SHASKIYA MAHAPRABHU VALLABHACHARYA
SNATKOTTAR MAHAVIDYALAYA,
MAHASAMUND (C.G.) 493445
Accredited With Grade "C" by NAAC
Registered Under Section 2f & 12 (B) of UGC Act, AISHE Code C-21676
Affiliated to Pt. RavishankarShukla University, Raipur (C.G.)
Website -http://mvpgcollege.org . Email -pgcollege.mahasamund@gmail.com, Phone- (07723) 299100

COURSE OUTCOMES

(COS)

SCIENCE

B.Sc. Part I

Paper I (Cell Biology and Non-Chordata)

Unit: I

1. To understand the scope and importance of cell biology and characteristics between Prokaryotic and Eukaryotic cell.

2. To understand the organization of cell and to study the whole-cell organelles with their structure and function.

3. To understand the structure, function and organization of chromosomes, DNA and RNA.

Unit: II

1. To understand the cell division (Mitosis and Meiosis) and to know the importance and features of the cell cycle in organisms.

2. To understand the various applications of cells and to understand and study various types of tumours and to get an elementary idea of Cancer cells and cell transformation.

3. To develop an elementary idea about immunity to study the lymphoid organs and the immune system

Unit: III

1. To understand the general characters and classification of Phylum Protozoa, Porifera, and Coelenterate up to order.

2. To study the structure of Protozoa (Paramecium), Porifera (Sycon), Coelenterate (Obelia)

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Unit: IV

1. To understand the general characters and classification of Phylum Platyhelminthes, Nemathelminths, Annelida and Arthropoda up to order.

2. To study the structure of selected species of Platyhelminthes, Nemathelminths, Annelida and Arthropoda

Unit: V

1. To study the general characters and classification of Phylum Mollusca and Echinodermata up to order. 2. To understand the features of Phylum Mollusca with the help of animal Pila.

3. To understand the external and internal morphology of Echinodermata- with the help of Asterias(starfish)

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B.Sc. Part I

Paper II (Chordata and Embryology)

On completion of the course, the students are able

Unit: I 1.

To study and understand various aspects of Hemichordate and its Classification.

2. To understand all features of Hemichordate with the help of animal Balanoglossus.

3. To understand the classification of Chordates up to orders.

4. To study the features of Protochordate with the help of Amphioxus.

5. To study the comparative account of Petromyzon and Myxine.

Unit: II

1. To be familiar with the features and structure of fish skin and scales.

2. To acquire knowledge on migration in fishes and parental care in fish.

3. To know the class Amphibia, it's parental care behaviour and neoteny.

4. To familiarize the features of class Reptilia.

5. To differentiate poisonous & Non-poisonous Snakes their Poison apparatus, venom and also, able to understand the Extinct Reptiles.

Unit-: III

1. To know the Birds, their Flight Adaptation, Migration, and Perching mechanism.

2. To know the features of Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities.

3. To know the features of Aquatic Mammals and their adaptations.

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Unit: IV

1. To understand the various aspects of Fertilization and Gametogenesis.

2. To understand the structure of gamete and Types of eggs and Cleavage.

3. To know the development of Frog up to the formation of three germ layers.

4. To understand Parthenogenesis

Unit: V

1. To know the process of embryonic induction, Differentiation and Regeneration.

2. To understand the Development of Chick up to the formation of three germ layers and also, the features of Extra-embryonic membranes.

3. To understand the Placentation in mammals.

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B.Sc. PART II

PAPER – I (ANATOMY & PHYSIOLOGY)

UNIT-I

1. To familiarize the Comparative Anatomy of various organ systems of vertebrates.

2. To know the Integument and its derivatives: structure of scales, hair and feathers.

3. To know the structure of the alimentary canal and digestive glands in vertebrates.

4. To understand the Respiratory Organs, Gills, lung and Air-Sac in birds.

UNIT-II

1. To study the endoskeleton-Limbs, girdles and vertebrae.

2. To understand the features of circulatory System and able to know the evolution of heart and aortic arches.

3. To understand the features of Urinogenital System and able to know the structure of Kidney and excretory ducts.

UNIT-III 1.To study the Nervous System and general plan of the brain and spinal cord.

2. To study the classification and histology of endocrine glands.

3. To know the structure and functions of gonads and genital ducts.

UNIT-IV

1. To understand the process of Digestion and absorption of dietary components.

2. To know the Physiology of heart, Cardiac cycle and ECG.

3. To know the processes of Blood Coagulation.

4. To know the Mechanism of Respiration and control of breathing.

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UNIT-V

1. To understand The Physiology of excretion and Osmoregulation.

2. To know the Physiology of Muscle contraction.

3. To understand the Physiology of nerve impulse, Synaptic transmission.

4. To know the structure and function of Ear and Eye.

PAPER-II VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR, EVOLUTION AND APPLIED ZOOLOGY

UNIT-I

1. To know the General Characters of Hormones and Hormone Receptors

2. To understand various aspects of Biosynthesis and secretion of the thyroid, Adrenal; Ovarian and testicular hormones

3. To know the Endocrine disorders due to hormones and other glands.

UNIT-II

1. To know the Reproductive cycle in vertebrate, Menstruation, Lactation and pregnancy.

2. To know the Mechanism of parturition.

3. To know the Hormonal regulation of gametogenesis.

4. To study the structure ad functions of Extra embryonic membranes.

UNIT-III

1. Too familiar with the evidence of organic evolution, Theories of organic evolution.

2. To understand Variation, Mutation, Isolation and Natural selection.

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3. To know the Evolution of Horse.

UNIT-IV

1. To know various aspects of Ethology.

2. To know the Patterns of Behaviour Taxes, Reflexes, Drives and Stereotyped Behaviour.

3. To understand the Reproductive Behavioural Patterns.

4. To know the Hormones and Drugs which influence Behaviour.

UNIT-V

1. To know the importance of Aquaculture, Sericulture, Apiculture, Pisciculture and Poultry keeping.

2. To understand the methods and features of Pest Control (Chemical control and Biological Control).

BSc. PART III Paper-I

Ecology, Environmental-biology; Toxicology; Microbiology and Medical Zoology.

On completion of the course, the students are able

UNIT-I (ECOLOGY) 1.To know the aims and scopes of Ecology.

2. To familiarize with the major ecosystems of the world.

3. To know the Characteristics and methods of regulation of Population densities.

4. To familiarize with the Communities and Ecosystems.

5. To study the Bio-geochemical cycles

6. To understand the impacts of air and water pollution

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7. To know various stages of Ecological succession.

UNIT-II (ENVIRONMENTAL BIOLOGY)

1. To study the Laws of limiting factors

2. To study the food chain in a freshwater ecosystem.

3. To know the energy flow in ecosystem-trophic levels

4. To know the importance of conservation of natural resources

5. To understand the importance of Environmental Impact Assessment

UNIT-III (TOXICOLOGY)

1. To know the field of Toxicology and principle of systematic toxicology

2. To study the Classification of toxicants, toxic agents (Metallic and inorganic agents) and their action. 3. To know the animal poisons (Snake-venom, Scorpion and bee poisoning) and Food poisoning.

UNIT-IV (MICROBIOLOGY)

1. To know the areas and scope of microbiology.

2. To understand the microbiology of domestic water and sewage, milk and milk products.

3. To familiarize the area of industrial microbiology.

UNIT-V (MEDICAL MICROBIOLOGY)

1. To know the pathogenic micro-organisms, Rickettsia, Spirochaetes and Bacteria.

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2. To study the life-history and pathogenicity of the Pathogenic Protozoans, Pathogenic helminths and Nematode Pathogenic parasites with reference to man.

