. & Dean, faculty of Home Science u/s 14(7) of the Maharashtra Universities Act, 1994 on 25.6.2012 on behalf of the authorities of the University.

AND

Whereas, it is necessary to frame an Ordinance/Regulation for M.Tech. (Cosmetics) as per semester pattern and credit grade system.

AND

Whereas, the making of Ordinance/Regulation for M.Tech.(Cosmetics) Semester-I to IV as per semester pattern and credit grade system is a time consuming process.

AND

Whereas, the Academic Session is commencing from June 2012 and it is necessary to provide the Schemes of examinations, eligibility criteria along with other details for the admission of students in the above pattern.

Now, therefore, I, Dr. Mohan K.Khedkar, Vice Chancellor of Sant Gadge Baba Amravati University, in exercise of powers conferred upon me under sub-section (8) of section 14 of the Maharashtra Universities Act., 1994, do hereby direct as under:

- 1) This Direction may be called "Examinations leading to the Degree of Master of Cosmetic Technology in the Faculty of Home Science (Semester Pattern - Credit Grade Based System), Direction, 2012".
- 2) This direction shall come into force from the date of its issuance.
- 3) The Examinations in Master of Cosmetic Technology course shall be conducted in following four specializations.
 - I) Cosmetic Technology
 - II) Quality Assurance
 - III) Perfumes & Colours
 - IV) Herbal Cosmetics
- 4) Subject to the compliance of the provisions of this Direction and any other ordinances in force from time to time, an applicant for admission to the Master of Cosmetic Technology Semester-I examination shall have passed Degree course in Cosmetic Technology of Amravati University or of any other statutory University equivalent thereto possessing minimum of 50% marks or its equivalent grade point in C.G.P.A. For admission to M.Tech. Semester-II, a candidate should have satisfactorily completed Semester-I.
- 5) An applicant for admission to the final M.Tech. (Semester-III & IV), Examinee should have satisfactorily completed Ist and IInd Semester i.e. the First M.Tech. Examination of this university, and shall have prosecuted a regular course of study in the Department/College as prescribed in this Ordinance. An applicant for the examination to the Final M.Tech. (Semester-III & IV) shall not be allowed to take the examination if he/she fails to submit to his/her dissertation on or before the 20th December or 31st May of the calendar year in which he/she has to take the examination.
- 6) The duration of the course leading to the degree of Master of Cosmetic Technology in the Faculty of Home Science shall be of two years consisting of Four Semesters, each of six months duration. There shall be Four examinations leading to the degree of Master of Cosmetic technology namely :
 - a) The first Examination shall be held at the end of six months which shall be known as Master of Cosmetic Technology Semester-I examination.
 - b) The Second Examination shall be held at the end of second semester and shall be known as Master of Cosmetic Technology Semester-II Examination.
 - c) The third Examination shall be held at the end of third semester and shall be known as Master of Cosmetic Technology Semester-III Examination.

- d) The fourth Examination shall be held at the end of fourth semester and shall be known as Master of Cosmetic Technology Semester-IV Examination.
- 7) The supplementary examinations shall be held for all semesters of M.Tech. examinations.
- 8) The Examination shall comprise of:
- (a) Semester-I
- | | |
|------------------------------|-----------|
| (i) Theory ‘ | 320 marks |
| and it’s Internal assessment | 80 marks |
| (ii) Practical | 140 marks |
| it’s Internal assessment | 60 marks |
- (b) Semester-II
- | | |
|------------------------------|-----------|
| (i) Theory | 240 marks |
| and it’s Internal assessment | 60 marks |
| (ii) Practical | 140 marks |
| it’s Internal assessment | 60 marks |
- (c) Semester-III
- | | |
|--|-----------|
| (i) Seminar on Research Envisaged for Dissertation | 100 marks |
| (ii) Seminar Recent Trends in Cosmetic Sciences | 150 marks |
- (d) Semester IV
- | | |
|---|-----------|
| (i) Seminar, Dissertation & Viva voce Internal | 100 marks |
| (ii) Seminar, Dissertation & Viva voce External | 200 marks |
-
- | | |
|-------------|-----------|
| Grand Total | 1650marks |
|-------------|-----------|

For theory examination :- For Internal assessment / sessionals / home assessments two sessional examinations shall be conducted each of 20 marks per semester. Average marks obtained out of the two examinations will be awarded.

