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### B.Com.- 3 years Undergraduate programme Outcomes

(PO) PO1. The students after the completion of this programme will be enabled to overcome the challenges and cash in the opportunities in the field of commerce.

PO2. The students after the completion of this programme will become well prepared to take up various professional assignments, engagements and jobs in medium to large scale business establishments, industries, commercial set-ups and other public/private commercial sectors like banking, stock-exchange, insurance, NBFCs as accountants, investment bankers, business analysts, finance officers, business / financial advisors etc.

PO3. The students will be able to think critically and take informed decisions after identifying the accuracy and validity of their assumptions and ideas from intellectual, organizational, and personal perspectives.

PO4. The students will be able to communicate effectively through speaking, reading, writing and listening clearly in one Indian language and thereby express themselves to the world by connecting with different ideas, books, people, media and technology.

PO5. The students will be able to interact socially and stimulate views, reconcile disagreements and help reach consensual conclusions.

PO6. The students will be able to demonstrate compassionate

PO7. The students will be able to ethically recognize different value systems, understand the moral dimensions of individual decisions and accept responsibility for them.

PO8. The students will be able to recognize the issues of environmental perspectives and appreciate sustainable development for long term environmental sustainability.

PO9. The students will be able to engage themselves in life-long self-determining and learning in the comprehensive background of socio-technological changes for continued self-directed and life-long learning.

### Programme Specific Outcomes (PSO)

PSO1. The students after the completion of this programme will become well versed with financial accounting.



*P. Gaur*  
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- PSO2.** The students after the completion of this programme will become well versed with business communication.
- PSO3.** The students after the completion of this programme will be able to understand business mathematics.
- PSO4.** The students after the completion of this programme will be able to understand business regulatory framework.
- PSO5.** The students after the completion of this programme will be able to identify a business environment.
- PSO6.** The students after the completion of this programme will be able to understand the economics of a business.
- PSO7.** The students after the completion of this programme will be able to understand the essentials of corporate accounting.
- PSO8.** The students after the completion of this programme will be able to understand the essentials of company law.
- PSO9.** The students after the completion of this programme will be able to understand the essentials of cost accounting.
- PSO10.** The students after the completion of this programme will be able to understand the principles of business management.
- PSO11.** The students after the completion of this programme will be able to understand the essentials of business statistics.
- PSO12.** The students after the completion of this programme will be able to understand the fundamentals of entrepreneurship.
- PSO13.** The students after the completion of this programme will be able to understand the principles of direct taxation - income tax.
- PSO14.** The students after the completion of this programme will be able to recognize the procedures of auditing.
- PSO15.** The students after the completion of this programme will be able to understand the essentials, principles and procedures of indirect taxation and GST.
- PSO16.** The students after the completion of this programme will be able to understand the essentials of management accounting.
- PSO17.** The students after the completion of this programme will be able to understand the fundamentals of insurance.

**PSO18.** The students after the completion of this programme will be able to understand the essentials of banking and money management.

#### **Course Outcomes (CO) Course**

##### **1: Financial Accounting**

**CO1.** The students after the completion of this course will be able to impart the knowledge of various accounting concepts.

**CO2.** The students after the completion of this course will be able to instill the knowledge about accounting procedures, methods and techniques & develop skills for computerized Accounting.

**Course 2: Business Communication CO1.** The students after the completion of this course will be able to understand the concept, process and importance of communication.

**CO2.** The students after the completion of this course will be able to develop awareness regarding new trends in business communication.

**CO3.** The students after the completion of this course will be able to recognize various media of communication.

##### **Course 3: Business Mathematics**

**CO1.** The students after the completion of this course will be able to prepare for competitive exams.

**CO2.** The students after the completion of this course will be able to improve their calculating power & skills.

**CO3.** The students after the completion of this course will be able to understand the concept of simple interest, compound interest & concept of EMI.

##### **Course 4: Business Regulatory Framework**

**CO1.** The students after the completion of this course will be acquainted with the basic concepts, terms & Provisions of mercantile & Business Laws.

**CO2.** The students after the completion of this course will be able to develop the awareness regarding laws affecting business, trade & commerce.

##### **Course 5: Business Environment**

**CO1.** The students after the completion of this course will become aware about the Business Environment.

**CO2.** The students after the completion of this course will be able to create entrepreneurial awareness.

**CO3.** The students after the completion of this course will be able to motivate themselves for taking up entrepreneurship as career.

**Course 6: Business Economics**

**CO1.** The students after the completion of this course will be able to use various economic theories.

**CO2.** The students after the completion of this course will be able to apply economic reasoning to problems of business.

**CO3.** The students after the completion of this course will be able to understand the basic micro economic concepts.

**Course 7: Corporate Accounting**

**CO1.** The students after the completion of this course will be enabled to develop awareness about corporate accounting with the provisions of companies Act & Accounting as per Indian Accounting standards.

**CO2.** The students after the completion of this course will be enabled to develop conceptual aspect of corporate accounting & develop skills about accounting standards.

**Course 8: Company Law**

**CO1.** The students after the completion of this course will be able to impart the knowledge of fundamentals of company law.

**CO2.** The students after the completion of this course will be able to update the knowledge of provisions of the companies Act of 2013.

**Course 9: Cost Accounting**

**CO1.** The students after the completion of this course will be enabled with the knowledge of Basic cost concepts, Elements of cost, Ascertainment of materials & costing.

**CO2.** The students after the completion of this course will be able to understand various methods of costing & their applications.

**Course 10: Principal of Business Management**

**CO1.** The students after the completion of this course will be able to understand about business management concept.

**CO2.** The students after the completion of this course will be able to understand about various functions of business management.

#### **Course 11: Business Statistic**

**CO1.** The students after the completion of this course will be able to understand & apply the concepts of mean, mode & median.

**CO2.** The students after the completion of this course will be able to apply various methods of sampling & probability measurement.

#### **Course 12: Fundamentals of Entrepreneurship**

**CO1.** The students after the completion of this course will be able to create entrepreneurial temper.

**CO2.** The students after the completion of this course will be able to take up the cause of entrepreneurship.

#### **Course 13: Income Tax**

**CO1.** The students after the completion of this course will be able to understand the basic concept & acquire knowledge about computation of Income.

**CO2.** The students after the completion of this course will be enabled to submit Income Tax Returns, Advance Tax & Tax deducted at source

**CO3.** The students after the completion of this course will be able to identify the procedures of Tax collection authorities under Income Tax Act.

#### **Course 14: Auditing**

**CO1.** The students after the completion of this course will be able to acquaint themselves about concept & principles of Auditing, Audit process, Assurance standards & Tax Audit and Audit of computerized

**CO2.** The students after the completion of this course will be able to prepare Audit Reports.

#### **Course 15: Indirect Taxes with GST**

**CO1.** The students after the completion of this course will be able to understand and apply the concept of GST.

**C02.** The students after the completion of this course will be able to understand and apply the concept of Excise duty, CENVAT.

**C03.** The students after the completion of this course will be able to understand and apply the knowledge of Registration under GST including its procedures & the liable person for GST registration.

**Course 16: Management Accounting**

**C01.** The students after the completion of this course will be able to understand and apply the basic knowledge of management accounting & its relevance in a business organization.

**C02.** The students after the completion of this course will be able to understand and apply managerial behavior & control structures prevalent under varied business environment.

**Course 17: Fundamental of Insurance**

**C01.** The students after the completion of this course will be able to understand and apply the fundamentals of insurance.

**C02.** The students after the completion of this course will be able to understand and apply the knowledge of life Insurance, Fire Insurance & Marine Insurance.

**C03.** The students after the completion of this course will be able to understand and apply the functions of Insurance agent.

**Course 18: Money and Banking**

**C01.** The students after the completion of this course will be able to understand and apply the fundamentals of banking.

**C02.** The students after the completion of this course will be able to understand and apply the banking business & practices.

**C03.** The students after the completion of this course will be able to understand and apply the new concepts introduced in the banking system

## **B.Sc. (Maths Group) - 3 years Undergraduate programme**

### **Programme Outcomes (PO)**

- PO1.** The undergraduate programme in Mathematics / Physics / Chemistry is aimed at providing the students necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in Mathematics / Physics / Chemistry becomes in tune with the changing scenario and incorporate new and rapid advancements and multi-disciplinary skills, societal relevance, global interface, self-sustaining and supportive learning.
- PO2.** It is desired that undergraduate programme in Mathematics / Physics / Chemistry besides teaching the basic concepts of Mathematics / Physics / Chemistry should in addition have broader vision for students so that the students therefore be exposed to societal interface of Mathematics / Physics / Chemistry and the role of Mathematics / Physics / Chemistry in the development of physical, chemical and mathematical sciences & technologies.
- PO3.** The students will be able to think critically and take informed decisions after identifying the accuracy and validity of their assumptions and ideas from intellectual, organizational, and personal perspectives.
- PO4.** The students will be able to communicate effectively through speaking, reading, writing and listening clearly in one Indian language and thereby express themselves to the world by connecting with different ideas, books, people, media and technology.
- PO5.** The students will be able to interact socially and stimulate views, reconcile disagreements and help reach consensual conclusions.
- PO6.** The students will be able to demonstrate compassionate social concern and act with cognizant awareness of issues to contribute in civic life by volunteering impartially towards national development and thereby deliver effective citizenship.
- PO7.** The students will be able to ethically recognize different value systems, understand the moral dimensions of individual decisions and accept responsibility for them.
- PO8.** The students will be able to recognize the issues of environmental perspectives and appreciate sustainable development for long term environmental sustainability.

**PO9.** The students will be able to engage themselves in life-long self-determining and learning in the comprehensive background of socio-technological changes for continued self-directed and life-long learning.

### **Programme Specific Outcomes (PSO)**

**PSO1.** The students after the completion of this programme will be able to understand and apply the fundamentals of Mechanics, Oscillation and Properties of Matter.

**PSO2.** The students after the completion of this programme will be able to understand and apply the fundamentals of Electricity, Magnetism and Electromagnetic Theory.

**PSO3.** The students after the completion of this programme will be able to understand and apply the fundamentals of Thermodynamics, Kinetic Theory and Statistical Physics.

**PSO4.** The students after the completion of this programme will be able to understand and apply the fundamentals of Wave, Acoustics and Optics.

**PSO5.** The students after the completion of this programme will be able to understand and apply the fundamentals of Relativity, Quantum Mechanics, Atomic, Molecular and Nuclear Physics.

**PSO6.** The students after the completion of this programme will be able to understand and apply the fundamentals of Solid State Physics, Solid State Devices and Electronics.

**PSO7.** The students after the completion of this programme will be able to understand and apply the fundamentals of Algebra & Trigonometry.

**PSO8.** The students after the completion of this programme will be able to understand and apply the fundamentals of Calculus.

**PSO9.** The students after the completion of this programme will be able to understand and apply the fundamentals of Vector Analysis & Geometry.

**PSO10.** The students after the completion of this programme will be able to understand and apply the fundamentals of Advanced Calculus.

**PSO11.** The students after the completion of this programme will be able to understand and apply the fundamentals of Differential Equations.

**PSO12.** The students after the completion of this programme will be able to understand and apply the fundamentals of Mechanics.



**PSO13.**The students after the completion of this programme will be able to understand and apply the fundamentals of Analysis.

**PSO14.**The students after the completion of this programme will be able to understand and apply the fundamentals of Abstract Algebra.

**PSO15.**The students after the completion of this programme will be able to understand and apply the fundamentals of Advanced Discrete Mathematics.

**PSO16.**The students after the completion of this programme will be able to understand and apply the fundamentals of Inorganic Chemistry.

**PSO17.**The students after the completion of this programme will be able to understand and apply the fundamentals of Organic Chemistry.

**PSO18.**The students after the completion of this programme will be able to understand and apply the fundamentals of Physical Chemistry.

### **Course Outcomes (CO)**

#### **Course 1: Mechanics, Oscillation and Properties of Matter**

**CO1.** The students after the completion of this course will be able to understand laws of motion and their application to various dynamical situations, notion of inertial frames and concept of Galilean invariance. Learn the concept of conservation of energy, momentum, angular momentum and apply them to basic problems.

**CO2.** The students after the completion of this course will be able to understand expression for the moment of inertia about the given axis of symmetry for different uniform mass distributions.

**CO3.** The students after the completion of this course will be able to understand and apply the principles of elasticity, viscosity and surface tension.

**CO4.** The students after the completion of this course will be able to understand and apply Kepler's law to describe the motion of planets and satellite in circular orbit, through the study of law of Gravitation.

**CO5.** The students after the completion of this course will be able to explain the phenomena of simple harmonic motion and the properties of systems executing such motions.

#### **Course 2: Electricity, Magnetism and Electromagnetic Theory**

**CO1.** The students after the completion of this course will be able to demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges.

**C02.** The students after the completion of this course will be able to demonstrate a working understanding of capacitors.

**C03.** The students after the completion of this course will be able to describe the magnetic field produced by magnetic dipoles and electric currents and explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields.

**C04.** The students after the completion of this course will be able to apply various network theorems and their applications.