3. To know prophylaxis and treatment.

4. To know the Vector insects.

PAPER-II (GENETIC'S, CELL PHYSIOLOGY, BIOCHEMISTRY, BIOTECHNOLOGY AND BIOTECHNIQUES)

UNIT-I (GENETIC'S)

1. To understand Linkage and Linkage maps.

2. To know the varieties of gene expression - Multiple alleles; lactogenesis ; Pleiotropic genes; gene interaction; epistasis

3. To know the sex chromosome systems and sex-linkage.

4. To understand mutation and chromosomal alterations; meiotic consequences.

5. To familiarize the area of Human genetics – chromosomal and single-gene disorders (somatic cell genetics)

UNIT-II (CELL PHYSIOLOGY)

1. To get a general idea about pH and Buffer.

2. To understand the structure of cell membrane, Mitochondria and Endoplasmic reticulum.

3. To know about the transport mechanisms across membranes and active transport and its mechanism in Mitochondria and Endoplasmic reticulum.

4. Hydrolytic enzymes – their chemical nature, activation and specificity.

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UNIT-III (BIOCHEMISTRY)

1. To understand the structure and biological functions of amino acids and peptides.

2. To study Carbohydrate and its metabolism through understanding Glycogenesis; Gluconeogenesis; glycolysis, Glycogenolysis and Cosi-cycle.

3. Lipid metabolism – Oxidation of glycerol; oxidation of fatty acid.

4. Protein metabolism – Deamination, Transamination, Transmethylation; Biosynthesis of Protein.

UNIT-IV (BIOTECHNOLOGY)

1. To understand the scope and importance of Biotechnology.

2. To study and know the recombinant DNA technology and gene cloning techniques and other tools of biotechnology.

3. To understand the applications of biotechnology in (i) Pharmaceutical industry, and (ii) Food processing industry.

UNIT-V (BIOTECHNIQUE)

1. To study the principles and techniques of pH meter, Colorimeter, Microscopy-Light microscopes, Phase contrast and Electron microscopes, Centrifugation etc.

2. To know the methods of Separation of biomolecules by chromatography and Electrophoresis.

3. To understand Histochemical methods for determination of Protein, Lipids and carbohydrates.

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PRACTICAL

B.Sc Part I

1. To study and understand the internal and external features of Earthworm, Cockroach, Palaemon and Pila.

2. To know the structure of appendages of Prawn & hastate plate, mouthparts of insects and radula of Pila.

3. To understand the morphology and arrangement of various systems of selected species through Alternative methods such as Clay/Thermal/drawing/Model etc.)

4. To study the Adaptive characters of Aquatic, terrestrial, aerial and desert animals.

5. To understand the features of invertebrates with the help of Museum specimens.

6. To study the morphology of Invertebrates, frog embryology, Chick embryology and cytology with the help of slides.

B.Sc Part II

1. To Study the Classification and characters of the different chordates with the help of representative examples.

2. To understand the structure of Afferent and Efferent branchial vessels, cranial nerves and internal ear of Scolion by dissection.

3. To understand the Simple microscopic technique through unstained or stained permanent mounts.

4. To Study and understand the prepared histological slides, as per theory papers.

5. To understand the structure of limb girdles and vertebrae of frog, Varanus, Pigeon and Rabbit.

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6. To identify species and individuals of honey bees.

7. To understand the Life cycle of honey bee and silkworm.

B.Sc. Part III

1. To Estimate population density, Percentage frequency and Relative density.

2. To understand the Producers and consumers in grassland.

3. To Detect gram-negative and gram-positive bacteria.

4. To understand various hematological experiments (blood grouping, Blood coagulation time, R.B.C and W.B.C counting and Preparation of Hematin crystals from the blood of rat).

5. To study Drosophila, wild and mutant through various experiments.

6. To understand the features of Chromatography (Paper or gel).

7. To know the Colorimetric estimation of hemoglobin.

8. To understand the processes in Mitosis with the aid of onion root tip.

9. To know the methods of Biochemical detection of Carbohydrate, Protein and Lipid.

10. To study about Parasites using Permanent slides based on theory paper.

11. To know the working Principles of pH meter, Colorimeter, centrifuge and microscopes.

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M.SC ZOOLOGY- COURSE OUTCOME

I SEMESTER

CO1; Study the significance of biosystematics importance of biosystematics, different aspects of taxonomy and bio diversity

CO2; Study the importance of body organisation, locomotion, feeding mechanism in invertebrates. The importance of respiration excretion and larval stages in invertebrates

CO3: Study the importance of evolution, evolution of different animals' population genetics

CO 4: Study the working principles, applications of tools, different Methods of fixation, different methods of staining

II SEMESTER

CO1; Brief account of cell organelles, genetic materials, photosynthesis, genetic code

CO2; Brief account of physiological processes such as digestion, respiration, temperature regulation, endocrine glands and hormones.

CO3; Brief account of gametes, fertilisation, developmental processes, metamorphosis organisers, teratology

CO 4: Brief knowledge of software, hardware, basic knowledge of computer applications . Importance of biological data, testing of significance

III SEMESTER

CO1; Discuss the of classification of vertebrates, study comparative anatomy of different organ system of vertebrates

CO2; Brief account of behaviour, orientation, migration in fish understand the scope and importance of Neural and hormonal control of behaviour. Social behaviour, Social organization in insects and primates, echolocation in bats

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CO 3; Brief knowledge of demography, life table, reproductive rates, reproductive values, Population growth, Population density adaptations Stress. Physiology; Basic concepts of environmental stress and strain, Concept of elastic and plastic strain

CO 4: Brief account of immune systems, lymphoid organs, cells of immune systems, immune globin pathogens, vaccines.

IV SEMESTER

CO1: A detailed knowledge on structure functions of proteins, carbohydrates lipids, vitamins. Chemistry of nucleic acids

CO 2; A detailed knowledge of physiological role of nerve cells nerve physiology, reflex action, brain

CO 3: A detailed knowledge on character of origin and evolution of fishes and importance of classification of fishes as proposed Byberg

CO 4: To understand the scope and importance of Collection of fish seed, breeding in fish, ponds required for fresh water fish culture farms. Management of fish farm. Composite fish culture Prawn culture and pearl industries in India

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DEPARTMENT OF PHYSICS - Course Outcome (CO)

B.Sc. Part I

Paper - I: Mechanics , Oscillations and Properties of Matter

CO1. Use the idea of different coordinate systems, inertial, non-inertial and rotating frames, central force problems, Keplar's law, concept of Center of mass, collisions and conservation theorems.

CO2. Understand the rigid body dynamics, momentum, harmonic oscillators,

CO3. Understand different mechanical and electric oscillators, Lissajous figure, oscillatory circuits, types of oscillators and resonance,

CO4. Understand the Electric and magnetic fields, CRO, Cyclotron, isotopes, mass spectrography,

CO5. Learn about the elasticity, modulus, viscosity, surface tension and their respective experiments.

Paper - II:

Electricity, Magnetism And Electromagnetic Theory

CO1. Understand the gradient, divergence, curl and their geometrical interpretation, line, surface and volume integrals, Flux of a vector field, Gauss's, Green's and Stoke's theorem and their physical significance, analysis of complex network theorems using Kirchoff's law.

CO2. Learn to calculate E for distribution of charges in different arrangements, Gauss's law and its applications.

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CO3. Understand dielectrics, polarization of molecules, polarization vector, concept of displacement current, other related terms and equations to understand the mechanism of polarization. Ferroelectric and para electric dielectrics, steady and non-steady current and their equations, rise and decay in LR, CR and LCR circuits, AC circuit problems, resonance.