For Practical Examination : One sessional examination each of 30 marks shall be conducted and marks will be awarded. The Head of the Department / Principal shall maintain in his / her office a complete record of the marks obtained by the candidates towards the Internal Assessment / Sessional and shall send them to the Controller to Examinations at least 15 days before the commencement of the theory examination.

- 9) Students admitted for Semester III of Maser of Cosmetic Technology shall carry out research under an approved guide belonging to that institution / college.
- 10) The defence examination of an examinee of Semester IV examination of master of cosmetic Technology shall be carried out by
- External Examiner appointed by the University, and
 - The guide guiding the Dissertation / Thesis
 - In Case of dispute, the opinion of the external examiner shall be final and binding.
 - Provided further that the external examiner shall submit a report to the controller of Examinations immediately.
- 11) i) Seminar on Recent Trends in Cosmetic Sciences of third semester should be held at college level & marks should be submitted to the university at the end of third semester.
- ii) Viva voce & defence examination based on the dissertation work will be carried out at the end of fourth semester in presence of external & internal examiners & marks should be sent to the university at the end of fourth semester.
- 12) i) The Scope of the topics in various papers shall be as indicated in the syllabus .
- ii) The medium of instruction and the examination shall be English only.
- 13) An Examinee who secures minimum of 50% of Marks in each theory paper, Seminar, Dissertation / Thesis, Viva-Voce shall be declared successful at the examination.
- 14) The fees for the examination shall be as prescribed by the University from time to time.
- 15) i) An Examinee who is unsuccessful at an examination shall be eligible for admission to the Examination in next theory / practical / Seminar dissertation Thesis and Viva Voce on pay of such fees as may be prescribed by the University from time to time.
- ii) For being eligible for exemption in a paper or a practical or dissertation and viva voce a candidate must have obtained minimum 50% of marks in that paper / Practical / Dissertation and viva voce as the case may be.
- 16) Without prejudice to the other provision of Ordinance No. 6 relating examinations in general the provisions of paras 5,8,10,23 and 31 of the said Ordinance shall apply to every candidate.
- 17) Provisions of Ordinance No. 18 of 2001 relating to an Ordinance to provide grace marks for passing in a Head of passing and Improvement of Division (Higher Class) and getting Distinction in

the subject and condonation of deficiency of marks in a subject in all the faculties prescribed by the Statute No. 18, Ordinance 2001 shall apply to the examination under this Direction.

- 18) The examination leading to the Semester I / Semester II / Semester III/ semester IV of Post graduate Master degree in Cosmetic Technology shall be held twice a year at such places and on such dates as decided by the Board of Examination.
- 19) The Schemes of Teaching & Examinations with credits along with other details & features of credit system for First, Second, Third and Fourth Semester for the Degree course “Mater of Cosmetic Technology” shall be as per **Appendices-I to III**.
- 20) Notwithstanding anything to the contrary in this Direction, no person shall be admitted to these examinations if he/ she has already passed the same examination or any examination equivalent there to any other statutory University.
- 21) The Degree, in the prescribed form shall be signed by the Vice-Chancellor of the University.

Sd/-

(Dr.M.K.Khedkar)

Vice-Chancellor

Amravati

Dated : 28/06/2012

APPENDIX II
SCHEME FOR CREDITS BASED ON CONTACT HOURS
DISTRIBUTION OF
SEMESTER III & IV

SEMESTER-III

The topic for the **research envisage for dissertation and seminar on recent trends in Cosmetic Sciences** shall be assigned to him/her by the Guide within one month from the date of the commencement of the third semester.