### **Course 3: Thermodynamics, Kinetic Theory and Statistical Physics**

**C01.** The students after the completion of this course will be able to describe the basic concepts of laws of thermodynamics, the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.

**C02.** The students after the completion of this course will be able to describe about Maxwell's thermodynamic relations.

**C03.** The students after the completion of this course will be able to describe the basic aspects of kinetic theory of gases, Maxwell-Boltzmann distribution law, equipartition of energies, mean free path of molecular collisions etc.

**C04.** The students after the completion of this course will be able to describe the about the real gas equations, Vander Waal equation of state, the Joule- Thompson effect etc.

### **Course 4: Wave, Acoustics and Optics**

**C01.** The students after the completion of this course will be able to describe the principle of superposition of waves and thus describe the formation of standing waves.

**C02.** The students after the completion of this course will be able to apply basic knowledge of principles and theories about the behavior of light and the physical environment to conduct experiments.

**C03.** The students after the completion of this course will be able to use the principles of wave motion and superposition to explain the physics of polarization, interference and diffraction.

**C04.** The students after the completion of this course will be able to describe the working of selected optical instruments like bi prism, interferometer, diffraction grating, and holograms.

**C05.** The students after the completion of this course will be able to describe the spontaneous and stimulated emission of radiation, optical pumping and population inversion as well as Ruby laser and He-Ne laser.

### **Course 5: Relativity, Quantum Mechanics, Atomic, Molecular and Nuclear Physics**

**C01.** The students after the completion of this course will be able to describe the main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and ability to discuss and interpret experiments that reveal the dual nature of matter.

**C02.** The students after the completion of this course will be able to describe the theory of quantum measurements, wave packets and uncertainty principle.

**C03.** The students after the completion of this course will be able to describe the central concepts of quantum mechanics and the Schrodinger equations.

**C04.** The students after the completion of this course will be able to describe the properties of nuclei and structure of atomic nucleus.

**C05.** The students after the completion of this course will be able to calculate the decay rates and lifetime of radioactive decays.

**C06.** The students after the completion of this course will be able to describe the fission and fusion as well as nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars.

#### **Course 6: Solid State Physics, Solid State Devices and Electronics**

**C01.** The students after the completion of this course will be able to describe the crystalline and amorphous substances and diffraction of X-rays by crystalline materials.

**C02.** The students after the completion of this course will be able to describe the lattice vibrations, phonons and in depth of knowledge of Einstein and Debye theory of specific heat of solids.

**C03.** The students after the completion of this course will be able to describe the band theory of solids and must be able to differentiate insulators, conductors and semiconductors.

**C04.** The students after the completion of this course will be able to describe the N- and P-type semiconductors, P-N junctions, application of PN junction for different type of rectifiers and voltage regulators.

**C05.** The students after the completion of this course will be able to describe the PNP and NPN transistors and their applications as amplifiers and oscillators.

#### **Course 7: Algebra & Trigonometry**

**C01.** The students after the completion of this course will be able to describe Group theory, Ring theory, Vector Space, Modules.

**C02.** The students after the completion of this course will be able to find the inverse of matrix, Canonical form and apply the Cayley - Hamilton theorem.

**CO3.** The students after the completion of this course will be able to describe that every problem can be solved as every theorem in Group theory and Ring theory has its proof and solution.

**CO4.** The students after the completion of this course will be able to apply de-morgen's theorem to solve related problems.

#### **Course 8: Calculus**

**CO1.** The students after the completion of this course will be able to test the continuity and differentiability of functions of one variable.

**CO2.** The students after the completion of this course will be able to calculate and solve the definite and indefinite integrals.

**CO3.** The students after the completion of this course will be able to find the Mac Lauren and Taylor's series of functions at any value.

#### **Course 9: Vector Analysis & Geometry**

**CO1.** The students after the completion of this course will be able to determine & calculate vector and scalars, dot and cross products.

**CO2.** The students after the completion of this course will be able to solve and verify Gauss, Green and Stokes theorem.

**CO3.** The students after the completion of this course will be able to solve Vector Integration and differentiation.

**CO4.** The students after the completion of this course will be able to describe Cone, Sphere, Cylinder, Generating Lines, Straight line, Plane etc.

#### **Course 10: Advanced Calculus**

**CO1.** The students after the completion of this course will be able to determine the series and alternating series. Different types of tests to solve the series.

**CO2.** The students after the completion of this course will be able to determine Jacobian of two and three variables.

**CO3.** The students after the completion of this course will be able to find the limit of a function of one and two and test its continuity and differentiability.

**CO4.** The students after the completion of this course will be able to determine the Beta - Gamma functions and solve the double and triple integrations.

#### **Course 11: Differential Equations**

**CO1.** The students after the completion of this course will be able to solve the ordinary and partial differential equations.

**CO2.** The students after the completion of this course will be able to compute the Laplace and Inverse Laplace transformation of the given equation.

**CO3.** The students after the completion of this course will be able to describe and solve differential equations.

#### **Course 12: Mechanics**

**CO1.** The students after the completion of this course will be able to find the velocity and acceleration of a moving particle.

**CO2.** The students after the completion of this course will be able to compute the equilibrium condition of particle.

**CO3.** The students after the completion of this course will be able to describe the attraction and potential of different particles (Moving and Static)

#### **Course 13: Analysis**

**CO1.** The students after the completion of this course will be able to determine the Fourier series of full and half range of any function of one variable.

**CO2.** The students after the completion of this course will be able to apply Schwarz and Young's theorem on various functions.

**CO3.** The students after the completion of this course will be able to analyze all type of trigonometric real functions.

#### **Course 14: Abstract Algebra**

**CO1.** The students after the completion of this course will be able to use various forms of "Sylow theorem" to identify the whole structure of group.

**CO2.** The students after the completion of this course will be able to analyze Groups, Sub-groups, Normal Sub-groups, and Semi-groups etc.

**CO3.** The students after the completion of this course will be able to determine inner product of two Vectors, and Inner product space.

**CO4.** The students after the completion of this course will be able to analyze Vector space, Ring, their types, modules, ideals etc.

#### **Course 15: Advanced Discrete Mathematics**

**C01.** The students after the completion of this course will be able to describe Graphs, Trees, Spanning Trees, Circuits, finite state machine and their types.

**C02.** The students after the completion of this course will be able to describe the difference between Mealy and Moore machine.

**C03.** The students after the completion of this course will be able to compute the output of a finite state machine corresponding to their next state of the given input.

### **Course 16: Inorganic Chemistry**

**C01.** The students after the completion of this course will be able to describe Atomic Structure, Periodic Properties.

**C02.** The students after the completion of this course will be able to describe Chemical Bonding.

**C03.** The students after the completion of this course will be able to describe S-Block Elements, Chemistry of Noble Gases.

**C04.** The students after the completion of this course will be able to describe P-Block Elements, Inorganic Chemical Analysis.

**C05.** The students after the completion of this course will be able to describe Chemistry of Elements of First Transition Series.

**C06.** The students after the completion of this course will be able to describe Chemistry of Elements of Second & Third Transition Series.

**C07.** The students after the completion of this course will be able to describe Oxidation and Reduction, Coordination Compounds.

**C08.** The students after the completion of this course will be able to describe Chemistry of Lanthanide Elements, Chemistry of Actinides.

**C09.** The students after the completion of this course will be able to describe Acids and Bases, Non-Aqueous Solvents.

**C010.** The students after the completion of this course will be able to describe Metal-Ligand Bonding in Transition Metal Complexes.

**C011.** The students after the completion of this course will be able to describe Magnetic Properties of Transition Metal Complexes.

**C012.** The students after the completion of this course will be able to describe Organo metallic Chemistry.

**C013.** The students after the completion of this course will be able to describe Bioinorganic Chemistry.

**C014.** The students after the completion of this course will be able to describe Hard and Soft Acids and Bases (HSAB).

### **Course 17: Organic Chemistry**

**C01.** The students after the completion of this course will be able to describe Electronic structure & bonding, mechanism of organic reactions.

**C02.** The students after the completion of this course will be able to describe Stereochemistry of organic compounds.

**C03.** The students after the completion of this course will be able to describe Aliphatic and aromatic ring compounds.

**C04.** The students after the completion of this course will be able to describe Alkenes, dienes and alkynes.

**C05.** The students after the completion of this course will be able to describe Arenes and aromaticity.

**C06.** The students after the completion of this course will be able to describe Alcohols, phenols, epoxides.

**C07.** The students after the completion of this course will be able to describe Aldehydes and ketones.

**C08.** The students after the completion of this course will be able to describe Carboxylic acids, substituted carboxylic acids, and carboxylic acid derivatives.

**C09.** The students after the completion of this course will be able to describe Organic compounds of nitrogen.

**C010.** The students after the completion of this course will be able to describe Heterocyclic compounds, amino acids and peptides.

**C011.** The students after the completion of this course will be able to describe organometallic compounds, organosulphur compounds, and organic synthesis via enolates.

**C012.** The students after the completion of this course will be able to describe Biomolecules, carbohydrates, proteins and nucleic acids.

**CO13.** The students after the completion of this course will be able to describe Synthetic polymers, synthetic dyes.

**CO14.** The students after the completion of this course will be able to describe Spectroscopy, mass spectroscopy, infra-red spectroscopy, uv-visible spectroscopy, nmr-spectroscopy, cmr-spectroscopy, magnetic resonance imaging (MRI).

### **Course 18: Physical Chemistry**

**CO1.** The students after the completion of this course will be able to describe Mathematical concepts for chemist and computer.

**CO2.** The students after the completion of this course will be able to describe Molecular velocities.

**CO3.** The students after the completion of this course will be able to describe Liquid state.

**CO4.** The students after the completion of this course will be able to describe Liquid crystals, colloidal state, and solid state.

**CO5.** The students after the completion of this course will be able to describe Chemical kinetics, catalysis.

**CO6.** The students after the completion of this course will be able to describe Thermo chemistry.

**CO7.** The students after the completion of this course will be able to describe Laws of thermodynamics.

**CO8.** The students after the completion of this course will be able to describe Phase equilibrium.

**CO9.** The students after the completion of this course will be able to describe Electrochemistry.

**CO10.** The students after the completion of this course will be able to describe Electrochemical cell or galvanic cell.

**CO11.** The students after the completion of this course will be able to describe Quantum mechanics.

**CO12.** The students after the completion of this course will be able to describe Quantum mechanical approach of molecular orbit theory.

**CO13.** The students after the completion of this course will be able to describe Spectroscopy, electromagnetic radiation, vibrational spectra, and Raman spectra.



**CO14.** The students after the completion of this course will be able to describe Electronic spectra, photo-chemistry.

**CO15.** The students after the completion of this course will be able to describe Thermodynamics, physical properties and molecular structure, magnetic properties.

### **B.Sc. (Bio Group) – 3 years Undergraduate programme**

#### **Programme Outcomes (PO)**

**PO1.** The undergraduate programme in Zoology / Botany / Microbiology is aimed at providing the students necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in Zoology / Botany / Microbiology becomes in tune with the changing scenario and incorporate new and rapid advancements and multi-disciplinary skills, societal relevance, global interface, self-sustaining and supportive learning.

**PO2.** The undergraduate programme in Zoology / Botany / Microbiology besides teaching the basic concepts of Zoology / Botany / Microbiology should in addition have broader vision for students so that the students therefore be exposed to societal interface of Zoology / Botany / Microbiology and the role of Zoology / Botany / Microbiology in the development of biological sciences.

**PO3.** The students will be able to think critically and take informed decisions after identifying the accuracy and validity of their assumptions and ideas from intellectual, organizational, and personal perspectives.

**PO4.** The students will be able to communicate effectively through speaking, reading, writing and listening clearly in one Indian language and thereby express themselves to the world by connecting with different ideas, books, people, media and technology.

**PO5.** The students will be able to interact socially and stimulate views, reconcile disagreements and help reach consensual conclusions.

**PO6.** The students will be able to demonstrate compassionate social concern and act with cognizant awareness of issues to contribute in civic life by volunteering impartially towards national development and thereby deliver effective citizenship.

**PO7.** The students will be able to ethically recognize different value systems, understand the moral dimensions of individual decisions and accept responsibility for them.

**PO8.** The students will be able to recognize the issues of environmental perspectives and appreciate sustainable development for long term environmental sustainability.

**PO9.** The students will be able to engage themselves in life-long self-determining and learning in the comprehensive background of socio-technological changes for continued self-directed and life-long learning.

### **Programme Specific Outcomes (PSO)**

**PSO1.** The students after the completion of this programme will be able to understand and apply the knowledge of Cell Biology & Invertebrates.

**PSO2.** The students after the completion of this programme will be able to understand and apply the knowledge of Vertebrates & Embryology.

**PSO3.** The students after the completion of this programme will be able to understand and apply the knowledge of Anatomy & Physiology.

**PSO4.** The students after the completion of this programme will be able to understand and apply the knowledge of Vertebrate Endocrinology, Reproductive Biology Behavior, Evolution and Applied Zoology.