CO4. Understand magnetization, magnetic vectors and their relationships, dia, para and ferromagnetic substances, hysteresis, uses of Biot- Sevart law and Ampere's circuital law in different situations,

CO5. Understand electromagnetic induction and their types, Faraday's law, Maxwell's equations, electromagnetic wave equations and Poynting vectors.

B.Sc. Part II

Paper - I: Thermodynamics, Kinetic Theory and Statistical Physics

CO1. Understand the laws of thermodynamics, Carnot's cycle, concept of entropy and change of entropy in and negative temperature.

CO2. Understand the thermodynamic functions, Maxwell's thermodynamic equations and their applications, TdS equations, Black body spectrum and its analysis, Quantum theory of radiation;

CO3. Learn the Maxwellian distribution of speeds in an ideal gas, Doppler broadening, Transport phenomena in gases, mean free path, behaviour or real gases,

CO4. Understand the statistical basis of thermodynamics, Gibb's ensemble, accessible and inaccessible states, equilibrium conditions, Boltzmann, canonical distribution law and applications transition to quantum statistics;

CO5. Understand the indistinguishability of particles and its consequences, Bose-Einstein, Fermi-Dirac, Maxwell-Boltzmann statistics and their applications.

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Paper - II: Waves,AcousticsAnd Optics

CO1. Understand waves in media, waves over liquid surface, group and phase velocity, production and uses of Ultrasonic and Infrasonic waves, Reflection, refraction and diffraction of sound, Sonar

CO2. Use of Fermat's principle in understanding reflection, refraction and to derive various formulas in plane as well as curved surfaces using geometrical methods, Aberrations and their reductions, Optical instruments and need of an eyepiece.

CO3. Understand the interference of light, Newton's rings, Michelson interferometer and their application to determine the precise wavelength, and other interferometers;

CO4. Understand the diffraction, phasor diagram and integral calculus methods, Diffraction in different conditions, resolving power of grating, prism and telescope, Concept and production of Polarized light and its mathematical representation;

CO5. Learn the Laser system and basic properties of laser action, Einstein's A and B coefficient, emission mechanisms, Types and applications of laser in various fields.

B.Sc. Part III

Paper - I: Relativity, Quantum Mechanics, Atomic, Molecular And Nuclear Physics

CO1. Understand the reference systems, special theory of relativity, transformations, mass-energy equivalence,

CO2. Learn about Origin of the quantum theory by explaining failure of classical physics in various phenomena,

CO3. Understand Schrodinger's equation, wave function, Orthogonality and normalization,

CO4. Learn Spectral analysis, transition rules vibration and electronic vibration spectra,

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CO5. Understand Structure and Basic Properties of Nuclei, Classification of Elementary Particles.

Paper - II: Solid State Physics, Solid State Devices And Electronics

CO1. Understand the types of crystal structures, their basic properties, theories of Specific heat of solids, Vibrational modes,

CO2. Understand the Free electron model of a metal, Density of states, Fermi Energy, Energy bands, Hall effect, Dia, Para and Ferromagnetism, B-H curve etc.

CO3. Understand the types of semiconductors, Concept of Fermi level, Mobility of electrons and holes, junction diodes and their characteristics, Transistors and their characteristics, FET, MOSFET.

CO4. Understand the different types, features and factors related to the respective rectifiers, h-parameters and its equivalent circuit, Transistor as power amplifier and oscillator, types of oscillators,

CO5. Understand the Analog and Digital Circuits, number systems, various logic gates, their realization using Diodes and Transistors, De Morgan's Theorems, Boolean Laws, Simplification of Logic Circuits, D/A and A/D converters.

Master of Science in Physics Semester – I

Paper - I: Mathematical Physics

CO1: Use the idea of vector algebra, vector operators, their physical interpretation and applications in Physics,

CO2: Solve different physical problems with complex variables,

CO3: Familiarized with different special functions like Legendre, Bessel, Hermite and Laguerre functions etc. and their solutions,

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CO4: They will get knowledge of Fourier and Laplace Transforms in solving different problems in Mechanics and Electronics etc,

CO5: Use the ideas of matrices to solve linear algebraic equations, linear transformations etc,

CO6: Use the series solution of complex differential equations, probability theory.

Paper - II: Classical Mechanics

CO1: Understand the development of Classical Mechanics, from Newtonian to Lagrangian Mechanics,

CO2: Understand the Hamiltonian approaches in classical mechanics,

CO3: Understand the transformation equations, Hamilton-Jacobi theory with application,

CO4: Solve the Central force problems, Understand the Kinematics and Dynamics of rigid bodies

CO5: Understand the theory of oscillations.

Paper - III: Electrodynamics and Plasma Physics

CO1: Solve problems in electrodynamics, electrostatics and magnetostatics,

CO2: Understand four-vectors and tensor notations, various modes in waveguides,

CO3: Practically verify some of the laws and results of mechanics,

CO4: Understand Maxwell's equations and electromagnetic boundary conditions,

CO5: Understand the complex physical phenomena in plasma.

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Paper - IV: Electronics

CO1: Understand the Basic Op-Amp characteristics, parameters and applications as inverter, integrator, differentiator etc,

CO2: Use basic gates to evaluate the Boolean expressions,

CO3: Understand basic principles of digital electronics and design combinational and sequential circuits,

CO4: Use a microprocessor based system using assembly level language programming,

CO5: Study the Organization and internal architecture of the Intel 8085,

M.Sc. Physics Semester – II

Paper - I: QUANTUM MECHANICS - I

CO1: Know about the limitations of classical physics and evolution of quantum mechanics,

CO2: Grasp the preliminary concepts of quantum theory of the material particle,

CO3: Know the fundamental rules of quantum mechanics and its application using Schrodinger's wave equations like Harmonic oscillator, Hydrogen Atoms etc,

CO4: Learn various commutation relationships, Pauli's matrices,

CO5: Understand central force problems, 3-D potentials, Perturbation theory, degeneracy, Zeeman effect, Stark effect.

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Paper - II: STATISTICAL MECHANICS

CO1: Understand the foundations of statistical mechanics, states of a system, ensembles, thermodynamic quantities, hypotheses and theorems,

CO2: Formulate quantum statistics - ensemble theory, density matrix,

CO3: Familiar with different statistics such as Maxwell-Boltzmann, Fermi-Dirac and Bose Einstein statistics and their applications,

CO4: Understand theory of Ideal gas and their thermodynamic behaviour,

CO5: Understand non-relativistic and relativistic degenerate electron gas, theory of white dwarf stars,

CO6: Understand Statistical Mechanics of interacting systems, Theory of phase transition, Fluctuations, Brownian motion.

Paper - III: ELECTRONIC & PHOTONIC DEVICESAND OPTICAL MODULATORS

CO1: Study characteristics of Thyristors, diodes and rectifiers,

CO2: Understand basic structure and characteristics of Unipolar devices,

CO3: Understand the CCDs, Microwave devices like Tunnel diode, IMPATT diode, Gunn diode etc,

CO4: Understand the Photonic devices, Lasers, Solar cells,

CO5: Understand basics of Optical Modulators, Luminescence and Display Devices.