A. SEMINAR ON RESEARCH ENVISAGED FOR DISSERTATION :
18 Hrs/Wk = 9 Credits

Contents	Credits
1. Selection of research topic and their applicability	02
2. Introduction and information retrieval systems	02
3. Reading research papers	02
4. Skill in oral presentation	03
Total	09

B. SEMINAR ON RECENT TRENDS IN COSMETICS SCIENCES

Contents	Credits
1. Introduction and information retrieval systems	01
2. Organization of material and references	01
3. Representation	01
4. Skill in oral presentation	02
5. Questioning and defending	02
6. Report	02
Total	09

“The report on seminars shall be submitted by respective guide/supervisor to Head of Department/Principal.”

SEMESTER –IV

Seminar, Dissertation & Viva-voce

Contents	Credits
1. Introduction, information retrieval systems	02
2. Experimental Work	06
3. Scientific Contents	02
4. Result/ Conclusion	04
5. Organization of scientific material, thesis, dissertation and references	04
Total	18

APPENDIX-III
Sant Gadge Baba Amravati University, Amravati
M.Tech (Cosmetics) Syllabus
Credit-grade based performance and assessment system (CGPA)
FEATURES OF THE CREDIT SYSTEM

- Master’s degree would be of 72 credits each.
- 4 credit course of theory will be of four clock hours per week running for 12 weeks.
- 3 credit course of theory will be of four clock hours per week running for 12 weeks.
- 1.5 credit course of practical will consist of 3 hours of laboratory exercise for 12 weeks.
- 1.5 credit course of practical/demonstration will consist of 6 hours of laboratory exercise for 12 weeks.

FIRST SEMESTER SHALL HAVE 5 THEORY COURSES, 2 PRACTICAL COURSES

- 2 Theory courses x 3 credits = 06 credits
 - 3 Theory courses x 4 credits = 12 credits
 - 2 Practical course x 1.5 credit = 03 credit
- Total = 21 credits

SECOND SEMESTER SHALL HAVE 3 THEORY COURSES, 2 PRACTICAL COURSES

- 3 Theory courses x 4 credits = 12 credits
 - 2 Practical course x 1.5 credit = 03 credit
- Total = 15 credits

THIRD SEMESTER SHALL HAVE 2 PRACTICAL COURSES OF 18 HRS./WK EACH

- 36 Practical courses/wk of 0.5 credit each = 18 credit
- Total = 18 credits

FOURTH SEMESTER SHALL HAVE 1 PRACTICAL COURSE 36 HRS./WK

- 36 Practical courses/wk of 0.5 credit each = 18 credit
- Total = 18 credits

EVERY STUDENT SHALL COMPLETE 72 CREDITS IN A MINIMUM OF FOUR SEMESTERS. FIRST SEMESTERS WILL HAVE 21 CREDITS, SECOND SEMESTER WILL HAVE 15 CREDITS, THIRD SEMESTER WILL BE OF 18 CREDITS AND FOURTH SEMESTER WILL BE OF 18 CREDITS.

- First semesters 21 credits = 21 credits
 - Second Semester 15 credits = 15 Credits
 - Third semester 18 credits = 18 credits
 - Forth semester 18 credits = 18 credits
- Four semesters total credits = 72 credits**

SCHEME OF SYLLABUS AND CREDIT SYSTEM

- 1) One credit is equal to one theory hour therefore three/four credits will be for each theory subject as the case may be & one credit is equal to two practical hours therefore for each practical subject there will be 1.5 credits.
- 2) Nine credits, in third semester have been allocated for recent trends in the Cosmetic Sciences.
- 3) Total Eighteen credits have been allocated for the seminar, dissertation & viva voce.
- 4) Academic calendar showing dates of commencement and end of teaching, internal assessment tests and term end examination shall be duly notified before commencement of each semester every year by the affiliated colleges.
- 5) Credit system offers more options to students and has more flexibility.
- 6) Students can get requisite credits from the concerned colleges where he is mutually permitted on terms mutually agreed to complete the same and be eligible to appear for term end examination.
- 7) The term end examination, however, shall be conducted by the Sant Gadge Baba Amravati University in the allotted centers.
- 8) The research/dissertation work shall be compulsory.
- 9) These activities, including preparation of the result-sheets for the students, would be co-ordinated by the Department Examination Committee comprising Course in-charges and HOD or Head of the institution.
- 10) A student who passes the internal tests but fails in Term End Examination of a course shall be given FF grade.
- 11) Student with FF grade in a course would be granted credit for that course but not the grade for that course and shall have to clear the concerned course.