**PSO5.** The students after the completion of this programme will be able to understand and apply the knowledge of Ecology, Environmental biology; Toxicology; Microbiology and Medical Zoology.

**PSO6.** The students after the completion of this programme will be able to understand and apply the knowledge of Genetics, Cell Physiology, Biochemistry, Biotechnology and Biotechniques.

**PSO7.** The students after the completion of this programme will be able to understand and apply the knowledge of General Diversity of Microbes and Cryptogams.

**PSO8.** The students after the completion of this programme will be able to understand and apply the knowledge of Cell Biology and Genetics.

**PSO9.** The students after the completion of this programme will be able to understand and apply the knowledge of Diversity of Seed Plants and their Systematics.

**PSO10.** The students after the completion of this programme will be able to understand and apply the knowledge of Structure Development and Reproduction in Flowering Plants.

**PSO11.** The students after the completion of this programme will be able to understand and apply the knowledge of Plant Physiology, Biochemistry and Biotechnology.

**PSO12.** The students after the completion of this programme will be able to understand and apply the knowledge of Ecology and Utilization of Plants.

**PSO13.** The students after the completion of this programme will be able to understand and apply the knowledge of General Microbiology.

**PSO14.** The students after the completion of this programme will be able to understand and apply the fundamentals of Biochemistry and Immunology.

**PSO15.** The students after the completion of this programme will be able to understand and apply the fundamentals of Microbial Physiology and Genetics.

**PSO16.** The students after the completion of this programme will be able to understand and apply the fundamentals of Principles of Bioinstrumentation and Techniques.

**PSO17.** The students after the completion of this programme will be able to understand and apply the fundamentals of Molecular Biology and Genetic Engineering.

**PSO18.** The students after the completion of this programme will be able to understand and apply the fundamentals of Environmental and Medical Microbiology.

#### **Course Outcomes (CO) Course 1: Cell Biology & Invertebrates**

**CO1.** The students after the completion of this course will be able to describe Prokaryotic & Eukaryotic Cells.

**CO2.** The students after the completion of this course will be able to describe Cell divisions (Mitosis & Meiosis).

**CO3.** The students after the completion of this course will be able to describe general characteristics & classification of invertebrates.

**CO4.** The students after the completion of this course will be able to describe Helminthes & Annelida.

**CO5.** The students after the completion of this course will be able to describe Mollusca, Protochordata.

#### **Course 2: Vertebrates & Embryology**

**CO1.** The students after the completion of this course will be able to describe the origin and classification of Chordates.

**CO2.** The students after the completion of this course will be able to describe Fishes, Amphibia & Reptilia.

**C03.** The students after the completion of this course will be able to describe Aves & Mammals.

**C04.** The students after the completion of this course will be able to describe Gametogenesis, Fertilization & Parthenogenesis, and Development of frog upto formation of three germ layers.

**C05.** The students after the completion of this course will be able to describe development of Chick upto formation of three germ layers, Extra embryonic membranes, Placenta in mammals.

### **Course 3: Anatomy & Physiology**

**C01.** The students after the completion of this course will be able to describe anatomy of various organ systems of vertebrates - Integument and its derivatives, structure of scales, hair and feathers; Alimentary canal and digestive glands in vertebrates; Respiratory Organs, Gills and lungs; Air-Sac in birds.

**C02.** The students after the completion of this course will be able to describe endoskeleton-limbs, girdles and vertebrae; Circulatory System - Evolution of heart and aortic arches; Urogenital System - Kidney and excretory ducts.

**C03.** The students after the completion of this course will be able to describe nervous system - general plan of brain and spinal cord; Endocrine glands - classification and histology; Gonads and genital ducts.

**C04.** The students after the completion of this course will be able to describe digestion and absorption of dietary components; physiology of heart, cardiac cycle and ECG; blood coagulation; respiration-mechanism and control of breathing.

**C05.** The students after the completion of this course will be able to describe physiology of excretion, osmoregulation; physiology of muscle contraction; physiology of nerve impulse; synaptic transmission; ear and eye - structure and function.

### **Course 4: Vertebrate Endocrinology, Reproductive Biology Behavior, Evolution and Applied Zoology**

**C01.** The students after the completion of this course will be able to describe general characters of hormones, hormone receptors, biosynthesis and secretion of thyroid, adrenal, ovarian and testicular hormones, endocrine disorder due to hormones and other glands.

**C02.** The students after the completion of this course will be able to describe reproductive cycle in vertebrates, menstruation, lactation and pregnancy, mechanism of parturition, hormonal regulation of gametogenesis, extra embryonic membrane.

**C03.** The students after the completion of this course will be able to describe evidences of organic evolution, theories of organic evolution, variation, mutation, isolation and natural selection, evolution of horse.

**C04.** The students after the completion of this course will be able to describe ethology, patterns of behavior taxes, reflexes, drives and stereotyped behavior, reproductive behavioral patterns, hormones, drugs and behavior.

**C05.** The students after the completion of this course will be able to describe aquaculture, sericulture, apiculture, pisciculture, poultry keeping, elements of pest control - chemical control & biological control.

#### **Course 5: Ecology, Environmental biology; Toxicology; Microbiology and Medical Zoology**

**C01.** The students after the completion of this course will be able to describe aims and scopes of ecology, major ecosystems of the world, population- characteristics and regulation of densities, communities and ecosystems, biogeochemical cycles, air and water pollution, ecological succession.

**C02.** The students after the completion of this course will be able to describe environmental biology, laws of limiting factors, food chain in a freshwater ecosystem, energy flow in ecosystem-trophic levels, conservation of natural resources, environmental impact assessment.

**C03.** The students after the completion of this course will be able to describe toxicology, definition of toxicity, classification of toxicants, principle of systematic toxicology, toxic agents and their action- metallic and inorganic agents, animal poisons - snake-venom, scorpion and bee poisoning, food poisoning.

**C04.** The students after the completion of this course will be able to describe microbiology, general and applied microbiology, microbiology of domestic water and sewage, microbiology of milk and milk products, industrial microbiology.

**C05.** The students after the completion of this course will be able to describe medical microbiology, brief introduction to pathogenic micro-organisms, rickettsia, spirochaetes and bacteria, brief account of life-history and pathogenicity of the following pathogens with reference to man; prophylaxis and treatment - pathogenic protozoans - entamoeba, trypanosoma, and giardia, pathogenic helminths-schistosoma, nematode pathogenic parasites of man, vector insects.

#### **Course 6: Genetics, Cell Physiology, Biochemistry, Biotechnology and Bio-techniques**

**C01.** The students after the completion of this course will be able to describe genetics, linkage and linkage maps, varieties of gene expression - multiple alleles; lithogenesis; pleiotropic genes; gene interaction; epistasis, sex-chromosome systems, and sex-linkage, mutation and

chromosomal alterations; meiotic consequences, human genetics - chromosomal and single gene disorders (somatic cell genetics).

**CO2.** The students after the completion of this course will be able to describe cell physiology, general idea about pH and buffer, transport across membrane - cell membrane; mitochondria and endoplasmic reticulum, active transport and its mechanism; active transport in mitochondria and endoplasmic reticulum, hydrolytic enzymes - their chemical nature, activation and specificity.

**CO3.** The students after the completion of this course will be able to describe biochemistry, amino acids and peptides - basic structure and biological function, carbohydrate and its metabolism - glycogenesis; gluconeogenesis; glycolysis, glycogenolysis; Krebs's cycle, lipid metabolism - oxidation of glycerol; oxidation of fatty acid, protein metabolism - deamination, transamination, transmethylation; biosynthesis of protein.

**CO4.** The students after the completion of this course will be able to describe biotechnology - scope and importance, recombinant DNA and gene cloning, cloned genes and other tools of biotechnology, applications of biotechnology in pharmaceutical industry, and food processing industry.

**CO5.** The students after the completion of this course will be able to describe biotechniques principles and techniques of pH meter, colorimeter, microscopy-light microscopes, phase contrast and electron microscopes, centrifugation, separation of biomolecules by chromatography and electrophoresis, biochemical methods for determination of protein, lipids, and carbohydrates.

**Course 7: General Diversity of Microbes and Cryptogams CO1.** The students after the completion of this course will be able to describe Viruses and Bacteria: General account of viruses and mycoplasma; bacteria structure; nutrition, reproduction and economic importance; general account of cyanobacteria.

**CO2.** The students after the completion of this course will be able to describe Algae: General characters, classification and economic importance; important features and life history of Chlorophyceae-Volvox, Oedogonim, Coleochaete; Xanthophyceae- Vaucheria; Phaeophyceae-Ectocarpus, Sargassum; Rhodophyceae- Polysiphonia.

**CO3.** The students after the completion of this course will be able to describe Fungi: General characters, classification and economic importance; important features and life history of Mastigomycotina- Pythium, Phytophthora; Zygomycotina- Mucor, Ascomycotina- Saccharomyces, Eurotium, Chaetomium, Peziza; Basidiomycotina- Puccinia, Agaricus; Deuteromycotina-Cercospora, Colletotrichum; general account of Lichens.

**CO4.** The students after the completion of this course will be able to describe Bryophyta: Amphibians of plant kingdom displaying alternation of generations; structure, reproduction and classification of Hepaticopsida (e.g. Riccia Marchantia); Anthocerotopsida (e.g. Anthoceros), Bryopsida (e.g. Funaria)

**C05.** The students after the completion of this course will be able to describe Pteridophyta: The first vascular plants; important characteristics of Psilopsida, Lycopsidea, Sphenopsida and Pteropsida; structure, Reproduction in Rhynia, Lycopodium, Selaginella, Equisetum, Pteris and Marsilea.

#### **Course 8: Cell Biology and Genetics**

**C01.** The students after the completion of this course will be able to describe the Cell: Envelope; Plasma membrane; bilayer lipid structure; functions; the cell wall, Ultra structure and function of nucleus: nuclear membrane; nucleolus and other organelles: Golgi bodies, ER, peroxisomes, Vacuoles.

**C02.** The students after the completion of this course will be able to describe Chromosome organization: Morphology; centromere and telomere; chromosome alterations; deletions, duplications, translocations, inversions; variations in chromosome number aneuploidy, polyploidy; sex chromosomes, Cell division: Mitosis; meiosis.

**C03.** The students after the completion of this course will be able to describe DNA the genetic material: DNA structure; replication; DNA- protein interaction; the nucleosome model; genetic code; satellite and repetitive DNA, Extra nuclear genome: Presence and function of mitochondrial and plastid DNA; plasmids.

**C04.** The students after the completion of this course will be able to describe Gene expression: Structure of gene; transfer of genetic information; transcription, translation, protein synthesis; tRNA; ribosomes; regulation of gene expression in prokaryotes and eukaryotes; proteins - 1D, 2D and 3D structures.

**C05.** The students after the completion of this course will be able to describe Genetic Variations: Mutations, spontaneous and induced; transposable genetic elements; DNA damage and repair: Genetic inheritance: Mendelism; laws of segregation and independent assortment: linkage analysis; allelic and non-allelic interactions.

#### **Course 9: Diversity of Seed Plants and their Systematics**

**C01.** The students after the completion of this course will be able to describe characteristics of seed plants; evolution of the seed habit; seed plants with (angiosperms) and without (gymnosperms) fruits; fossil and living seed plants, general features of gymnosperms and their classification; evolution and diversity of gymnosperms; geological time scale, fossilization and fossil gymnosperms.

**C02.** The students after the completion of this course will be able to describe morphology of vegetative and reproductive parts; anatomy of roots, stem and leaf, reproduction and life cycle of Pinus, Cycas and Ephedra.

**C03.** The students after the completion of this course will be able to describe angiosperms: origin and evolution, some examples of primitive angiosperms, angiosperms taxonomy: brief history, aims and fundamental components; identification, keys taxonomic literature, botanical nomenclature: principles and rules; taxonomic ranks; type concept; principle of priority.

**C04.** The students after the completion of this course will be able to describe classification of angiosperms; salient features of the systems proposed by Bentham and Hooker and Engler and Prantl, major contributions of cytology, phytochemistry and taximetrics to taxonomy.

**C05.** The students after the completion of this course will be able to describe diversity of flowering plants: general account of the families- Ranunculaceae, Brassicaceae, Malvaceae, Rutaceae, Fabaceae, Apiaceae, Acanthaceae, Apocynaceae, Asclepiadaceae, Solanaceae, Lamiaceae, Chenopodiaceae, Euphorbiaceae, Liliaceae and Poaceae.

#### **Course 10: Structure Development and Reproduction in Flowering Plants**

**C01.** The students after the completion of this course will be able to describe the basic body plan of a flowering plant: modular type of growth, diversity in plant form in annuals, biennials and perennials; convergence of evolution of tree habit in gymnosperms, monocotyledons and dicotyledons; trees-largest and longest-lived organisms.

**C02.** The students after the completion of this course will be able to describe the shoot system: the shoot apical meristem and its histological organization; vascularization of primary shoot in monocotyledons and dicotyledons; formation of internodes, branching pattern; monopodial and sympodial growth canopy architecture; cambium and its functions; formation of secondary xylem, a general account of wood structure in relation to conduction of water and minerals; characteristics of growth rings, sapwood and heart wood; role of woody skeleton; secondary phloem – structure, function, relationships, periderm.