Paper - IV: COMPUTATIONAL METHODS & PROGRAMMING

CO1: Understand concepts of determination of zeroes of algebraic equations, curve fitting error estimations,

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CO2: Get elementary information about compilers, interpreters and operating systems, Fortran programming, flow charts,

CO3: Learn Fortran programming where the main emphasis is given to numerical analysis, From series generation, solution of quadratic equations

M.Sc. Physics Semester – III

Paper - I: QUANTUM MECHANICS – II

CO1: Understand Variational method, approximations and their solutions, energy levels;

CO2: Understand theory of scattering, Partial wave analysis;

CO3: Understand Time-dependent perturbation theory, Selection rules, wave functions;

CO4: Understand Relativistic quantum mechanics, Dirac equation;

CO5: Explain Dirac particle, negative energy state, spin –orbit energy;

Paper - II:ATOMICAND MOLECULAR PHYSICS

CO1: Understand quantum states of one electron atoms, fine structure, intensity rules;

CO2: Understand two electron systems, interaction energy in L-S and J-J Coupling, Hyperfine structure;

CO3: Explain normal and anomalous Zeeman effect, early discoveries and developments, vector models of one electron system, selection rules, weak and strong magnetic effects in Hydrogen atom;

CO4: Understand the types of molecules, Rotational spectra of diatomic molecules, Raman Effect;

CO5: Explain vibrational spectra of diatomic molecules, IR spectrometer

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Paper - III: SOLID STATE PHYSICS - I

CO1: Understand concepts of electrons present in solids and their electronic properties like, energy bands in solids, various electronic models, theorems, crystal structures, etc;

CO2: Understand the Fermi surfaces and metals, and explain the observed physical properties of solids in terms of the motion of electrons in the periodic lattice space;

CO3: Explain the crystal vibration and thermal properties, lattice dynamics;

CO4: Understand the Electron-Phonon interaction and Superconductivity

CO5: Gain knowledge on Semiconductor crystals, donor-acceptor concept, thermo-electric effects.

Paper - IV: ELECTRONICS (COMMUNICATION) - I

CO1: Gain knowledge on various Microwave devices;

CO2: Understand the Microwave waveguides their different modes & components;

CO3: Understand the Microwave cavities, Transferred Electrons devices, Gunn diodes, IMPATT diodes, TRAPATT diodes and Microwave communications;

CO4: Understand the Radar system, types of satellites and Satellite communication.

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M.Sc. Physics Semester – IV

Paper - I: NUCLEAR & PARTICLE PHYSICS

CO1: Understand the Nuclear Interactions, structure of the nucleus, its stability and nuclear forces;

CO2: Understand the Nuclear Reactions and related theories;

CO3: Understand the different decay processes of the nucleus and the origin and uses of radioactivity,

CO4: Learn different models of the nucleus, nuclear binding energy, nuclear reactions and energy release processes.

CO5: Learn about elementary particles and their properties.

Paper - II: LASER PHYSICSAND APPLICATIONS

CO1: Understand the Laser Characteristics;

CO2: Learn about different types of Laser Systems;

CO3: Learn advanced topics in laser Physics;

CO4: Explain multi-photon processes, Laser spectroscopy;

CO5: Understand the applications of Lasers in various fields, Communication by lasers

Paper - III: SOLID STATE PHYSICS - II

CO1: Understand the Plasmon, Polaritons , Plasma optics, electrostatic screening etc;

CO2: Gain knowledge on Dielectric and ferroelectrics, polarizability, phase transition theories, piezoelectricity;

CO3: Update their knowledge about general ideas of dia- and para- magnetisms, quantum theory of paramagnetism;

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CO4: Understand the Ferromagnetism and anti ferromagnetism

CO5: Understand the Optical Processes & Excitons and crystal defects.

Paper - IV: ELECTRONICS (COMMUNICATION) - II

CO1: Learn about fundamentals of Digital communications;

CO2: Learn about different Digital modulation techniques;

CO3: Learn about Mathematical representation of noise;

CO4: Understand the Data Transmission techniques.

DEPARTMENT OF MATHEMATICS

B.Sc. Maths

Learn to solve improper integrals.

Make use of linear equations for solving any differential equations.

Understand various problems related with planar graphs, demonstrate a rigorous understanding of the core theories & principles of physics, which includes mechanics, electromagnetism, thermodynamics, & quantum mechanics,

Serve as the Programmers or the Software Engineers with the sound knowledge of practical and theoretical concepts for developing software.

Serve as the Computer Engineers with enhanced knowledge of computers and its building blocks. Work as the Hardware Designers/Engineers with the knowledge of Networking Concepts.

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B.Sc I Year Mathematics:

Paper I: Algebra and Trigonometry

CO1: Elementary operations on matrices, Inverse of a matrix. Linear independence of row and column matrices, Row rank, column rank and rank of a matrix. Equivalence of column and row ranks

CO2: Application of matrices to a system of linear (both homogeneous and nonhomogeneous equations. Theorems on consistency of a system of linear equations

CO3: Mappings, Equivalence relations and partitions. Congruence modulon. Definition of a group with examples and simple proper ties. Subgroups, generation of groups, cyclic groups

CO4: Homomorphism and Isomorphism of groups. The fundamental theorems of homomorphism. Introduction, properties and examples of rings

CO5: De-Moiré's theorem and its applications. Direct and inverse circular and hyperbolic functions. Logarithm of a complex quantity. Expansion of trigonometrical functions

Mathematics: Paper II: Calculus

CO1: $\varepsilon - \delta$ definition of the limit of a function. Basic properties of limits. Continuous functions and classification of discontinuities

CO2: Asymptotes. Curvature.Tests for concavity and convexity. Points of inflexion. Multiple points. Tracing of curves in Cartesian and polar coordinates

CO3: Integration of transcendental functions. Reduction formulae. Definite integrals. Quadrature. Rectification. Volumes and surfaces of solids of revolution

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CO4: Degree and order of a differential equation. Equations reducible to the linear form.Exact differential equations. First order higher degree equations solvable for x, y, p. Clairaut 's form and singular solutions

CO5: Linear differential equations of second order. Transformation of the equation by changing the dependent variable/the independent variable

Mathematics: Paper III: Vector Analysis & Geometry

CO1: Scalar and vector product of three vectors. Product of four vectors.Reciprocal Vectors. Vector differentiation. Gradient, divergence and curl

CO2: Vector integration. Theorems of Gauss, Green, Stokes and problems based on these

CO3: General equation of second degree. Tracing of coni cs. System of conics. Confocal conics. Polar equation of a conic CO4: Sphere. Cone. Cylinder

CO5: Central Conchoids. Paraboloids .Plane sections of conchoids. Genera ting lines. Confocal Conchoids. Reduction of second-degree equations

B.Sc.II Year Mathematics:

Paper I: Advance Calculus

CO1: Definition of a sequence. Theorems on limits of sequences. Bounded and monotonic sequences. Cauchy's convergence criterion. Series of nonnegative terms

CO2: Continuity, Sequential continuity, Properties of continuous functions, Uniform continuity, Chain rule of differentiability, Mean value theorems and their geometrical interpretations

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CO3: Limit and continuity of functions of two variables, Partial differentiation Change of variables, Euler's theorem on homogeneous functions

CO4: Envelopes, Evolutes, Maxima, minima and saddle points of functions, two variables, Lagrange's multiplier method. CO5: Beta and Gamma functions, Double and triple integrals, Dirichlet's integrals, Change of order of integration in double integrals

Mathematics:Paper II: Differential Equation

CO1: Series solutions of differential equations- Power series method, Bessel and Legendre, Functions and their properties-convergence, recurrence.

CO2: Laplace Transformation - Linearity of the Laplace transformation, Existence theorem for Laplace transforms, Laplace transforms of derivatives.

CO3: Partial differential equations of the first order, Lagrange's solution, Some special types of equations

CO4: Partial differential equations of second and higher orders, Classification of linear partial differential equations of second order.