- 12) The evaluation is based on average weightage system. Every subject has credit point based system. Every student is awarded grade point out of maximum 10 points in each subject (based on 10 point scale).
- 13) Grades-Marks for each course would be converted to grades as shown in following Table 1.

Table 1: Grade point for Theory/ Practical/Laboratory course /Seminar

Grade	Range of Marks obtained out of 100 or equivalent fraction	Grade point
AA	90-100	10
AB	80-89	9
BB	70-79	8
BC	60-69	7
CC	55-59	6
CD	50-54	5
FF	Below 50	0
ZZ	Absent in Examination	

- 14) Equivalence of the conventional division/class with the CGPA in final semester is in accordance with the following table 2 and Grade Points for SGPA and CGPA of M.Tech in Table-3.

Table-2: Equivalence of class/Division to CGPA

Sr.No.	CGPA	Class/Division
1.	7.5 or more than 7.5	First Class with Distinction
2.	6.00 or more but less than or equal to 7.49	First Class
3.	5.50 or more but less than or equal to 5.99	Higher Second Class
4.	5.00 or more but less than or equal to 5.49	Second Class

Table-3 : Grade Points for SGPA and CGPA of M.Tech.

Grade Point	Final Grade
9 - 10	AA
8 - 8.99	AB
7 - 7.99	BB
6 - 6.99	BC
5.5 - 5.99	CC
5 - 5.49	CD
0 - 4.99	FF
Absent in Examination	ZZ

- 15) Based on the grade point obtained in each subject, Semester Grade Point Average (SGPA) and then Cumulative Grade Point Average (CGPA) are computed as follows.

16) Computation of SGPA and CGPA:

Every student is awarded point out of maximum out of 10 point in each subject. (Based on 10 point scale). Based on the Grade point obtained in subject the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) are computed. The computation of SGPA and CGPA is as under.

Semester Grade Point Average (SGPA) is the weightage average of point obtained by a student in a semester and computed as follows.

$$SGPA = \frac{U_1 \times M_1 + U_2 \times M_2 + \dots + U_n \times M_n}{U_1 + U_2 + \dots + U_n}$$

Where U_1, U_2, \dots are subject credit of the respective course and M_1, M_2, \dots are the grade point obtained in the respective subject (out of 10).

The Semester Grade Point Average (SGPA) for all the four semester is also mentioned at the end of every semester.

The Cumulative Grade Point Average (CGPA) is used to describe the overall performance of a student in the course and is computed as under. CGPA shall be calculated on final semester of the course (i.e from Semester I-IV).

$$CGPA = \frac{\sum_{n=1}^{n=4} SGPA(n)C(n)}{\sum_{n=1}^{n=4} C(n)}$$

Where SGPA (n) is the nth semester SGPA of the student and C_n is the nth semester total credit. The SGPA and CGPA are rounded off to the second place of decimal.

ACADEMIC CALENDAR AND TERMS

The terms and academic activities of the college affiliated to Sant Gadge Baba Amravati University under CGPA shall be as per the dates given below, only the years shall be changed i.e. the dates shall remain same as given below irrespective of the year.

Beginning of First Term (Semester I, and III) : As per University academic calendar

Vacation : As per University academic calendar

Beginning of Second Term (Semester II, and IV) : As per University academic calendar

**Syllabus prescribed for the course of Master of Cosmetics Technology
(Ist Semester)
(Implemented from the Academic Session 2012-13)**

**1-T-1 Principles of Cosmetics Technology
(Common for all specialization)**

Theory :

Inter facial Phenomena: Liquid-Liquid interface: Insoluble monolayers, surface pressure, surface potential, surface rheology and their measurement, structure and state of monolayers, mixed monolayers, Macromolecular films, Biological membranes, Liquid-Solid interface, details study of wetting , detergency and water repellance.