**C03.** The students after the completion of this course will be able to describe leaf: origin, development, arrangement and diversity in size and shape; internal structure in relation to photosynthesis and water loss; adaptations to water stress; senescence and abscission, the root system: the root apical meristem; differentiation of primary and secondary tissues and their roles; structural modification for storage, respiration, reproduction and for interaction with microbes.

**C04.** The students after the completion of this course will be able to describe flower: a modified shoot; structure, development and varieties of flower, functions, structure of anther and pistil, the male and female gametophytes; types of pollination; attractions and rewards for pollinators; pollen-pistil interaction, self incompatibility, double fertilization, formation of seed-endosperm and embryo; fruit development and maturation.

**C05.** The students after the completion of this course will be able to describe significance of seed: suspended animation; ecological adaptation; unit of genetic recombination and replenishment, dispersal strategies, vegetative reproduction: vegetative propagation, grafting, economic aspects.

#### **Course 11: Plant Physiology, Biochemistry and Biotechnology**

**C01.** The students after the completion of this course will be able to describe plant-water relations: importance of water to plant life; physical properties of water; diffusion and osmosis; absorption, transport of water and transpiration; physiology of stomata, mineral nutrition:



essential macro and micro-elements and their role; mineral uptake; deficiency and toxicity symptoms.

**C02.** The students after the completion of this course will be able to describe transport of organic substances: mechanism of phloem transport; source-sink relationship; factors affecting translocation, basic of enzymology: discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and cofactors; regulation of enzyme activity, mechanism of action, photosynthesis: significance; historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photo-phosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration.

**C03.** The students after the completion of this course will be able to describe respiration: ATP - the biological energy currency; aerobic and anaerobic respiration; Krebs' cycle, electron transport mechanism (chemi-osmotic theory); redox potential; oxidative phosphorylation; pentose phosphate pathway, Nitrogen and lipid metabolism: Biology of nitrogen fixation; importance of nitrate reductase and its regulations; ammonium assimilation; structure and function of lipids; fatty acid biosynthesis; Beta-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

**C04.** The students after the completion of this course will be able to describe growth and development: definitions; phases of growth and development; kinetics of growth, seed dormancy, seed germination and factors of their regulation; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; biological clocks; physiology of senescence, fruit ripening; plant hormones auxins, gibberellins, cytokinins, abscisic acid and ethylene, history of their discovery, biosynthesis and mechanism of action; photomorphogenesis; phytochromes and cryptochromes, their discovery, physiological role and mechanism of action.

**C05.** The students after the completion of this course will be able to describe genetic engineering: tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; techniques of gene mapping and chromosome walking, biotechnology: functional definition; basic aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of *Agrobacterium*; vectors for gene delivery and marker genes; salient achievements in crop biotechnology.

#### **Course 12: Ecology and Utilization of Plants**

**C01.** The students after the completion of this course will be able to describe plants and environment: atmosphere (gaseous composition), water (properties of water cycle), light (global radiation, photosynthetically active radiation), temperature, soil (development, soil profiles, physico-chemical properties), and biota, Morphological, anatomical and physiological responses of plants to water (hydro-phytes and xerophytes), temperature (thermoperiodicity), light (photoperiodism, heliophytes and sciophytes) and salinity.

**C02.** The students after the completion of this course will be able to describe community ecology: community characteristics, frequency, density, cover, life forms biological spectrum;

ecological succession, ecosystems: structure, abiotic and biotic components; food chain, food web, ecological pyramids, energy flow; biogeochemical cycles of carbon, nitrogen and phosphorus.

**CO3.** The students after the completion of this course will be able to describe population ecology: growth curves; ecotypes; ecoregions, biogeographical regions of India, Vegetation types of India: Forests and grasslands.

**CO4.** The students after the completion of this course will be able to describe utilization of plants food plants: rice, wheat, maize, potato, sugarcane, fibers: cotton and jute, vegetable oils: groundnut, mustard and coconut, general account of sources of firewood, timber and bamboos.

**CO5.** The students after the completion of this course will be able to describe Spices, Medicinal plants, Beverages- Tea and coffee, Rubber

### **Course 13: General Microbiology**

**CO1.** The students after the completion of this course will be able to describe unity of microbial world, scope of microbiology, microbiology and human health, beneficial and harmful microbes, development of microbiology (contributions and pioneers).

**CO2.** The students after the completion of this course will be able to describe diversity of microbial world: principle of classification, classification of viruses, bacteria (including cyanobacteria) algae and fungi (including yeast) and protozoa.

**CO3.** The students after the completion of this course will be able to describe methods of studying microorganism: origin of microbes, microscopy, pure culture techniques, sterilization, aseptic techniques, isolation of pure culture, conditions and media for growth of microorganisms in the laboratory.

**CO4.** The students after the completion of this course will be able to describe general organization of microbes; structural functional organization and economic importance of algae (Nostoc, anabaena, Ocillitoria), fungi (Rhizopus, Penicillium, Aspergillus), yeast and lichens.

**CO5.** The students after the completion of this course will be able to describe structure, functional organization and economic importance of bacteria (Gram +ve and Gram -ve), viruses (plant and animal) and protozoa (Ciliates, Flagellates and Sporozoans).

### **Course 14: Biochemistry and Immunology**

**CO1.** The students after the completion of this course will be able to describe structure and properties of mono and disaccharides, amino acids and peptides, bases; purines and pyrimidines, sugars; ribose, deoxyribose and nucleoside and nucleotide; general account of lipids.

**CO2.** The students after the completion of this course will be able to describe the concept of macromolecules; structural and functional organization of polysaccharides (starch, glycogen, cellulose, mucopolysaccharides), proteins and nucleic acids (DNA, RNA).

**CO3.** The students after the completion of this course will be able to describe enzymes; historical account, classification, co-enzymes and their role, enzyme action, enzyme kinetics, km, vm and enzyme inhibition, allosteric enzyme and isoenzyme, extracellular enzymes and their role.

**CO4.** The students after the completion of this course will be able to describe metabolism; general concept of metabolism (anabolism, catabolism and amphibolism), glycolysis, TCA Cycle and HMP Shunt, Anaerobic catabolism of glucose; alpha, beta and gamma oxidation of fatty acids.

**CO5.** The students after the completion of this course will be able to describe concept of immunity, innate and acquired immunity, brief account of cells and organs of immune system, antigen and antigenicity, antibody structure and function, antigen-antibody reaction.

#### **Course 15: Microbial Physiology and Genetics**

**CO1.** The students after the completion of this course will be able to describe plasma membrane and transport across membrane, energy transformation, physiology of bacterial growth, phases of growth, growth conditions, differentiation in bacterial cells-sporulation, germination; bacterial cell division replication of chromosome, partition of chromosome into daughter cell.

**CO2.** The students after the completion of this course will be able to describe primary and secondary metabolism.

**CO3.** The students after the completion of this course will be able to describe bacterial plasmids; structure and properties, replication, incompatibility, plasmid amplification, bacteriophages; lytic development cycle - T4; lytic and lysogenic development of phage, single stranded DNA phage, transposition; structure of bacterial transposons, types of bacterial transposons, mechanism of antibiotic resistance and spread of antibiotic resistance.

**CO4.** The students after the completion of this course will be able to describe genetic recombination; requirements, molecular basis, genetic analysis of recombination in bacteria.

**CO5.** The students after the completion of this course will be able to describe DNA repair and restriction; types of repair systems, restriction endonuclease, various types of restriction enzymes, dam and dcm methylases.

#### **Course 16: Principles of Bioinstrumentation and Techniques**

**CO1.** The students after the completion of this course will be able to describe colorimetry and spectrophotometry, spectrofluorimetry, turbidometry, nephelometry, luminometry, pH meter.

**CO2.** The students after the completion of this course will be able to describe chromatography; adsorption partition, column, gas, ion-exchange, gel filtration, and affinity chromatographies, HPLC, FPLC.

**C03.** The students after the completion of this course will be able to describe centrifugation and ultracentrifugation, microscopy- light, phase-contrast, fluorescence, dark field, electron microscopy, laser, confocal, microscopy and digital image analysis.

**C04.** The students after the completion of this course will be able to describe tissue culture techniques; principal and requirements of animal tissue culture, decontamination, sterilization and disinfection.

**C05.** The students after the completion of this course will be able to describe electrophoreses techniques- types and their application; electrophoresis of proteins and nucleicacids, immune-electrophoresis sequencing of proteins and nucleic acids, radioisotope techniques; nature of radioactivity, detection measurement, counter, safety aspects, enzyme purification and assay techniques.

#### **Course 17: Molecular Biology and Genetic Engineering**

**C01.** The students after the completion of this course will be able to describe history of molecular biology, model systems, concepts of molecular biology, early history of genetic engineering, genetic engineering concepts, ethical issue.

**C02.** The students after the completion of this course will be able to describe mutation; spontaneous and induced, base pair change, frame shift, deletion, inversion, random duplication, insertion, useful phenotypes (auxotrophs, conditional lethal, resistance), reversion vs. suppression, Ame's test.

**C03.** The students after the completion of this course will be able to describe function of macromolecules; early observation on the mechanism of heredity, DNA as genetic material; basic mechanism of replication, enzymes involved in replication, enzymes involved in transcription translation, genetic code, regulation of gene expression-transcription, translation and control of gene expression in microbes.

**C04.** The students after the completion of this course will be able to describe DNA repair and restriction, types of repair systems, restriction modification systems, types of restriction enzymes, properties and uses, methylation, biology of plasmids, bacteriophages, lytic vs. lysogenic phages, single standard DNA phages, M 13, restriction modification systems, restriction enzymes.

**C05.** The students after the completion of this course will be able to describe plasmid and phage vectors, restriction and ligation of vector and passenger DNA, transformation of host cells, selection vs. screening of recombinant colonies, analysis of recombinant clones, DNA sequencing, protein separation and identification methods.

#### **Course 18: Environmental and Medical Microbiology**

**C01.** The students after the completion of this course will be able to describe aerobiology; definition, droplet nuclei, aerosol assessment of air quality, some important air borne diseases

caused by bacteria (Diphtheria, Pneumonia, Meningitis), virus (Influenza, Chicken pox, Measles) and fungi (mycosis); their symptoms and preventive measures.

**C02.** The students after the completion of this course will be able to describe soil microbiology: physical and chemical characteristics and micro flora of various soil types, rhizosphere, phyllosphere, brief account of microbial interactions: symbiosis, mutualism, commensalism, competition, amensalism, synergism, parasitism, and predation. biofertilizers - biological nitrogen fixation, nitrogenase enzyme, nif genes, symbiotic nitrogen fixation, and non-symbiotic nitrogen fixation (Azotobacter, Azospirillum), VAM-ecto-endo-ectendomycorrhizae.

**C03.** The students after the completion of this course will be able to describe aquatic microbiology; ecosystem, fresh water (ponds, lakes, stream) and marine, water zonation: upwelling, eutrophication, potability of water - microbial assessment of water quality, brief account of water borne diseases (Typhoid, Dysentery, Cholera, Hepatitis) and preventive measures.

**C04.** The students after the completion of this course will be able to describe food spoilage and food borne infections, biodegradation, xenobiotics, bioaccumulation, biopesticides and deterioration, general concept of industrial microbiology and their applications.

**C05.** The students after the completion of this course will be able to describe waste treatment: types of wastes, characterization of solid and liquid waste, waste treatment solid saccharification, gasification, composting, liquid waste treatment - aerobic, anaerobic primary, secondary and tertiary methods, useful byproducts, mushroom, fuel, fertilizer, biodegradation of industrial waste.

## **B.A.- 3 years Undergraduate programme**

### **Programme Outcomes (PO)**

- PO1.** The undergraduate programme in Hindi Literature / English Literature / Economics / Political Science / Sociology / Geography / Home Science is aimed at providing the students necessary inputs so as to set forth the task of bringing about new and innovative ideas/concepts so that the formulated model curricula in Hindi Literature / English Literature / Economics / Political Science / Sociology / Geography / Home Science becomes in tune with the changing scenario and incorporate new and rapid advancements and multi-disciplinary skills, societal relevance, global interface, self-sustaining and supportive learning.
- PO2.** The undergraduate programme in Hindi Literature / English Literature / Economics / Political Science / Sociology / Geography / Home Science / besides teaching the basic concepts of Hindi Literature / English Literature / Economics / Political Science / History / Sociology / Geography / Home Science should in addition have broader vision for students so that the students therefore be exposed to societal interface of Hindi Literature / English Literature / Economics / Political Science / Sociology / Geography / Home Science and the role of Hindi Literature / English Literature / Economics / Political Science / Sociology / Geography / Home Science in the development of arts and social sciences.
- PO3.** The students will be able to think critically and take informed decisions after identifying the accuracy and validity of their assumptions and ideas from intellectual, organizational, and personal perspectives.
- PO4.** The students will be able to communicate effectively through speaking, reading, writing and listening clearly in one Indian language and thereby express themselves to the world by connecting with different ideas, books, people, media and technology.
- PO5.** The students will be able to interact socially and stimulate views, reconcile disagreements and help reach consensual conclusions.