CO5: Calculus of Variations - Variation problems with fixed boundaries- Euler's equation for functional containing first order derivative and one independent variable, Externals

Mathematics: Paper III: Mechanics

CO1: Analytical conditions of Equilibrium, Stable and unstable equilibrium, virtual work, Catenary

CO2: Forces in three dimensions, Pointset's central axis, Null lines and planes, Dynamics

CO3: Simple harmonic motion, Elastic strings, velocities and accelerations along radial and transverse directions, Projectile, Central orbits

CO4: Kepler's laws of motion, velocities and acceleration in tangential and normal directions, motion on smooth and rough plane curves.

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CO5: Motion in a resisting medium, motion of particles of varying mass, motion of a particle in three dimensions, acceleration in terms of different coordinate systems

B.Sc. III Year Mathematics:

Paper I: Analysis

CO1: Series of arbitrary terms. Convergence, divergence and Oscillation.Abel's and Dirichlet's test .Multiplication of series. Double series

CO2: Riemann integral. Inerrability of continuous and monotonic functions.The fundamental theorem of integral calculus. Mean value theorems of integral calculus

CO3: Complex numbers as ordered pairs. Geometric representation of Complex numbers.Stereographic projection. Continuity and differentiability of Complex functions

CO4: Definition and examples of metric spaces. Neighbourhoods, Limit points, Interior points, Open and closed sets, Closure and interior.

CO5: Dense subsets. Blaire Category theorem. Separable, second countable and first countable spaces. Continuous functions. Extension theorem

Mathematics: Paper II: Abstract Algebra

CO1: Group-Auto morphisms, inner auto morphism. Auto morphism groups and their computations, Conjugacy relation, Normaliser, Counting principle.

CO2: Ring Theory-Ring homomorphism. Ideals and Quotient Rings.Field of Quotients of an Integral Domain, Euclidean Rings, Polynomial Rings, Polynomials over the Rational Field.

CO3: Definition and examples of vector spaces. Subspaces. Sum and direct sum of subspaces, Linear span. Linear dependence, independence

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CO4: Linear transformations and their representation as matrices. The Algebra of linear transformations.The rank nullity theorem. Change of basis.

CO5: Inner Product Spaces-Cauchy-Schwarz inequality. Orthogonal vectors.Orthogonal Complements. Orthonormal sets and bases

Mathematics: Paper III: Programming in C & Numerical Analysis

CO1: Programmer's model of a computer. Algorithms. Flow Charts.Data Types. Arithmetic and input/output instructions. Decisions control structures

CO2: Solution of Equations: Bisection, Secant, Regula Falsi, Newton's Method, Roots of Polynomials: Interpolation: Lagrange and Hermite Interpolation

CO3: Linear Equations: Direct Methods for Solving. Systems of Linear Equations, Iterative Methods, The Algebraic Eigenvalue problem

CO4: Ordinary Differential Equations: Euler Method, Single-step Methods, Runge-Kutta's Method, Multistep Methods, Milne-Simpson Method.

CO5: Monte Carlo Methods Random number generation, congruential generators, statistical tests of pseudorandom numbers

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M.Sc.: Mathematics

Apply the knowledge of mathematical concepts in interdisciplinary fields, Understand the nature of abstract mathematics and explore the concepts in further details. Model the real-world problems in to mathematical equations and draw the inferences by finding appropriate solutions. Employ confidently the knowledge of mathematical software and tools for treating the complex mathematical problems and scientific investigation.

M.Sc (Mathematics) Semester I

Paper-I: Advanced Abstract Algebra (I)

CO1: Groups - Normal and Subnormal series. Composition series.Jordan- Holder theorem.Solvable groups. Nilpotent groups

CO2: Field theory- Extension fields. Algebraic and transcendental extensions. Separable and inseparable extensions

CO3: Perfect fields. Finite fields.Primitive elements. Normal extensions, Splitting field

CO4: Auto morphisms of extensions. Galois extensions. Fundamental theorem of Galois theory

CO5: Solution of polynomial equations by radicals. Insolvability of the general equation of degree 5 by radicals

Paper-II: Real Analysis (I)

CO1: Sequences and series of functions, pointwise and uniform convergence, Cauchy criterion for uniform convergence, Weierstrass M-test

CO2: Power series, uniqueness theorem for power series, Abel's and Tauber's theorems. Rearrangements of terms of a series

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CO3: Functions of several variables, linear transformations, Derivatives in an open subset of Rn, Chain rule, Partial derivatives

CO4: Jacobians, extremum problems with constraints, Lagrange's multiplier method, Differentiation of integrals

CO5: Partitions of unity, Differential forms, Stoke's theorem

Paper-III: Topology

CO1: Countable and uncountable sets. Infinite sets and the Axiom of Choice.Cardinal numbers and its arithmetic. Schroeder-Bernstein theorem

CO2: Alternate methods of defining a topology in terms of Kuratowski Closure Operator and Neighbourhood Systems. Continuous functions and homeomorphism

CO3: Separation axioms; their Characterizations and basic properties. Urysohn's lemma, Tietze extension theorem.

CO4: Compactness. Continuous functions and compact sets. Basic properties of Compactness. Compactness and finite intersection property

CO5: Compactness in metric spaces. Equivalence of compactness, countable compactness and sequential compactness in metric space.Connected spaces.

Paper-IV: Complex Analysis (I)

CO1: Complex integration, Cauchy-Goursat.Theorem. Cauchy's integral formula. Higher order derivatives. Morera's Theorem

CO2: Maximum modulus principle. Schwarz lemma.The argument principle.Rouche's theorem Inverse function theorem

CO3: Residues. Cauchy's residue theorem. Evaluation of integrals.Branches of many valued functions with special reference to arg z, log z and za.

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CO4: Definitions and examples of conformal mapping Bilinear transformations, their properties and classifications CO5: Spaces of analytic functions. Hurwitz's theorem.Montel's theorem Riemann mapping theorem.

Paper-V: Advanced Discrete Mathematics (I)

CO1: Formal Logic-Statements. Symbolic Representation and Tautologies.Quantifiers, Predicates and Validity. Propositional Logic

CO2: Homomorphism of semigroups and monoids. Congruence relation and Quotient Semigroups. Sub semigroup and sub monoids

CO3: Lattices-Lattices as partially ordered sets. Their properties.Lattices as Algebraic Systems. Sub lattices, Direct products, and Homomorphism's

CO4: Direct Products and Homomorphism's. Join-Irreducible elements, Atoms and Minters. Boolean Forms and Their Equivalence

CO5: Grammars and Languages-Phrase-Structure Grammars. Rewriting Rules.Derivations.Sentential Forms. Language generated by a Grammar.

M.Sc (Mathematics) Semester II

Paper-I: Advanced Abstract Algebra (II)

CO1: Modules - Cyclic modules. Simple modules. Semi-simple modules .Schuler's Lemma.Free modules.

CO2: Linear Transformations - Algebra of linear transformation, Singular and non-singular transformation

CO3: Canonical Forms - Similarity of linear transformations. Invariant subspaces. Reduction to triangular forms

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CO4: Smith normal form over a principal ideal domain and rank. Fundamental structure theorem for finitely generated modules over a principal ideal domain

CO5: Rational canonical from. Generalised Jordan form over any field.

Paper-II: Real Analysis (II)

CO1: Definition and existence of Riemann-Stieltjes integral, Properties of the Integral, integration and differentiation.

CO2: Lebesgue outer measure. Measurable sets. Regularity. Measurable functions. Borel and Lebesgue measurability

CO3: Measures and outer measures, Extension of a measure. Uniqueness of Extension. Completion of a measure

CO4: The Four derivatives. Lebesgue Differentiation Theorem. Differentiation and Integration

CO5: Functions of Bounded variation. The L - spaces. Convex functions. Jensen's inequality.

Paper-III: General and Algebraic Topology

CO1: Tychon off product topology in terms of standard sub-base and its characterizations. Projection maps.