Solubilization : Micelle formation, factors affecting micelle formation and physical methods of investigation of micellar solutions, Theory and mechanism of solubilization. Some factors in the formulation of cosmeticeuticals containing solubilized materials like choice of surface active agents, effects and the nature of the solubility, effect of co-solublizing agents on the solubilizing action of surface active agents, effect of temperature on the solubilization, phase equilibria in system containing surfactants, application of solubilization, solubilization of phenolic disinfectants, idophers, Vitamin preparations, Hormones solution, steroids, flavors and perfumes, etc.

Theories of Dispersion Techniques : General basic physical consideration, adsorption and interfacial energetics and study of relevant equations, adsorption on solid surface, electrical phenomena at interfaces, particle-particle interactions, influence of polymer adsorption on particle, vehicle interaction, flocculation kinetics, controlled flocculation, Application of dispersion techniques in formulation of emulsion and suspension.

Suspension : Theory, production, equipment, Industrial processing and large scale manufacturing.

Emulsions : Electrical theories of stabilization of emulsions, assessment and prediction of emulsion shelf life, equations involved in emulsion stability stress conditions and physical parameters employed to evaluate emulsion stability, presentation of interaction between preservation and emulsion ingredients like surface active agents hydrophilic polymers, suspended particle, packaging materials etc. prediction of preservative efficiency. Production, equipments, Industrial processing and large scale manufacture.

Rheology : Theoretical consideration. Thixotropy, spurs and bulges in the hysteresis loop continuous shear rheometry of semisolids, viscoelasticity, the creep test, study including principle of operation and application cone

& plate, blonnei, Mac Michal, Brooke - field viscometer. Chemical and physical factors affecting rheological properties. Rheology and product design, Rheology of cosmetic products. Rheological and Biological application.

Micromeritics: Adsorption, air permeability techniques and determination of surface area and size of particals and classification and evolution of some basic properties of powders, flow properties of various powder system.

Recommended Books:

- 1) "Advanced in Pharmaceutical Sciences" Vol. I, II, III & IV, edited by Bran, Becheti & Carless.
- 2) Martin A.N. "juiysical Pharmacy"
- 3) Lachman et al "The Theory and Practice of Industrial Pharmacy".
- 4) "Remington, Pharmaceutical Practice" Mac Publications, USA.
- 5) Badger W.L., & Banchemo "Introduction of Chemical Engineering."
- 6) Chemical Engineering by Richardson & Crudson.

**1-T-2 Quality Assurance Technique
(Common for all specialization)**

Theory :

- 1) The theoretical aspects, basic instrumentation and applications of following technique in analysis of cosmetic raw materials and cosmetic preparation.
 - a. Separation technique :- Gel filtration Chromatrography, ion exchange chromatography, affinity chromatography, HPLC, HPTLC, GLC and paper chromatography.
 - b. Introduction and brief study of spectroscopic technique UV Visible , IR, NMR, Mass , Atomic absorption spectroscopy and flame photometry.
 - c. Light scattering methods in qualitative analysis. Nephilometry and Turbidimetry.
- 2) General methods of analysis to determine quality of raw materials used in cosmetic industry and evaluation of products :- Emulsion (Liquid, Cream), Suspension (lotion), Powders (Talcum, Baby, Compact), Lipsticks, Mascara, Kajal, Hair Care products (Shampoo, Colorants), Tooth paste, tooth powder, Deodorants, aerosols etc.
- 3) Validation of analytical methods and calibration of instruments and equipments.
- 4) Sampling plans and procedures
- 5) Stability testing – Role of stability testing, stability test guidelines, protocols of stability testing including testing under different climatic zones, and conditions, presentations and recording of stability data and determination of shelf life.

- 6) Documentation – Importance of documentation, statutory requirements and procedure for documentation.
- 7) Principles and procedure involved in Biological tests of Following.
 - a. Absence of pyrogens.
 - b. Histamine like substances
- 8) Determination of toxic elements.
- 9) Introduction of skin absorption and studies and their importance.
- 10) Quality assessment of packaging containers, closures etc
- 11) Compliance and drug and cosmetic act 1940 with reference to provisions for packaging and labelling (Rule 150A, Schedule S) permitted colors, flavours etc.