**PO6.** The students will be able to demonstrate compassionate social concern and act with cognizant awareness of issues to contribute in civic life by volunteering impartially towards national development and thereby deliver effective citizenship.

**PO7.** The students will be able to ethically recognize different value systems, understand the moral dimensions of individual decisions and accept responsibility for them.

**PO8.** The students will be able to recognize the issues of environmental perspectives and appreciate sustainable development for long term environmental sustainability.

**PO9.** The students will be able to engage themselves in life-long self-determining and learning in the comprehensive background of socio-technological changes for continued self-directed and life-long learning.

### **Programme Specific Outcomes (PSO)**

**PSO1.** The students after the completion of this programme will be able to understand and apply the knowledge of Pracheen Hindi Kavya

**PSO2.** The students after the completion of this programme will be able to understand and apply the knowledge of Hindi Katha Sahitya

**PSO3.** The students after the completion of this programme will be able to understand and apply the knowledge of Arvacheen Hindi Kavya

**PSO4.** The students after the completion of this programme will be able to understand and apply the knowledge of Hindi Nibandh Evam Gadya Vidhayen.

**PSO5.** The students after the completion of this programme will be able to understand and apply the knowledge of Janpadiya Bhasha Sahitya(Chhattisgarhi).

**PSO6.** The students after the completion of this programme will be able to understand and apply the knowledge of Hindi Bhasha Sahitya ka itihās tathā kavyāṅgā Vivechan.

**PSO7.** The students after the completion of this programme will be able to understand and apply the knowledge of Literature in English From 1550-1750 A.D.

**PSO8.** The students after the completion of this programme will be able to understand and apply the knowledge of Literature in English From 1750-1900 A.D.

**PSO9.** The students after the completion of this programme will be able to understand and apply the knowledge of Modern English Literatures - I.

**PSO10.** The students after the completion of this programme will be able to understand and apply the knowledge of Modern English Literatures - II.

- PSO11.** The students after the completion of this programme will be able to understand and apply the knowledge of Indian Writing in English.
- PSO12.** The students after the completion of this programme will be able to understand and apply the knowledge of American Literature.
- PSO13.** The students after the completion of this programme will be able to understand and apply the knowledge of Micro Economics.
- PSO14.** The students after the completion of this programme will be able to understand and apply the knowledge of Indian Economy.
- PSO15.** The students after the completion of this programme will be able to understand and apply the knowledge of Macro Economics.
- PSO16.** The students after the completion of this programme will be able to understand and apply the knowledge of Money, Banking and Public Finance.
- PSO17.** The students after the completion of this programme will be able to understand and apply the knowledge of Development and Environmental Economics.
- PSO18.** The students after the completion of this programme will be able to understand and apply the knowledge of Statistical Methods.
- PSO19.** The students after the completion of this programme will be able to understand and apply the knowledge of Political Theory.
- PSO20.** The students after the completion of this programme will be able to understand and apply the knowledge of Indian Government and Politics.
- PSO21.** The students after the completion of this programme will be able to understand and apply the knowledge of Western Political Thought.
- PSO22.** The students after the completion of this programme will be able to understand and apply the fundamentals of Comparative Politics and Government.
- PSO23.** The students after the completion of this programme will be able to understand and apply the knowledge of International Politics.
- PSO24.** The students after the completion of this programme will be able to understand and apply the knowledge of Public Administration.
- PSO33.** The students after the completion of this programme will be able to understand and apply the knowledge of Society in India.
- PSO34.** The students after the completion of this programme will be able to understand and apply the knowledge of Crime and Society.



**PS035.** The students after the completion of this programme will be able to understand and apply the knowledge of Sociology of Tribal Society.

**PS036.** The students after the completion of this programme will be able to understand and apply the knowledge of Social Research Methods.

**PS037.** The students after the completion of this programme will be able to understand and apply the knowledge of Physical Geography - Elements of Geomorphology.

**PS038.** The students after the completion of this programme will be able to understand and apply the knowledge of Introduction to Geography and Human Geography.

**PS039.** The students after the completion of this programme will be able to understand and apply the knowledge of Physical Geography - Climatology and Oceanography.

**PS040.** The students after the completion of this programme will be able to understand and apply the knowledge of Regional Geography with Special Reference to North America.

**PS041.** The students after the completion of this programme will be able to understand and apply the knowledge of Geography - Resources and Environment.

**PS042.** The students after the completion of this programme will be able to understand and apply the knowledge of Geography of India (with special reference to Chhattisgarh).

**PS049.** The students after the completion of this programme will be able to understand and apply the knowledge of Anatomy, Physiology & Hygiene

**PS050.** The students after the completion of this programme will be able to understand and apply the knowledge of Home Science - Extension Education.

**PS051.** The students after the completion of this programme will be able to understand and apply the knowledge of Fabric & Cloth Science.

**PS052.** The students after the completion of this programme will be able to understand and apply the knowledge of Family Resource Management.

**PS053.** The students after the completion of this programme will be able to understand and apply the knowledge of Home Science - Human Development.

**PS054.** The students after the completion of this programme will be able to understand and apply the knowledge of Food & Nutrition Science.

### **Course Outcomes (CO)**

#### **Course 1 प्राचीन हिन्दी काव**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend कबीर (कबीर-कांतिकुमार जैन)

**C02.** The students after the completion of this course will be able to contemplate and comprehend जायसी-संक्षिप्तपद्मावत-श्यामसुंदरदासनागमतीवियोगवर्णन

**C03.** The students after the completion of this course will be able to contemplate and comprehend सूर (भ्रमर गीतसार- सं. आचार्यरामचन्द्र)

**C04.** The students after the completion of this course will be able to contemplate and comprehend तुलसी- 'रामचरितमानस'

**C05.** The students after the completion of this course will be able to contemplate and comprehend घनानन्द (घनानन्द-सर्णविश्वनाथप्रसादमिश्र)

**C06.** The students after the completion of this course will be able to contemplate and comprehend विद्यापति

**C07.** The students after the completion of this course will be able to contemplate and comprehend रहीम

**C08.** The students after the completion of this course will be able to contemplate and comprehend रसखान

**Course 2: हिन्दी कथा साहित**

**C01.** The students after the completion of this course will be able to contemplate and comprehend प्रेमचंद. गबन

**C02.** The students after the completion of this course will be able to contemplate and comprehend प्रेमचंद-कफन

**C03.** The students after the completion of this course will be able to contemplate and comprehend जयशंकरप्रसाद-आकाशदीप

**C04.** The students after the completion of this course will be able to contemplate and comprehend फणीशंवरनाथरेणु-ठेस

**C05.** The students after the completion of this course will be able to contemplate and comprehend मेहन राकेश-मलवे का मालिक

**C06.** The students after the completion of this course will be able to contemplate and comprehend भीष्म साहनी-चीफ की दावत

**C07.** The students after the completion of this course will be able to contemplate and comprehend राजेन्द्र यादव-बिरादरी बाहर

**C08.** The students after the completion of this course will be able to contemplate and comprehend रागेय राघव-गदल

**C09.** The students after the completion of this course will be able to contemplate and comprehend उपेन्द्रनाथअशक, 2. बालशौरिरेड्डी 3. शिवनी

### **Course 3: अर्वाचीन हिन्दी का**

**C01.** The students after the completion of this course will be able to contemplate and comprehend मैथिली शरणगुप्त-भारत-भारती की कविताएं

**C02.** The students after the completion of this course will be able to contemplate and comprehend सूर्यकांत त्रिपाठी निराली-सखि बसन्त आया, वर दे, वीणावादिनी वर दे, हिन्दी के सुमनों के प्रति पत्र, तोड़ती-पत्थर, राजे ने अपनी रखवाली की।

**C03.** The students after the completion of this course will be able to contemplate and comprehend सुमित्रानंदनपंत-बादल, परिवर्तन, खोलता इधर जन्म लोचन, आज का दुख कल का आल्हाद, ताज, झंझा में नीम, भारतमाता।

**C04.** The students after the completion of this course will be able to contemplate and comprehend माखन लाल चतुर्वेदी- बलि पंथी से, सांझ और ढोलक की थापें, मैं बेच रही हूँ, दही, उलाहना, निःशस्त्र सेनानी।

**C05.** The students after the completion of this course will be able to contemplate and comprehend स.ही. वात्स्यायनअज्ञेय -सबरे उठा तो धूप खिली थी, सामाग्री का नैवेद्य दान, घर, चंदनी जीलो, दूर्वाचल।

**C06.** The students after the completion of this course will be able to contemplate and comprehend अयोध्या सिंह उपाध्याय "हरिऔध", सुभद्रा कुमारी चौहान, श्रीकांत वर्मा। **बनतेम 4रू** हिन्दी निबंध तथा गद्य विधाएं

**C01.** The students after the completion of this course will be able to contemplate and comprehend नाटक-अंधेरी नगरी-भारतेन्दु हरिश्चन्द्र

**C02.** The students after the completion of this course will be able to contemplate and comprehend निबंध क्रोध -आचार्य राम चन्द्र शुक्ल, बसन्त-डॉ. हजारी प्रसाद द्विवेदी, उस अमराई ने राम-रामकही है-डॉ. विद्यानिवास मिश्र, काव्येषु नाट्यम रम्यम् -बाबू गुलाब राय, बेईमानी की परत-हरिशांकर परसाई।

**C03.** The students after the completion of this course will be able to contemplate and comprehend एंकाकी-औरगंजेब की आखिरी रात-डॉ. रामकुमार वर्मा,स्ट्राईक-भुनेश्वर, एक दिन-लक्ष्मीनारायण मिश्र,दस हजार-उदय शंकर भट्ट,मम्मी ठकुराईन-डॉ. लक्ष्मीनारायण लाल

**C04.** The students after the completion of this course will be able to contemplate and comprehend jkgqylkad`R;k;u]egknssohoekZ]gchcruohj

#### **Course 4 जनपदीय भाषा साहित्य (छत्तीसगढ़ी)**

**C01.** The students after the completion of this course will be able to contemplate and comprehend रचनाएं-प्राचीन कवि संत धर्मदास-गुरु पइया लागों नाम लखादी जोहो,नैन आगे ख्याल घनेरा,भजनक रौभाईरे, अइसन तन पाय के ।

**C02.** The students after the completion of this course will be able to contemplate and comprehend लखनलाल गुप्त का गद्य-सेनपान

**C03.** The students after the completion of this course will be able to contemplate and comprehend अर्वाचीन रचनाकार डॉ. सत्यभामा आडिल रचित गद्य -सीख सीख के गोठ

**C04.** The students after the completion of this course will be able to contemplate and comprehend डॉ. विनय पाठक की कविताएं-तंय उठथस सुरुज उथे,एक किसिम के नियाव

**C05.** The students after the completion of this course will be able to contemplate and comprehend मुकुन्दकौशल-छत्तीसगढ़ गजल " छै बित्ता के मनखे देखों ..... से-मछरीमन लाख लेथे"

**C06.** The students after the completion of this course will be able to contemplate and comprehend सुन्दरलाल शर्मा,कविलनाथ कश्यप,रामचन्द्र देशमुख (रंगकर्मी)

#### **Course 5: हिन्दी भाषा-साहित्य का इतिहास तथा काव्यांग विवेचन**

**C01.** The students after the completion of this course will be able to contemplate and comprehend हिन्दी भाषा क अस्वरूप विकास- हिन्दी कर उत्पत्ति, हिन्दी की मूल आकर भाषाएं तथा विभिन्न विभाषाओं का विकास । हिन्दी भाषा के विभिन्न रूप-बोलचाल की भाषा,रचनात्मक भाषा, राष्ट्र भाषा, राजभाषा, सम्पर्कभाषा, संचारभाषा

**C02.** The students after the completion of this course will be able to contemplate and comprehend हिन्दी का शब्द भण्डार-तत्सम, तद्भव, देज, आग तशब्दावली ।

**CO3.** The students after the completion of this course will be able to contemplate and comprehend हिन्दी साहित्य काइतिहास :-आदिकाल, पूर्व मध्यकाल, उत्तर मध्यकाल और आधुनिक काल की सामाजिक, सांस्कृतिक पृष्ठभूमि, प्रमुख युगप्रवृत्तियां, विशिष्टरचनाकार और उनकी प्रतिनिधि कृतियां, साहित्यिकविशेषताएं।

**CO4.** The students after the completion of this course will be able to contemplate and comprehend काव्यांग-काव्य कास्वरूप एवं प्रयोजन।रस के विभिन्न भेद, विभिन्न अंगह, विभावादि तथा उदाहरण। दोहा, सोरठा, चौपाई, कुण्डलियां, सवैया। शब्दालंकार-अनुप्रास, यमक, श्लेष, वक्रोक्ति, पुनरुक्तिप्रकाश। अर्थालंकार-उपमा, रूपक, उत्प्रेक्षा, अतिशयोक्ति, भ्रंतिमान।

**CO5.** The students after the completion of this course will be able to contemplate and comprehend राजभाषा हिन्दी -मलिकमोहम्मद

**CO6.** The students after the completion of this course will be able to contemplate and comprehend हिन्दी भाषा-डॉ. भोलानाथतिवारी।

#### **Course 6: Literature in English from 1550-1750 A.D.**

**CO1.** The students after the completion of this course will be able to demonstrate knowledge of the major texts and traditions of English literature.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend different periods of literature and important authors like Shakespeare, Milton, etc of English literature.