CO2: Product spaces, separation axioms connectedness (Tychonoff's theorem). Compactness

CO3: Embedding and metrization. Embedding lemma and Tychonoff embedding. The Urysohnmetrization theorem

CO4: Nets and filter. Topology and convergence of nets.Hausdorffness and nets.Compactness and nets. Filters and their convergence

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CO5: The fundamental group and covering spaces-Homotopy of paths. The fundamental group. Covering spaces

Paper-IV: Advanced Complex Analysis (II)

CO1: Weierstrass' factorization theorem.Gamma function and its properties .Riemann Zeta function.

CO2: Analytic Continuation. Uniqueness of direct analytic continuation. Uniqueness of analytic continuation along a curve

CO3: Harmonic functions on a disk. Harnack's inequality and theorem.Dirichlet Problem

CO4: Canonical products. Jensen's formula.Poisson-Jensen formula.Hadamard's three circles theorem

CO5: The range of an analytic function. Bloch's theorem. The Little Picard theorem. Schottky's theorem

Paper-V: Advanced Discrete Mathematics (II)

CO1: Graph Theory-Definition of (Undirected) Graphs, Paths, Circuits, Cycles, & Subgraphs. Induced Subgraphs.

CO2: Spanning Trees, Cut-sets, Fundamental Cut -sets, and Cycle. Minimal Spanning Trees and Kruskal's Algorithm

CO3: Directed Graphs. In degree and Out degree of a Vertex. Weighted undirected Graphs. Dijkstra's Algorithm

CO4: Introductory Computability Theory-Finite State Machines and them Transition Table Diagrams

CO5: Finite Automata. Acceptors. Non-deterministic Finite Automata and equivalence of its power to that of Deterministic Finite Automata

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M.Sc (Mathematics) Semester III

Paper-I: Integration Theory and Functional Analysis (I)

CO1: Signed measure. Hahn decomposition theorem, mutually singular measures.Radon-Nikodym theorem.

CO2: Lebesgue-Stieltjes integral, product measures, Fubini's theorem. Differentiation and Integration

CO3: Baire sets. Baire measure, continuous functions with compact support. Regularity of measures on locally compact spaces

CO4: Normed linear spaces. Banach spaces and examples. Quotient space of normed linear spaces and its completeness

CO5: Weak convergence and bounded linear transformations, normed linear spaces of bounded linear transformations.

Paper-II: Partial Differential Equation and Mechanics (I)

CO1: Examples of PDE. Classification. Transport Equation-Initial Value Problem. Non-homogeneous Equation.

CO2: Heat Equation-Fundamental Solution, Mean Value Formula, Properties of Solutions, Energy Method

CO3: Generalized coordinates. Holonomic and Non-holonomic systems.Scleronomic and Rheonomic systems

CO4: Poisson's Bracket. Poisson's Identity. Jacobi-Poisson Theorem. Motivating Problems of calculus of variations

CO5: Attraction and potential of rod, disc, spherical shells and sphere. Surface integral of normal attraction.

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Paper-III(A): Fundamental of Computer Science (Object Oriented Programming and Data Structure)

CO1: Object Oriented Programming-Classes and Scope, nested classes, pointer class members.

CO2: Overloaded functions and operators; Templates including class templates;

CO3: Data Structures-Analysis of algorithms, q, W, 0, o, w notations; Sequential and linked representations

CO4: Trees: Binary tree- search tree implementation, B-tree (concept only); CO5: Sorting: Insertion sort, shell sort, quick-sort, heap sort and them analysis; Hashing-open and closed.

Paper-IV(A): Operation Research (I)

CO1: Operations Research and its Scope. Necessity of Operations Research in Industry

CO2: Other Algorithms for Linear Programming-Dual Simplex Method

CO3: Parametric Linear Programming. Upper Bound Technique.Interior Point Algorithm.

CO4: Transportation and Assignment Problems

CO5: Network Analysis-Shortest Path Problem. Minimum Spanning Tree Problem.

Paper-V(A): Programming in C (with ANSI features) (I)

CO1: An overview of programming. Programming language, Classification .C Essentials-Program Development. Functions

CO2: Scalar Data Types-Declarations, Different Types of Integers. Different kinds of Integer Constants. Floating-Point Types

CO3: Control Flow-Conditional Branching. The Switch Statement.Looping, Nested Loops. The break and continue Statements

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CO4: Operators and Expressions-Precedence and Associativity. Unary Plus and Minus operators. Binary Arithmetic Operators

CO5: Arrays -Declaring an Array. Arrays and Memory.Initializing Arrays. Encryption and Decryption

M.Sc (Mathematics) Semester IV

Paper-I: Functional Analysis (II)

CO1: Uniform boundedness theorem and some its consequences. Open mapping and closed graph theorems.

CO2: Hahn-Banach theorem for real linear spaces, complex linear spaces and normed linear spaces. Reflexive spaces

CO3: Inner product spaces. Hilbert spaces. Orthonormal Sets.Bessel's inequality. Complete orthonormal sets and Parseval's identity

CO4: Structure of Hilbert spaces. Projection theorem.Riesz representation theorem. Adjoint of an operator on a Hilbert space

CO5: Self-adjoint operators, Positive, projection, normal and unitary operators. Abstract variational boundary-value problem

Paper-II: Partial Differential Equations and Mechanics (II)

CO1: Non-linear First Order PDE-Complete Integrals, Envelopes, Characteristics, Hamilton Jacobi Equations.

CO2: Representation of Solutions-Separation of Variables, Similarity Solutions, Fourier and Laplace Transform

CO3: Asymptotic, Power Series (Non- characteristic Surfaces, Real Analytic Functions

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CO4: Hamilton's Principle. Principle of least action.PoincareCartan Integral invariant. Whittaker's equations

CO5: Hamilton-Jacobi equation. Jacobi theorem.Method of separation of variables. Lagrange Brackets

Paper-III(A): Operating System and Database Management System

CO1: Database Systems-Role of database systems, database system architecture and data modeling

CO2: Introduction to relational algebra and relational calculus

CO3: Introduction to SQL: Basic features in clouding views; Integrity constraints;

CO4: Operating Systems- Overview of operating system, user interface, processor management

CO5: I/O management, concurrency and Security, network and distributed Systems

Paper-IV(A): Operation Research (II)

CO1: Dynamic Programming-Deterministic and Probabilistic Dynamic programming.

CO2: Game Theory-Two-Person, Zero-Sum Games. Games with Mixed Strategies.Graphical. Solution

CO3: Integer Programming-Branch and Bound Technique

CO4: Applications to Industrial Problems-Optimal product mix and activity levels.

CO5: Nonlinear Programming-One/and Multi-Variable Unconstrained Optimization.

Paper-V(A): Programming in C (with ANSI features) (II)

CO1: Storage Classes-Fixed vs. Automatic Duration. Scope. Global variables. The register Specifier

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CO2: Pointers Pointer Arithmetic. Passing Pointers as Function Arguments. Accessing Array Elements through Pointers

CO3: Functions-Passing Arguments. Declarations and Calls.Pointers to Functions. Recursion

CO4: Structures and Unions-Structures. Dynamic Memory Allocation.Linked Lists. Unions, enum Declarations

CO5: Input and Output-Streams, Buffering. The Header File.Error Handling. Opening and Closing a File.

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Department of Chemistry

B.Sc. I

PAPER-I

CO1 – To study atomic structure and periodic properties to explain the chemical behavior.

CO2- To discuss chemical bonding, valence bond theory and shape of some inorganic molecules.

CO3 - To study chemical bonding and ionic structures.

CO4 – Comparative study and features of s block & p block elements.