Books Recommended

- 1) Principles of Instrumental analysis by D.A. Skoog
- 2) Instrumental methods of chemical analysis by B.K. Sharma
- 3) Instrumental methods of chemical analysis by G.R. Chatwal and S.K. Anand
- 4) Introduction to instrumental analysis by F.D. Brawn
- 5) Analytical chemistry by G.D. Christian.
- 6) Classification of cosmetic raw materials and adjuncts IS 3958 of Indian standard.
- 7) F.V. Smith, J.T. Stewart Text Book of Bio pharmaceutical analysis.
- 8) Indian Pharmacopocia 2007 controller of publications Govt. of India, New Delhi.
- 9) Beckett and stanlake practical pharmaceutical chemistry part I & II
- 10) K.A. Cannors, Text Book of pharmaceutical analyser

1-T-3 Product Development & Formulation (Common for all specialization)

Theory :

- 1) **Development of New Cosmetics :-** Steps involved in development new cosmetics, abstracts to its evaluation, limitation of screening procedures, skin toxicity test. Generation of Laboratory data & new cosmetics application as per WHO norms. Requirements and guidelines on clinical trials of new cosmetic in India.
- 2) **Pilot Plant scale up techniques** – Purpose & function, concept of & pilot plant for development & contract, planning of pilot plant size of pilot plant, organization & personnels, as per schedules
- 3) **Topical active delivery system** – Percutaneous absorption, factors affecting vehicles and in cosmetic preparation, enhancers, controlled released cosmetics & general consideration, design & formulation options as microencapsulation, Liposome, nano technooogy etc.

- 4) **Product Developemnt Approaches :-** Product Development Approaches for Emulsion, suspension, powders, shampoos, tooth paste, antiperspirants, deodorant, Nail lacquers, Aerosal, Soaps & perfume.
- 5) **Performualtion studies :-** Physicals & chemical problems inherent in development of new formualtion.
- 6) **Physical proteries** – physical form, particle size, solubility wetting of solid, flow properties, organoleptic properties. Chemical properties & stability .

Recommended Books

- 1) Cosmetic Science and Technology Vol I, II, III by Sagarin.
- 2) Harry's Cosmetology
- 3) Theory and Practice of Industrial Pharmacy by Leon Lachman.
- 4) New Cosmetic Science
- 5) Indian Herbs by Chopra
- 6) Wealth of India by CSIR

1-T-4 Biostatistics (Common for all specialization)

Theory :

Biostatistics :- Histograms and Frequency Polygons, measure of central tendency (mean, median and mode), dispersion standard mean and quartile deviation and range), skewness and kurtosis : Probability - Bayes theorem, variable and distributions (including Chi-square, t and f test); Non-parametric tests - Sign, run and order statistics median tests; Confidance intervals, square methods, regressions and randomizations; Analysis of variance (1-2- and 3-way) and covariance; quantitative response relationship and probit analysis, Correlation and Co-efficient of Correlation.

REFERENCES

- 1) Pharmaceutics Statistics by Bolton Marcel Dekkar inc.
- 2) Biostatistics and Computer by Dr.Paradkar.

1T5 Research Methodology (Common for all specialization)

Theory :

Research Methodology:- Introduction to Research Methodology – Importance of research in decision making, defining research problem and formulation of scientific experimental design.
Data Collection and Measurement:- Methods and techniques of data collection sampling and sampling designs attitude measurements and scales.

Data Presentation and Analysis :- Data processing statistical analysis and interpretation of data non-parametric tests multivariate analysis of data model building and decision making.

Report Writing and Presentation :- Substance of reports, formats of reports, presentation of a report.

Research Paper: Preparation of research paper, presentation of research paper.

Reference Books :-

- 1) Methodology of Economic Research by A.K.Dasgupta.