#### **Course 7: Literature in English from 1750-1900 A.D.**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and become familiar with representative literacy and cultural texts with in a significant number of historical and cultural contexts.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and form an idea about the various stages in the development of English literature.

#### **Course 8: Modern English Literatures - I**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and develop critical thinking through long and short fictions of English literature.

**CO2.** The students after the completion of this course will be able to write and appreciate different types of prose of English literature.

#### **Course 9: Modern English Literatures - II**

**CO1.** The students after the completion of this course will be able to familiarize with the plays of master- dramatists and will have developed the ability to appreciate and evaluate different types of plays of English literature.

**CO2.** The students after the completion of this course will be able to appreciate and evaluate different types of plays of English literature.

**Course 10: Indian Writing in English**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the various phases of the evolution of Indian writing in English.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the thematic concern, genres and trends of Indian writing in English.

**Course 11: American Literature**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the cultural themes, literary periods and key artistic features of American Literature.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the various aspects of American Society through a critical examination of the literary texts representing different periods and culture.

**Course 12: Micro Economics**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the definitions, nature and scope of economics.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the theory of production and cost.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize the market structure.

**CO4.** The students after the completion of this course will be able to contemplate and comprehend and recognize factor pricing.

**CO5.** The students after the completion of this course will be able to contemplate and comprehend and recognize welfare economics.

**Course 13: Indian Economy**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize pre and post independent Indian economy.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in population and human development.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in agriculture.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in industry.

**C05.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in foreign external sector.

#### **Course 14: Macro Economics**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize national income & social accounts.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in consumption function.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the nature and characteristics of trade cycle.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in international trade.

**C05.** The students after the completion of this course will be able to contemplate and comprehend and recognize the functions of IMF, World Bank and WTO.

#### **Course 15: Money, Banking and Public Finance**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize basic concepts of money.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the role of economics in commercial banking.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the meaning and scope of public finance.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the sources of public revenue and taxation.

**C05.** The students after the completion of this course will be able to contemplate and comprehend and recognize public debt and financial administration.

#### **Course 16: Development and Environmental Economics**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize economic growth and development.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the relationship between economics and population problem & growth.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize Harrods and Domar growth model.

**CO4.** The students after the completion of this course will be able to contemplate and comprehend and recognize the relationship between economics and environment & ecology.

**CO5.** The students after the completion of this course will be able to contemplate and comprehend and recognize the concept of intellectual capital.

#### **Course 17: Statistical Methods**

**CO1.** The students after the completion of this course will be able to comprehend and apply statistical methods in economics.

**CO2.** The students after the completion of this course will be able to comprehend and apply the measurement of central tendency in economics.

**CO3.** The students after the completion of this course will be able to comprehend and apply the methods & tools of dispersion in economics.

**CO4.** The students after the completion of this course will be able to comprehend and apply coefficient of correlation in economics.

**CO5.** The students after the completion of this course will be able to comprehend and apply index number and measurement of trend in economics.

#### **Course 18: Political Theory**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the nature and scope of political theory.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the concept of state, nation and civil society.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize the meaning of organs of government and theory of separation of power.

#### **Course 19: Indian Government and Politics**



**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the salient features in making of Indian Constitution.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize and appreciate the fundamental rights and duties and the directive principle of state policy.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize and evaluate the evolution, functioning and consequences of political parties in India.

#### **Course 20:Western Political Thought**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the nature, methods and significance of political thought.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize and appreciate various social and political ideas of political thinkers.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize and demonstrate the knowledge of political thinkers and political concepts.

#### **Course 21: Comparative Politics and Government**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize and critically assess presidential and parliamentary system.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the difference between federal and unitary systems of government.

#### **Course 22:International Politics**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize and critically assess the international political system.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the relations of India with neighboring countries.

#### **Course 23:Public Administration**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize and critically assess the administrative system of the nation.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize various concepts in public administration and the effective use of libraries, archives, and databases.

**Course 24: Introduction to Sociology**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the nature and scope of sociology.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the basic concepts of society, community, institution, association etc.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize different social groups.

**CO4.** The students after the completion of this course will be able to contemplate and comprehend and recognize various social processes.

**Course 25: Contemporary Indian Society**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the classical view about Indian Society and Varna Vyavastha.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the structure and composition of Indian society.

**Course 26: Society in India**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize various social problems like Casteism, Regionalism, and Communalism etc.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize various social problems like Dowry, Domestic Violence, Divorce etc.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize basic Institutions of society.

**Course 27: Crime and Society**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize social structure and anomalies.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize meanings, causes, consequences and remedies of Terrorism.

#### **Course 28: Sociology of Tribal Society**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize classification of tribal people.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize socio cultural profile of tribe.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize various tribal problems.

**CO4.** The students after the completion of this course will be able to contemplate and comprehend and recognize various tribal movements.

#### **Course 29: Social Research Methods**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize & apply social survey and research.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize & apply research design.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize & apply techniques of data collection and statistics.

#### **Course 30: Physical Geography - Elements of Geomorphology**

**CO1.** The students after the completion of this course will be able to contemplate and comprehend and recognize the effect of rotation and revolution the earth.

**CO2.** The students after the completion of this course will be able to contemplate and comprehend and recognize the interior structure of the earth.

**CO3.** The students after the completion of this course will be able to contemplate and comprehend and recognize theory regarding of origin of continents and oceans.

**CO4.** The students after the completion of this course will be able to contemplate and comprehend and recognize the formation of rocks.

**CO5.** The students after the completion of this course will be able to contemplate and comprehend and recognize the work of internal and external forces and their associated land forms.

**Course 31: Introduction to Geography and Human Geography**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the relationship of man and environment.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the races of man kinds.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the modes of life of pigmy, Bushman, Eskimos, Masai, Gond and Nagar.

**Course 32: Physical Geography - Climatology and Oceanography**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the weather and climate.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the atmospheric moisture.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the air masses and fronts.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the surface configuration of the ocean floor.

**C05.** The students after the completion of this course will be able to contemplate and comprehend and recognize the circulation of oceanic water.

**C06.** The students after the completion of this course will be able to contemplate and comprehend and recognize the marine deposits, coral reefs.

**Course 33: Regional Geography with Special Reference to North America**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the regional concept, bases of regionalization.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the structure, relief, climate and soils of North America.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the mineral and energy resources, Forests and North America.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the Agriculture belts, line stock and dairy forming in North America.

**C05.** The students after the completion of this course will be able to contemplate and comprehend and recognize the Industries and Regions of North America.

**Course 34: Geography - Resources and Environment**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the resources: meaning, nature and components.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the distribution and utilization of resources.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the man environment interrelations.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the environmental conservation and management.

**Course 35: Geography of India (with special reference to Chhattisgarh)**

**C01.** The students after the completion of this course will be able to contemplate and comprehend and recognize the geo-physical features of India.

**C02.** The students after the completion of this course will be able to contemplate and comprehend and recognize the drainage, climate of India.

**C03.** The students after the completion of this course will be able to contemplate and comprehend and recognize the resources, geo-cultural features of India.

**C04.** The students after the completion of this course will be able to contemplate and comprehend and recognize the geo-physical features, geo-cultural features of Chhattisgarh.

**Course 36: Anatomy, Physiology & Hygiene**

**C01.** The students after the completion of this course will be able to describe anatomical structure & physiological functions of cell, tissue and their functions skeletal system - Types of bones, classification general structure & functions of bones, Muscular system - General structure, types and function.

**C02.** The students after the completion of this course will be able to describe anatomical structure & physiological functions of Circulatory system - General structure of organs and functions, composition of blood & function, Respiratory system - General structure of organs and functions.

**C03.** The students after the completion of this course will be able to describe anatomical structure & physiological functions of Digestive system - General introduction of Nutrients,

Liver and spleen organs of digestion their general structure and function, Excretory system- organs of excretion, Kidney & skin - structure & function.

**C04.** The students after the completion of this course will be able to describe anatomical structure & physiological functions of Nervous system - Central nervous system structure and function, Senses and Sensory organs - ear and eye structure & function.

**C05.** The students after the completion of this course will be able to describe and apply principles of Hygiene - Personal Hygiene, social Hygiene, Environmental and Industrial Hygiene, Water - its importance and purification, Air - its importance and purification, First aid home nursing - Principles, qualities of nurse, responsibilities, selection of sick room, care of the patient, some common accidents and their aid, poison, bleeding, burns and scalds, fracture sprain, dislocation.

### **Course 37: Home Science - Extension Education**

**C01.** The students after the completion of this course will be able to describe, recognize and apply in Home Science - Concepts, goals and Areas of Home Science & their inter relationship with extension, Principles and methods of home science extension education general concepts of extension work, Objectives of extension education in qualities of extension workers, extension education process.

**C02.** The students after the completion of this course will be able to describe, recognize and apply principles of community development organization and function of community development, Role of home scientists in community development, programmes of extension education for community, programmes of community development at central, state, district, block and village level, Family planning programme, Community problems, child marriage, Dowry system, pardapratha, rural indebtedness unemployment.

**C03.** The students after the completion of this course will be able to describe, recognize and apply methods of learning - Discussion, demonstration, observation and their application to home science teaching, Extension Methods - their scope advantages and application, Scope and use in Home Science teaching, Extension Methods - their scope advantages and application.

**C04.** The students after the completion of this course will be able to describe, recognize and apply in attitude towards Home Science, Motivation towards Home Science, Application of Home Science towards improvement in family living, Job opportunities in Home Science, National and International agencies and their collaboration with Home Science, Official organization Home Science Association of India, W.H.O. FAG, CARE, ICAR, ICDS, ICSSR, ICMR, IRDP, Adult education.

**C05.** The students after the completion of this course will be able to describe, recognize and apply basic concept of curriculum planning, components of curriculum planning, implementation, evaluation and improvement required in the existing system of H.Sc. education policy and its relevance to H.Sc. Programme planning-concept, principles, objectives and steps in programme planning.

### **Course 38: Fabric & Cloth Science**

- CO1.** The students after the completion of this course will be able to describe, recognize and apply in fabric science and its testing, cloth weaving and its styling.
- CO2.** The students after the completion of this course will be able to describe, recognize and apply textile ornamentation, selection of dyes and fabrics.
- CO3.** The students after the completion of this course will be able to describe, recognize and apply textile & cloth printing and its types, tie & dye methods.
- CO4.** The students after the completion of this course will be able to describe, recognize and apply laundry methods for various fabrics and cloth materials, stain removal.
- CO5.** The students after the completion of this course will be able to describe, recognize and apply dress designing, fashion designing according to personality types, types of dress designing & ornamentation.

### **Course 39: Family Resource Management**

- CO1.** The students after the completion of this course will be able to describe, recognize and apply in Home management process, role of home-maker, decision making.
- CO2.** The students after the completion of this course will be able to describe, recognize and apply in Home decoration, interior designing, selection of colors for home, furniture selection, flower decoration.
- CO3.** The students after the completion of this course will be able to describe, recognize and apply in family resource management, time management, man-power management, income management, family income and budget, family savings, standard of living, account / book keeping.
- CO4.** The students after the completion of this course will be able to describe, recognize and apply in Kitchen planning & management, modernization of kitchen and kitchen space, use of alternative energy sources like solar, water distribution system, ventilation, lighting and storage.

### **Course 40: Home Science - Human Development**

- CO1.** The students after the completion of this course will be able to describe, recognize and apply in child growth and development, different aspects of growth, principles of development, factors affecting child development, heredity and environment.

**C02.** The students after the completion of this course will be able to describe, recognize and apply in stages of development - Physiology of pregnancy, Prenatal - Reproductive system, Prenatal development, Infancy, Early infancy, Babyhood, Childhood, Early childhood, Late childhood, Adolescence, Early adolescence, Late adolescence, prenatal growth and development - Sources of studying prenatal life, Stages of growth prenatal and development, Factors affecting prenatal and development growth, Mother's food, Health of mother, Narcotics, Age of parents, Effect of season, Emotion of mother.

**C03.** The students after the completion of this course will be able to describe, recognize and apply in effect of normal and caesarean delivery, Adjustment to new environment - Temperature, Respiration, Food consumption, Excretion, Physical development of infant-Physical proportion, Height, Weight, Pulse rate, Respiration rate, Body temperature, Frequency of hunger, Sensory development of infant - Light, Sound, Taste, Smell, Skin sensitivity, Motor activity of infants -Mass activities, Specific activities -Reflex activities, Advantages of reflex action, Emotions of infants -Types of emotions, Significance of emotions, Characteristics of infant behavior- Dependency, Individual difference, Adjustment.