CO5 – To study chemical properties of noble gases and inorganic chemical analysis.

PAPER-II

CO6- To study electronic structure and bonding of organic reactions.

CO7 – To discuss stereochemistry of organic compounds

CO8 – To study aliphatic and aromatic ring compounds of cycloalkanes.

CO9 – Discuss the mechanism of alkenes ,dienes, alkynes. CO10- Study the Mechanism and stereochemistry of Alkyl halides and Aryl Halides.

PAPER- III

CO11- To study the mathematical concept, permutation &combination & probability.

CO12- Discuss the molecular velocities.

CO13- To study the liquid state and colligative properties.

CO14- Discuss liquid crystals & colloidal state.

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CO15 - Study the chemical kinetics Arrhenius theory & catalysis.

B.Sc. -II PAPER-I

CO1- Discuss the Chemistry of elements of first transition series

CO2- Discuss the Chemistry of elements of second & third transition series.

CO3- Study the oxidation & reduction and coordination compounds.

CO4 - Study of Chemistry of lanthanide elements.

CO5- Study the Acid and bases.

PAPER-II

CO6 - To study alcohols, phenols & ethers.

CO7- Study of aldehydes & ketones.

CO8- Discuss the carboxylic acid and its derivatives.

CO9- Discuss the organic compounds of nitrogen.

CO10- Study of heterocyclic compounds.

PAPER-III

CO11- To study fundamentals of thermodynamic system and surroundings.

CO12- To study change in entropy of different processes through thermodynamics.

CO13 - To discuss phase rule, phase component & Nernst distribution law.

CO14 - To study electrochemistry and its various laws.

CO15 - To study about electrochemical cell & various redox reactions.

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B.Sc. -III PAPER-I

CO1- To study Metal-ligand bonding in transition metal complexes.

CO2- To discuss Magnetic properties of transition metal complexes.

CO3- To study organometallic compounds.

CO4 - To Study Bioinorganic Chemistry Essential and trace elements in biological processes

CO5 - Study of Hard and soft acids and bases

PAPER-II

CO6 –To study organometallic &organolithium compounds.

CO7- To study biomolecules classification and their constituents.

CO8- To study synthetic polymers and synthetic dyes.

CO9- To Discuss mass and UV-visible spectroscopy

CO10- To study NMR spectroscopy.

PAPER-III

CO11- To study Quantum Mechanics.

CO12- To Discuss Quantum mechanical approach of molecular orbit theory.

CO13- To study electromagnetic radiations and Raman spectra.

CO14- To study Electronic Spectra of diatonic molecule and: Interaction of radiation with matter

CO15- To study principles and application of thermodynamics.

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M.Sc. Chemistry The Scientific study of the structure of substances and what happen to them in different conditions or when mixed with each other.

M.Sc. (Chemistry) Semester I

Paper I

CO1 - Study of symmetry and group theory in chemistry.

CO2 - Discussions on metal ligand bonding and metal complexes.

CO3 – Study of metal ligand equilibria in solution and study of isopoly acid and heteropoly acid.

CO4 – Study on metal clusters, chains and rings.

Paper II

CO5 – To study nature of bonding in organic molecules and aromaticity.

CO6 – Knowledge about conformational analysis and stereochemistry.

CO7 – Study of reaction intermediates and elimination reactions.

CO8 – To study about pericyclic reactions.

Paper III

CO9 – Understanding some mathematical concept in quantum chemistry.

CO10 – Study of basics of thermodynamics.

CO11 - Knowledge about electrochemistry of various solutions.

CO12 – Study of various rate laws through chemical dynamics.

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Paper IV

CO13 – Study of unifying principles of spectroscopy.

CO14 – Detailed study on microwave spectroscopy.

CO15 – Discussions on scattering spectroscopy.

CO16 – Study of theories, instrumentation and applications of Raman spectroscopy.

M.Sc. (Chemistry) Semester II Paper I

CO17 – Study of reaction mechanism of transition metal complexes.

CO18 - Discussion on electronic spectra and magnetic properties of transition metal complexes.

CO19 – Study on transition metal complexes and transition metal compounds with bond to hydrogen.

CO20 – Discussions on alkyl and aryl of transition metals, compounds of transition metal – carbon multiple bonds and fluxional organometallic compounds.

Paper II

CO21 – To study about aliphatic nucleophilic substitution and aromatic nucleophilic substitution reactions.

CO22 – To study aliphatic electrophilic substitution and aromatic electrophilic substitution mechanisms.

CO23 - Mechanistic and stereochemical aspects of addition reactions i.e., Addition to carbon-carbon multiple bonds.

CO24 – Study on addition to carbon-hetero multiple bonds.

Paper III

CO25 – Application of matrices in quantum chemistry, angular momentum in quantum chemistry andapproximate methods.

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CO26 – Study on statistical thermodynamics.

CO27 – Discussions on electrochemistry.

CO28 – Study on chemical dynamics.

Paper IV

CO29 – Study on ultraviolet and visible spectroscopy.

CO30 – Explanation about Infrared spectroscopy.

CO31 – Detailed study on mass spectrometry. CO32 – Study on nuclear resonance spectrophotometry.

M.Sc. (Chemistry) Semester III

Paper I

CO33 – Study about electron spin resonance spectroscopy and nuclear quadruple resonance spectroscopy.

CO34 – Discussions on photoelectron spectroscopy and photoacoustic spectroscopy.

CO35 – Explanations on photochemical reactions, determination of reaction mechanism and study on some miscellaneous photochemical reactions.

CO36 – A descriptive study on organocatalysed.

Paper II

CO37 – Conceptual study on bioenergetics, electron transfer in biology and transport and storage ogdioxygen.

CO38 – Study on metalloenzymes and enzyme models.

CO39 – Study about enzymes, co-enzyme chemistry and biotechnological applications of enzymes.

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CO40 – Discussions on biopolymer interactions, thermodynamics of biopolymer solutions and study on cell membrane and transport of ions.

Paper III

CO41 – Study of acids, bases, electrophiles, nucleophiles and catalysis.

CO42 – Discussion on micelles and adsorption.

CO43 – Study on solid state chemistry CO44 – Explanations on Macromolecules.

Paper IV

CO45 – Knowing about sample preparation, digestion and statistical analysis.

CO46 – Discussion on different separation techniques in analytical chemistry.

CO47 – Study about thermal and automated methods.

CO48 – Study about electrochemistry.

M.Sc. (Chemistry) Semester

IV Paper

CO49 – Knowledge on advanced chromatography including ion chromatography, size exclusion chromatography etc.

CO50 – Study of X – Ray and photon induced spectroscopy.

CO51 – Study about atomic emission spectroscopy.

CO52 – Discussions on atomic absorption spectroscopy and hyphenated techniques.

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Paper II

CO53 – Study about terpenoids and carotenoids, alkaloids.

CO54 –Study of steroids and plant pigments.

CO55 – A detailed study on drug design including various theories and discussions on pharmacokinetics and pharmacodynamics.

CO56 – Study on antineoplastic agents, antibiotics, antimalerials.

Paper III

CO57 – Study on non-equilibrium thermodynamics.

CO58 – Discussion on material chemistry.

CO59 – Study on supramolecular chemistry.

CO60 – Study on nuclear and radiochemistry, nuckeartheory, nuclear fission, nuclear energy and applied radiochemistry.

Paper IV

CO61 – Discussions on air pollution monitoring and analysis.

CO62 – Study of soil and water pollution.

CO63 – Detailed study on food chemistry involvind food additives, food adulteration etc.

CO64 – Description about cosmetics, clinical and drug analysis.