**1-P-1 Quality Assurance Technique
(Common for all specialization)**

Practicals

- 1) Use of spectrophotometer for analysis of cosmetic raw materials and their formulations.
- 2) Applications of Basic Chromatographic techniques.
- 3) Simultaneous estimation of combination preparation.
- 4) Application of IR for interpretation of samples with different functional groups.
- 5) Analysis of cosmetic and their adulteration with reference to drugs and cosmetic rules 1945.

**1-P-2 Product Development & Formulation
(Common for all specialization)**

Practicals

1. Evaluation of Stability of Emulsions through different methods,
 - a. Accelerated Stability Study,
 - b. Particle Size Analysis,
 - c. Other Parameters.
2. Evaluation of Stability of Suspensions through different methods.
 - a. Accelerated Stability Study.
 - b. Particle Size Analysis.
 - c. Other Parameters.
3. To measure Zeta potential of emulsion and to co-relate with stability.
4. To measure Zeta potential of suspensions and to co-relate with stability.
5. To Study the thixotropic behaviours of some creams.
 - a. Viscosity
 - b. Sedimentation.
6. To Study the thixotropic behaviours of some lotions.
7.
 - a. Viscosity
 - a. Sedimentation.
8. To demonstrate the effect of air entrapment on rheology of creams.

9. To determine the cmc of surfactants by stalagmometer. (Anionic, Cationic, Nonionic, Ampholytic)
10. To determine the cmc of surfactants by capillary rise method.
11. To study the effect of salts on cmc of surfactant.
12. Determination of amount of surfactants with respect to phase-volume ratio.
13. Antioxidants, Emulsifying agents.'
14. Interaction between the preservatives, antioxidants, emulsifying agents.
15. Interaction of above mentioned additives on the different packaging material.
16. To study the effect of pH on partition co-efficient of weak acids.
17. To study the effect of solvents on partition co-efficient of weak acids.
18. To study the flow properties of powders.
 - i. Effect of Particle size, b) Moisture content on angle of repose,
 - ii. other additives like glidants & lubricants.

**Syllabus prescribed for the course of Master of Cosmetics Technology
with Specialization in Cosmetics Technology
(IInd Semester)
(Implemented from the Academic Session 2012-13)
2-T-1 Advanced Cosmetic Technology I**

Theory :

- 1) Unit operations :- Unit operations related to manufacturing of cosmetics Emulsification, mixing, compaction, moulding, study of machines used in unit operations. Raw materials commonly used water, preservatives, antioxidants, humectants oils, fats & waxes, control of microbial contamination in manufacturing of cosmetics use of cyclodextrins in cosmetic preparations.
- 2) Skin care cosmetics :- Development of formulations & manufacturing consideration for creams & lotions, suntan & anti sunburn preparations skin bleaches, Skin tonics & astringents. Antiperspirent & deodorants face powder & colored make up preparation. face pack & masks lipstics & bath preparation. Latest ingredients be used in the formulation.
- 3) Eye Cosmetics :- Introduction eye shadow, eye liners, eye brow preparations & mascara. Evaluation of eye cosmetics.
- 4) Microencapsulation technique in cosmetics :- Definition of microcapsules study of core & coating materials used in microencapsulation. Advantages & disadvantages. Various methods used to prepare microcapsules like polymerisation technique, phase separation coacervation technique(s) spray drying & congealing study of microspheres & its preparation. Evaluation of microcapsules & microspheres.

(IInd Semester)**2-T-2 Advanced Cosmetic Technology II****Theory :**

- 1) Liposomal delivery of cosmetics : Definition advantages, disadvantages composition, classification, loading techniques, preparations of liposomes by various methods, characterisation of liposomes. Neosomes & disomes & organogels & detailed study related to cosmetics.
- 2) Hairs :- Structure & chemistry of hair shaft, absorption theory & hair roots & enhancers Nutrients for hair growth and growth stimulators
- 3) Hair Care Cosmetics : Hair Cleansers shampoo, Cream shampoo, shampoo cakes, Hair nutrients, hair tonics, hair oils, Brillantiones, Gels , Hair conditioners, hair lose, Dandruff, hair grooming preparation, hair waver, hair straighteners, hair setters, hair softners (shaving creams & gels) Quality control studies & stability.