**C04.** The students after the completion of this course will be able to describe, recognize and apply in childhood : Adolescence, Characteristics of this stage, Factors affecting growth and development during childhood and adolescence, Physical growth height, weight, body proportion, teeth, Growth and development of internal organs - Nervous, Mental, Circulatory system, Digestive system, Respiratory system, Tissues and muscles systems, Development of motor abilities, Types of motor abilities, importance and characteristics of motor abilities in childhood, Development of motor skills, Types of motor skills, Delayed motor development.

**C05.** The students after the completion of this course will be able to describe, recognize and apply in development of emotional behavior-characteristics special emotions (affection, anger, fear, jealousy and worries) factors affecting emotional behavior, Social developments stages - during infancy, nursery school period, elementary school period, Factor affecting social development, Development of intelligence - Types according to Thorndike, theories regarding intelligence.

**C06.** The students after the completion of this course will be able to describe, recognize and apply in Play, work and play, theories of play, characteristics of children's play, types of play, factors effecting play and importance of play, Habits : Definition, Functions performed by habits, Habits and learning, Laws of habit formation-identical to laws of learning, Habit formation, Principles of habit formation, Rules for habit formation, Children delinquency-Types causes and remedial measures.

#### **Course 41: Food & Nutrition Science**

**C01.** The students after the completion of this course will be able to describe, recognize and apply the principles and components of nutrition like carbohydrates, lipids, proteins, minerals, vitamins & water and their sources, RDA, metabolism and deficiency.

**C02.** The students after the completion of this course will be able to describe, recognize and apply the principles and components of foods like food groups, cereals & grains, pulses &



legumes, milk & dairy products, vegetables & fruits, egg, meat, fish & poultry, sugar, jiggery & honey, beverages & spices and their types, composition, nutrition, cooking and processing.

**CO3.** The students after the completion of this course will be able to describe, recognize and apply the principles and components of food preservation, food spoilage, food toxicity, food adulteration, food hygiene and food storage.

**CO4.** The students after the completion of this course will be able to describe, recognize and apply the principles and components of dietary management & menu planning, RDA, economics of menu planning, infant nutrition, pediatric nutrition, child nutrition, student & youth nutrition, nutrition during pregnancy and lactation, geriatric nutrition.

**CO5.** The students after the completion of this course will be able to describe, recognize and apply the principles and components of therapeutic nutrition, therapeutic nutrition for - diabetics, under-weight & over-weight, anemic, vitamin deficiency, protein energy malnutrition, liver diseases, peptic ulcer, indigestion, diarrhea, constipation, hypertension.

**Course Outcomes (CO) of the Courses common to all the UG Programmes mentioned above Course: Foundation course English Language**

**CO1.** The student will be able to write a paragraph with a topic sentence, support and concluding sentence.

**CO2.** The student will be able to produce appropriate vocabulary and correct word forms.

**CO3.** The student will be able to use grammatical structures accurately.

**CO4.** The student will be able to broaden their vocabularies and develop an appreciation of language.

**CO5.** The student will be able to be competent to write a report or idea expansion.

**CO6.** The student will be able to summarize and paraphrase information in a text.

**Course: Environmental Studies and Human Rights**

**CO1.** The students after the completion of this course will be able to describe, recognize and practice multi disciplinary nature of environmental studies, natural resources: renewable and non-renewable resources - forest resources, deforestation, timber extraction, mining, dams and their effects on forests and tribal people and relevant forest act, water resources, surface and ground water, floods drought, conflicts over water, dams benefits and problems and relevant act, mineral resources, environmental

effects of extracting and using mineral resources, food resources, world food problems, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, energy resources, renewable and non-renewable energy sources, use of alternate energy sources, land resources, land degradation, man induced landslides, soil erosion and desertification.

**C02.** The students after the completion of this course will be able to describe, recognize and practice ecosystem - producers, consumers and decomposers, energy flow in ecosystem, ecological succession, food chains, food webs and ecological pyramids, structure and function of forest, grass, desert and aquatic ecosystem.

**C03.** The students after the completion of this course will be able to describe, recognize and practice biodiversity and its conservation, genetic, species and ecosystem diversity, biogeographical classification of India, value of biodiversity: consumptive use, productive use, social ethics, aesthetic and option values, biodiversity at global, national and local levels, India as mega-diversity nation, hot spots of biodiversity, threats to biodiversity, habitat loss, poaching of wildlife, man-wild life conflict, endangered and endemic species of India, conservation of biodiversity: in situ and ex-situ conservation of biodiversity..

**C04.** The students after the completion of this course will be able to describe, recognize and practice pollution: causes, effect and control measures for - air, water, soil, marine, noise, nuclear pollution and human population, solid waste management, urban and industrial wastes, disaster management: floods, earthquake, cyclone and landslides, environmental management - from unsustainable to sustainable development, water conservation, rain water harvesting, water shed management, resettlement and rehabilitation of people, environmental ethics, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, wasteland reclamation, environment protection act, environmental legislation, information technology in environment and human health.

**C05.** The students after the completion of this course will be able to describe, recognize and practice concepts of human rights, classification of human rights, protection of human rights under the UNO charter, protection of human rights under the universal declaration of human rights, 1948 convention on the elimination of all forms of discrimination against women, convention on the rights of the child, 1989.

**C07.** The students after the completion of this course will be able to describe, recognize and practice human rights norms in India, human rights under the constitution of India, fundamental rights under the constitution of India, directive principles of state policy under the constitution of India, enforcement of human rights in India, protection of human rights under the human rights act, 1993- national human rights commission, state human rights commission and human rights court in India, fundamental duties under the constitution of India.

**M.A. Hindi - 4 Semesters Postgraduate programme**  
**Programme Outcomes (PO),**  
**Programme Specific Outcomes (PSO),**  
**Course Outcomes (CO)**

**एम. ए. हिन्दी – प्रथम सेमेस्टर**

**प्रथम प्रॉन पत्र – हिन्दी साहित्य का इतिहास**

इतिहास ऐतिहासिक घटनाओं और वृत्तान्तों का लेखा-जोखा ही नहीं प्रस्तुत करता, इतिहास का निर्माण भी करता है। इतिहास के स्वरूप को समझना सरल कार्य नहीं है। इतिहास से मनुष्य का संबंध पुराना है। हमारा संस्कार, हमारा व्यवहार हमारी संस्कृति, हमारी नीति अतीत से अनुशासित एक अनवरत धारा है। अतीत के परिप्रेक्ष्य में वर्तमान को समझ सकते हैं। अतः विद्यार्थियों के लिए यह सर्वाधिक उपयोगी पाठ्यक्रम है।

**द्वितीय प्रॉन पत्र – प्राचीन एवं मध्यकालीन काव्य**

प्राचीन एवं मध्यकालीन काव्य में समाज को दिशा निर्दिष्ट करने के साथ धार्मिक एवं ऐतिहासिक तथ्यों से लोगों को अवगत करना साहित्य का मुख्य उद्देश्य है। काव्य में भक्तिकाल, जहाँ लोक जागरण को स्वर देने वाला है, वहीं रीतिकाल अपने लौकिक – श्रृंगारिक परिदृश्य में तत्कालीन सामाजिक, सांस्कृतिक, राजनीतिक स्थितियों को बेलौस अभिव्यंजित करता है। अतः भाषा, संस्कृति, विचार, मानवता काव्यरूपता, लौकिकता, पारलौकिकता आदि दृष्टियों से इसका अध्ययन आवश्यक है।

**तृतीय प्रॉन पत्र – द्विवेदीयुगीन एवं छायावादी काव्य**

साहित्य समय का सहचर होता है समाज में आत बदलावों का साक्षी होता है। साहित्य सिर्फ समुन्नत समाज की कल्पना नहीं करता बल्कि सर्वांगीण विकास जिसमें समता, स्वतंत्रता और बंधुता का भाव हो। साहित्य के आधुनिकता, लोक व कुलीन, इतिहास व वर्तमान सभी को ध्यान में रखकर चलता है तथ्य और सत्य दोनों की आराधना साहित्य का विषय होता है साहित्य के चिंतन मनन के केन्द्र में मानव कल्याण के बीच छिपे है इन समस्त स्थितियों से विद्यार्थियों को अवगत कराना है ताकि उनमें चेतना का संचार हो, उनमें लेखन की भावना जागृत हो।

**चतुर्थ प्रॉन पत्र – हिन्दी गद्य साहित्य**

आधुनिक काव्य गद्य की विधाओं पर आश्रित है यह मानव के मन और मस्तिष्क में अनेक प्रयोजनों को प्रस्तुत करता है। उन्हीं भावनाओं के आधार पर काव्य का सृजन होता है। इसमें चिन्तन, मनन और रागात्मकता का प्रस्तुतीकरण कौशलपूर्ण ढंग से होता है। प्राकृतिक परिवेश में काव्य वैभव का भाव एवं कला पक्ष इसमें गद्य साहित्य की विविध विधाओं में अत्यन्त विंगल बन गया है। हमारी सांस्कृतिक चेतना को इसने अत्यन्त प्रभावित किया है। साहित्य के विद्यार्थी इससे लाभान्वित होते हैं।

**एम. ए. हिन्दी – द्वितीय सेमेस्टर**

**तृतीय प्रॉन पत्र – आधुनिक काव्य – 2**

(प्रगतिवाद, प्रयोगवाद, नई कविता एवं समकालीन कविता) साहित्य एक सामाजिक संस्था है इसलिए समाज में परिवर्तन का अर्थ है साहित्य के स्वरूप और दृष्टिकोण में परिवर्तन। केवल हिन्दी कविता पर ध्यान दे तो उसमें वीरगाथा काल, भक्तिकाल, रीतिकाल, भारतदु युग, द्विवेदी युग, छायावाद, प्रगतिवाद, नई कविता एवं समकालीन कविता जैसी विविध - काव्य दृष्टियाँ परिलक्षित होती हैं। जीवनानुभूतियाँ और उन पर पड़ने वाले तत्कालिक दबावों को कारगर ढंग से व्यक्त करने के लिए कविता आवश्यक है। अतः यह पाठ्यक्रम विद्यार्थियों के लिए उपयोगी है।

#### **चतुर्थ प्र'न पत्र - आधुनिक गद्य साहित्य (उपन्यास, निबंध एवं कहानी)**

छात्राओं में नाटक एवं एकांकी के रसास्वाद की दृष्टि विकसित हुई। इनमें हिन्दी नाटक का स्वरूप, तत्व आदि मानदंडों के आधार पर समीक्षा की क्षमता निर्मित हुई। उनमें हिन्दी के प्रतिनिधि उपन्यास, निबंध, कहानीकारों का परिचय प्राप्त हुआ। उनकी कहानियों एवं नाटकों में निहित तत्वों से अवगत हुए। अच्छाइयों एवं बुराइयों को समझने की उनमें चेतना जागृत हुई।

#### **पंचम प्र'न पत्र - उत्तर मध्यकाल**

से आधुनिक काल तक छात्राओं में हिन्दी साहित्य के विकास क्रम की समझ पैदा करना। उत्तर मध्यकाल की परिस्थितियों एवं प्रवृत्तियों से परिचित कराना। स्वाधीनता आंदोलन की पृष्ठभूमि में साहित्य की भूमिका को परिलक्षित करना। गद्य लेखन के प्रादुर्भाव एवं महत्व से भी छात्राओं को परिचित कराना इस पठन का उद्देश्य है। इस पाठ के माध्यम से विद्यार्थी आधुनिक काल के साहित्य की प्रमुख रचनाओं एवं प्रवृत्तियों को जान एवं समझ सकेंगे। ७

#### **अठम प्र'न पत्र - मध्यकालीन काव्य**

विद्यार्थियों को मध्ययुग के कवियों के योगदान का परिचय प्राप्त हुआ। विद्यार्थियों में साहित्यिक कृतियों के िल्प एवं सौन्दर्य को देखने की दृष्टि विकसित होती है। इनमें संत एवं भक्तों के काव्य सौन्दर्य की जानकारी प्राप्त होती है। छात्राओं को हिन्दी साहित्य के प्रतिनिधि रचनाकारों का महत्व प्रदेय, प्रभाव आदि का ज्ञान प्राप्त हुआ।

#### **एम. ए. हिन्दी - तृतीय सेमेस्टर**

#### **प्रथम प्र'न पत्र - साहित्य के सिद्धांत तथा आलोचना ाास्त्र**

भारतीय काव्य'ास्त्रीय आचार्य हित चिंतन के पक्षधर रहे हैं। साहित्य मानवीय मूल्यों की स्थापना व प्रतिष्ठा करने का बेजोड़ माध्यम है। वाट्सअप, फेसबुक, ई - मेल के छद्म व सतही प्रेम के दौर में साहित्य ही तो बचा है जो मानवीय प्रेमवस्तु को मजबूती प्रदान करता है। साहित्य विद्यार्थियों में संवेदना के भाव को जगाता है राष्ट्रीय व अंतर्राष्ट्रीय मंचों पर हिन्दी भाषा व साहित्य की महत्ता व उपयोगिता को बताते हैं। हिन्दी साहित्य के विद्यार्थी जो स्नातकोत्तर कक्षाओं में अध्ययनरत हैं उनके ाोध, प्र'न, जिज्ञासा आदि के लिए यह उपयोगी सिद्ध होगा।

## द्वितीय प्रश्न पत्र – भाषा – विज्ञान

विद्यार्थियों को भाषा विज्ञान के माध्यम से हिन्दी भाषा के व्यवस्थित और यथोचित प्रयोग का ज्ञान प्राप्त कराना। छात्रों में भाषा विज्ञान के वैज्ञानिक अध्ययन की दृष्टि से वि'व में फैली विभिन्न भाषाओं का तुलनात्मक, ऐतिहासिक कालक्रमानुसार अध्ययन कराना उद्दे'य है। जिससे विद्यार्थियों को विविध रूपों का ज्ञान प्राप्त हो सके। विद्यार्थियों को भाषा के स्वरूप परिभाषा और वि'षताओं की जानकारी प्राप्त कराना इसका उद्दे'य है।

## तृतीय प्रश्न पत्र – कामकाजी हिन्दी और पत्रकारिता

मानव की सामाजिक आव'यकताओं और जीवन में भाषा का वि'ष महत्व है। कामकाजी हिन्दी में राजभाषा का वि'ष प्रयोजन है। ज्ञान-विज्ञान के क्षेत्र में ज्ञानवर्धक सामग्री का प्रयोग किया जा सकता है। ासकीय एवं अ'ासकीय कार्यों की भाषा संबंधित ाब्दावली का सुन्दर प्रयोग करके इसे सरल बनाया जा सकता है। स्नातकोत्तर के विद्यार्थियों के लिए यह पाठ्यक्रम उपयोगी व सार्थक है।

## चतुर्थ प्रश्न पत्र – भारतीय साहित्य

मनुष्य विविध दे'काल में भाषा, साहित्य और संस्कृति का सृजन और विकास करता आया है जिसमें अनेक प्रकार की विविधताएँ, भिन्नताएँ और समानताएँ पाई जाती हैं, इन भिन्नताओं और समानताओं का अध्ययन आव'यक है। वि'व साहित्य में जो कुछ भी श्रेष्ठतम उसका अध्ययन मनन और प्रचार करना चाहिए ताकि प्राणवान और सत्य विचारों की धारा प्रवाहित की जा सकें। इसलिए पाठ्यक्रम उपयोगी है।

## एम. ए. हिन्दी – चतुर्थ सेमेस्टर

### प्रथम प्रश्न पत्र – हिन्दी आलोचना तथा समीक्षा ास्त्र

हिन्दी आलोचना के अंतर्गत ास्त्रीय, व्यक्तिवादी, ऐतिहासिक, प्रभाववादी, समाज की मनोवि'लेषणवादी तुलनात्मक काव्यधाराओं का वर्णन समाहित है जो हिन्दी आलोचना का औचित्य प्रदर्ित करता है। हिन्दी आलोचना तथा समीक्षा ास्त्र के अध्ययन से विद्यार्थियों को समझने व परखने का अवसर मिलता है। जिससे सामाजिक और सांस्कृतिक परिवे'ा को समझने में विद्यार्थियों को सहायता मिलती है।

### द्वितीय प्रश्न पत्र – हिन्दी भाषा

लोक मानस भाषा का व्यवहार अपनी जरूरतों के मुताबिक करता है। संविधान में हिन्दी भाषा को राजभाषा का दर्जा दिया गया है। कोई भी भाषा जनता के जितने करीब होती है, उनमें जनभाषा बनने की उतनी ही सामर्थ्य होती है। भाषा का विकास जनता की राष्ट्रीय भावना के विकास का प्रतीक है। अतः यह पाठ्यक्रम विद्यार्थियों के विकास में बहुत उपयोगी होगा।

### तृतीय प्रश्न पत्र – मीडिया – लेखन एवं अनुवाद

आज के युग में मीडिया लेखन का अत्यधिक महत्व है। मीडिया के माध्यम दे'ग विदे'ग में होने वाली घटनाओं, क्रियाकलापों एवं गतिविधियों की जानकारी गीघ्न प्राप्त होती है। ज्ञान विज्ञान तकनीकी, अनुसंधान, सामाजिक, आर्थिक, धार्मिक, सांस्कृतिक, राजनीतिक समस्त क्षेत्रों में घटित होने वाली समस्त प्रकार की जानकारी मीडिया के माध्यम से विद्यार्थियों को प्राप्त होती है। उनमें चेतना जागृत होती है। यह पाठ्यक्रम छात्र के लिए उपयोगी है।

### चतुर्थ प्रश्न पत्र – छत्तीसगढ़ी भाषा

जनपदीय भाषा एवं साहित्य के माध्यम से छात्राओं को छत्तीसगढ़ की गौरवगाथा, ऐतिहासिकता, पौराणिकता का ज्ञान कराना है। छत्तीसगढ़ी साहित्य की सामाजिक, धार्मिक, सांस्कृतिक गतिविधियों का जीवंत दस्तावेज है। जनपदीय भाषा साहित्य के माध्यम से छत्तीसगढ़ी भाषा की विकास यात्रा का विस्तृत ज्ञान कराता है। विद्यार्थी छत्तीसगढ़ी साहित्य एवं साहित्यकारों का अध्ययन कर यहाँ की रीति-रिवाज, रहन-सहन, खान-पान, संस्कृति का ज्ञान प्राप्त कराता है।

## **M.Sc. Physics – 4 Semesters Postgraduate programme**

**Programme Outcomes (PO), Programme Specific Outcomes (PSO), Course Outcomes (CO)**

### **Semester-I**

#### **PAPER –I MATHEMATICAL PHYSICS**

In this course the student will:

1. Learn about special type of matrices that are relevant in physics and then learn about tensors.
2. Get introduced to Special functions like Delta function, Dirac delta function, Bessel functions and their recurrence relations.
3. Learn different ways of solving second order differential equations and familiarized with singular points and Frobenius method transforms etc.
4. Learn the fundamentals and applications of Fourier series, Fourier and Laplace transforms their inverse.
5. Know the method of contour integration to evaluate definite integrals of varying complexity. 6 To become familiar with the method of Green's function to solve linear differential equations with inhomogeneous term.

#### **PAPER –II CLASSICAL MECHANICS**

This paper enables the students to understand

1. The Lagrangian and Hamiltonian approaches in classical mechanics.
2. The classical background of Quantum mechanics and get familiarized with Poisson brackets and Hamilton -Jacobi equation.
3. Kinematics and Dynamics of rigid body in detail and ideas regarding Euler's equations of motion.
4. Theory of small oscillations in detail along with basis of Free vibrations.
5. Basic ideas about Non linear equations and chaos.

#### **PAPER –III ELECTRODYNAMICS AND PLASMA PHYSICS**

After successful completion of the course, the student is expected to:

1. Have gained a clear understanding of Maxwell's equations and electromagnetic boundary conditions.
2. Know that laws of reflection, refraction are outcomes of electromagnetic boundary conditions.
3. Have grasped the idea of electromagnetic wave propagation through wave guides and transmission lines.
4. Extend their understanding of special theory of relativity by including the relativistic electrodynamics.
5. Understand the rather complex physical phenomena observed in plasma.

#### **PAPER -IV ELECTRONIC**

On completion of this course the student will learn about

1. Field Effect Transistors, their principles and applications.
2. Photonic devices like LED, Laser diode, photo detectors, solar cells etc and their working in detail.
3. Basic operational amplifier characteristics, OPAMP parameters ,applications as inverter, integrator, differentiator etc.
4. Digital electronics basiscusing logic gates and working of major digital devices like flip flops, CMOS , CCD etc.
5. Study the Organization and internal architecture of the Intel 8085.

#### **Semester-II**

##### **PAPER -I QUANTUM MECHANICS -I**

After successful completion of this paper, the student will be well-versed in

1. Linear vector spaces, Hilbert space, concepts of basis and operators and bra and ket notation. Both schrodinger and Heisenberg formulations of time development and their applications.
2. Theory of angular momentum and spin matrices, orbital angular momentum and Clebsh Gordan Coefficient.
3. Space-time symmetries and conservation laws, theory of identical particles.
- 4<sup>v</sup> Theory of scattering and calculation of scattering cross section, optical theorem, Born approximation, partial wave analysis etc.

##### **PAPER -II STATISTICAL MECHANICS**

The students should be able to,

1. Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics.
2. Apply the principles of statistical mechanics to selected problems.
3. Grasp the basis of ensemble approach in statistical mechanics to a range of situations.
4. To learn the fundamental differences between classical and quantum statistics and learn about quantum statistical distribution laws.
5. Study important examples of ideal Bose systems and Fermi systems.

##### **PAPER -III ELECTRONICS & PHOTONICS DEVICES & OPTICAL MODULATORS**

The students should be able to,

1. To learn the Special Bipolar Devices: Diac & Triac, SCR, UJT etc.
2. Explain the Unipolar Devices : JFET, MOSFET, MESFET etc.
3. Learn common applications of Photonic Devices.
4. Study the Optical modulator and display devices like luminescence , LCD etc.

##### **PAPER -IV COMPUTATIONAL PHYSICS & COMPUTER PROGRAMMING**

The students should be able to,

1. Learn about the linear and nonlinear algebraic equation and their solution.
2. Apply the Newton cotes formula , Gauss method in polynomial equation.
3. 3Numerical solution of ordinary differential equation.



4. Elementary information about the digital computer principle and FORTRAN Programs  
**Semester-III PAPER -I QUANTUM MECHANICS - II**

This course will enable the student to have basic knowledge about advanced techniques like

1. Approximation methods for time-independent problems like the WKB approximation.
2. The variational equation and its application to ground state of the hydrogen and Helium atom.
3. Perturbation theory and Interaction of an atom with the electromagnetic field.
4. Relativistic Quantum Mechanics using Dirac equation, Dirac matrices. The Klein Gordon equation etc.

#### **PAPER -II ATOMIC & MOLECULAR SPECTROSCOPY**

After successful completion of the course, the student is expected to:

1. Know about different atom model and will be able to differentiate different atomic systems, different coupling schemes and their interactions with magnetic and electric fields.
2. Have gained ability to apply the techniques of microwave and infrared spectroscopy to elucidate the structure of molecules.
3. Be able to apply the principle of Raman spectroscopy and its applications in the different field of science & Technology.
4. To become familiar with different resonance spectroscopic techniques and its applications. 5 To find solutions to problems related different spectroscopic systems.

#### **PAPER -III SOLID STATE PHYSICS - I**

After successful completion of the course, the student is expected to

1. Have a basic knowledge of crystal systems and spatial symmetries.
2. Know what phonons and be able to perform estimates of their dispersive and thermal properties, be able to calculate thermal and electrical properties in the free-electron model.
3. Know Bloch's theorem and what energy bands are and know the fundamental principles of semiconductors
4. Know the fundamentals of dielectric and ferroelectric properties of materials.
5. Be able to explain superconductivity using BCS theory.

#### **PAPER -IV ELECTRONICS**

The students should be able to,

1. To learn about the Microwave devices like, Klystron, Magnetron.
2. Explain the Microwave wave guide & components with their modes.
3. Use Microwave cavities in communication system and explain Transferred Electrons devices.
4. Learn about the Radar System.
5. Know Satellite Communication through the orbital satellite, geostationary satellite etc.

6.

#### Semester-IV PAPER -I NUCLEAR AND PARTICLE PHYSICS

After successful completion of the course, the student is expected to

1. Have a basic knowledge of nuclear size , shape , binding energy etc and also the characteristics of nuclear force in detail.
2. Be able to gain knowledge about various nuclear models and potentials associated.
3. Acquire knowledge about nuclear decay processes and their outcomes. Have a wide understanding regarding beta and gamma decay.
4. Grasp knowledge about Nuclear reactions, Fission and Fusion and their characteristics.
5. Understand the basic forces in nature and classification of particles and study in detail conservation laws and quark models in detail.

#### PAPER -II LASER PHYSICS AND APPLICATIONS

After successful completion of the course, the student is expected to

1. Have a basic knowledge of laser physics and their working process.
2. Learn about the many types of laser system such as solid state laser, gas laser, etc.
3. Study advanced in laser physics like giant pulse dynamic harmonic generation, optical mixing etc.
4. Explain the multi-photon processes.
5. Be able to gain knowledge about various application of laser.

#### PAPER -III SOLID STATE PHYSICS- II

This paper enables the students to understand

1. Gain knowledge about Plasmon's, Polaritons.
2. Study the dielectric and ferroelectric materials.
3. Learn about the advance in magnetism theory.
4. Have a gain the knowledge about the ferromagnetism and anti ferromagnetism.
5. Explain the optical processes and excitons and defects in crystal structure.

#### PAPER -IV ELECTRONICS

The students should be able to,

1. Be able to gain knowledge about the digital communication.
2. Explain the digital modulation techniques.
3. Study the Noise in Digital communication.
4. Learn about data transmission through PSK, FSK etc.
5. Understand the basic knowledge of PCM Transmission.



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