- 4) Nail Cosmetics :- Cuticle cream, oils & removers nail bleaches. Nail polish using film former polymers as basic materials, Quality control testings.

Books Recommended

- 1) Cosmetics science & Technology vol I, II IV by sqrix
- 2) Harry's Cosmetology
- 3) New Cosmetics science
- 4) Novel Cosmetic Market & Dehairker
- 5) Cosmetics technology by Nanda & Khar
- 6) Theory & Practicals in Novel Drug Delivery Systems
- 7) Text Book of S.P. Vyas cosmetics by NPMQ, Rathore & Dubey

(IInd Semester)

**2-T-3 Skin Dermatology
(Common for all specialization)**

Theory :**Skin Dermatology**

- i) **Skin** : Anatomy and Physiology of skin and appendages. Hair, Nail, Sebaceous Gland, Sweat Gland.
- ii) **Common Dermatological Diseases and Therapy** : Acne, Alopecia, Dermatitis (Atopic Contact), Dry skin, Hyperpigmentation and Hypopigmentation, Miliria Seborrheic dermatitis and Dandruff, Sun reaction and protection, Preparation of skin aging.
- iii) **Formulary** : Topical corticosteroids, Topical anti-infective, healing agents, Depilatories and removal of excess Hair by thermolysis, electrolysis, Keratolytic, Pigmenting agent.

References:

- 1) Anatomy and Physiology by Ross G Wilson.
- 2) Manual of Dermatologic Therapeutics by Kenneth A. Amdt, (A Little • Brown Company)
- 3) Roxburgh's common skin diseases.

(IInd Semester)**2-P-1 Advanced Cosmetic Technology I****Practicals**

- 1) Formulation and Preparation of various skin care cosmetics :
 - a. Creams, b) Lotions, c) Suntan and anti sun burn preparations d) Skin bleaches e) skin tonics and Astringents 1) Anti Perspirants & deoderants g) Face powder h) Lipsticks i) Bath Preparations.

- 2) Formulations and Preparations of Eye- Cosmetics
 - a) Eye shadow b) Eye liners c) Eye brow d) Mascara
- 3) Evaluation of above formulations
- 4) Preparations of microcapsules using biodegradable polymer (Natural & synthetic)

(IInd Semester)

2-P-2 Advanced Cosmetic Technology II

Practicals

- 1) Formulations and Preparations of various Hair Care Cosmetics
- 2) Shampoo- Detergent and Non-detergent type
- 3) Hair Tonics, Hair setting preparations, Hair Grooming product, Shaving Soaps, Hair Colorants, Hair oils
- 4) Formulations and preparation of Cosmetics for Nails :
 - 1) Cuticle creams 2) Cuticle oils and removers
 - 3) Nail bleaches 4) Nail Polish
 - 5) Nail Polish Removers.
- 5) Formulations and preparations of Dental cosmetics.
 - a) Tooth paste b) Tooth Gel
 - c) Tooth Powders d) Mouth washes
- 6) Preparations of lyposome using different film formers & bases.

Syllabus Prescribed for the course of Master of Cosmetics Technology

(IIIrd Semester)

(To be implemented from the Academic Session 2013-14)

(Common for all specialization)

Seminar :

- (a) The seminar shall be based on research envisaged for dissertation.
- (b) The seminar shall be based on recent trends in Cosmetic Sciences.

Syllabus Prescribed for the course of Master of Cosmetics Technology

(IVth Semester)

(To be implemented from the Academic Session 2013-14)

(Common for all specialization)

Dissertation :

Every student for the degree of Master of Cosmetic Technology (all specialization) shall be required to undertake a dissertation work involving Methodical research under the supervision of an approved guide and submit three copies of the report of the dissertation work, duly certified by the supervisor to the Head of the Department. .

Research Reviews:

Seminar on Dissertation :-

The candidate shall deliver seminar during the session, on selected topics of current research interest as reported in the research journals in the field of Cosmetic Technology. The candidate shall deliver seminar after completion of dissertation work.

Viva-Voce :

Viva-voce shall be based on dissertation work.