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DEPARTMENT OF BOTANY

B.Sc. I

CO1-A brief account on general character of Viruses, Bacteriophages, virusoids, viroids, Prions, Cyanophages and Mycorhiza and its economic importance.

CO2- General characteristic of Bacteria and its economic importance, study of Rhizobium, Azotobacter and Anabena and its role on Microbial biotechnology.

CO3- General account on Fungi, VAM fungi, Parasexuality and Heterothallism and life cycle of various fungi.

CO4- General account on Algae, life cycle pattern of various Algae and study of Gaidukov Phenomena.

CO5- General account of Lichen, Mycoplasma, role of Blue Green Algae and Mushroom Biotechnology.

CO6 - General account on Bryophyta, evolution of its sporophyte its ecological and economical role. Study of anatomy and reproduction of various Bryophyte.

CO7- General account on Pteridophyte, its economical role, Heterospory and seed habit, Stellar system, Apospory and Apogamy, Telome theory and role of Azolla as biofertilizers.

CO8- Study of morphology, anatomy and reproductive structure of various Pteridophytes.

CO9- General characters of Gymnosperms its affinity and economic importance and detailed study of Cycas, Pinus and Ephedra.

CO10- An account on Paleobotany and study of some fossil Gymnosperms.

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B.Sc. II

CO1- Give an account on Characteristic of seed plant with reference to fossil and living seed plants. General account of Gymnosperms its evolution and diversity, and also highlight geological time scale and process of fossilization.

CO2- Detailed study of Cycas, Pinus and Ephedra.

CO3- Origin and evolution of Angiosperm, taxonomy and principles and rules of botanical nomenclature.

CO4- Classification of Angiosperm proposed by Bentham and Hooker and Engler and Prantl and contribution Cytology, Phytochemistry and taximetrics to taxonomy.

CO5- Detailed study of some dicotyledonous and monocotyledonous families.

CO6- Basic body plan of flowering plants, diversity of plant form and evolution of tree habit in Gymnosperm and Angiosperms.

CO7- Vascularisation of shoot system, formation of internodes, Canopy architecture, role of Cambium

CO8- Account on origin, development and arrangement of Leaf, its adaptations, also highlight on Senescence and abscission.

CO9- Embryology of Angiosperms

CO10- Significance of seeds and explain different methods of vegetative propagation.

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B.Sc. III

CO1- Plant water relations

CO2- Phloem transport, Enzymology, Photosynthesis and Photorespiration.

CO3- Respiration, Nitrogen and Lipid metabolism.

CO4- Growth and development, seed dormancy, germination and plant movements. Photoperiodism, physiology of flowering, Senescence, plant hormone Phytochrome and Cryptochromes.

CO5- Recombinant DNA technology, cloning vectors, genomics, cDNA library, genetic mapping, chromosome walking and concept of Biotechnology and crop biotechnology.

CO6- Environmental factors, its effect on plant and anatomical and physiological response of plants to water, temperature, light and salinity.

CO7- Characteristics of Community, Ecosystem, Biogeochemical cycles and Ecological succession.

CO8- Population ecology, Biogeographical region and types of vegetation in India.

CO9- Economic Botany: food plant, fibre yielding plant, oil yielding plant, wood and non-wood forest plant and its utilization.

CO10- Medicinal and Aromatic plants, rubber plant and plants which provide Beverage

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M.Sc. (Botany) Semester I

Paper I Cytology

CO1- Structure and Function of Cell, Cell Wall and Plasma membrane

CO2- Structure and Function of Cell organelles

CO3- Cell cycle and apoptosis, amitosis, mitosis and meiosis.

CO4- Techniques in cell biology, electron microscope.

Paper II Genetics

CO5- Chromatin organization, specialized type of chromosomes and sex chromosomes

CO6- Mapping of bacteriophage genome, molecular basis of chromosomal pairing.

CO7- Genetic recombination and genetic mapping.

CO8- Plant breeding technique, alien gene transfer through chromosome manipulation.

Paper III Microbiology, Phycology and Mycology

CO9- Archaebacteria, Eubacteria, Cyanobacteria.

CO10- Viruses, Phytoplasma and Mycoplasma.

CO11- Phycology: classification, account of various members, economic importance, pigmentation, perennation, evolution and development of sex in algae.

CO12- Mycology: Characteristic feature, classification, reproduction. Recent account of all groups.Mycorrhiza: VAM fungus.

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Paper IV Bryophyta, Pteridophyte and Gymnosperm

CO13- Bryophyta: General account, progressive sterilization of sporogenous tissue, spore dispersal mechanism, thallus organization, theory of origin and development.

CO14- Pteridophyte: Introduction, homospory, heterospory and origin of seed habit, fossil pteridophyte, prothallus organization.

CO15- Gymnosperm: classification of gymnosperm, affinities gymnosperm, distribution in India, biotechnology, economic importance, structure and theories regarding origin of Paleozoic ovule.

CO16- Extinct gymnosperm, extant gymnosperm

M.Sc. (Botany) Semester II

Paper I Taxonomy and Diversity of Plants

CO1- Plant nomenclature, plant identification, taxonomic hierarchy, taxonomic evidences.

CO2- Pre and Post Darwinian classifications, recent modifications, fossil angiosperm.

CO3- Study of dicotyledon families of both polypetalae and gamopetalae

CO4- Study of monochlamydeae and monocotyledon families Paper II Molecular biology

CO5- RNA and DNA structure, DNA replication.

CO6- Transcription, translation in prokaryotes and eucaryotes, molecular cytogenetics, restriction mapping, multigene families and their evolution.

CO7- Gene structure and expression, protein sorting.

CO8- Mutation: Types, Mutagens, Mutagenesis, Inherited human disease and defects.

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Paper III Plant Physiology

CO9- Membrane transport and translocation of water and solutes

CO10- Signals transduction: G proteins, C-AMP, Calmodulin, Protein kinases, Signalling Mechanisms

CO11- Stress physiology: Mineral nutrition in plants (excess and deficiency).

CO12- Sensory photobiology, the flowering process: Photoperiodism and vernalisation.

Paper IV Plant Metabolism

CO13- Photosynthesis, Photorespiration, Biosynthesis of starch and sucrose, Physiological and ecological considerations.

CO14- Respiration and Lipid metabolism

CO15- Nitrogen and sulphur metabolism

CO16- Plant growth regulators and elicitors, movements in plants, fundamentals of enzymology.

M.Sc. (Botany) Semester III

Paper I Plant Development and Plant Resources

CO1- Introduction of unique feature of plant development, root development.

CO2- Shoot development, Secretary ducts and laticifers, wood development in relation to environmental factors

CO3- Leaf development, flower development

CO4- Plant resources

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Paper II Ecosystem and vegetation ecology

CO5- Ecosystem organization, Biogeochemical cycles

CO6- Ecosystem stability and management, Concept of sustainable development

CO7- Vegetation organization: Concept and analysis of community, coefficients, ecological niche

CO8- Vegetation development: Temporal changes, ecological succession

Paper III Biotechnology and genetic engineering of plants and microbes

CO9- Biotechnology, recombinant DNA technology

CO10- Microbial genetics manipulations, genetic engineering of plants

CO11- DNA synthesis and sequencing

CO12- Genomics and proteomics

Paper IV Elective Course- Molecular Plant Pathology

CO13- Introduction, history and general principle of plant pathology, disease inciting organisms

CO14- Diseases syndrome and general symptoms of plant disease, sources of infection, pathogenesis

CO15- Effect of environment on disease development, host parasitic relationship, physiological specialization

CO16- Recurrence of disease, methods of studying plant disease

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M.Sc. (Botany) Semester IV

Paper I Plant Reproduction and Utilization of Resources

CO1-Reproduction: Vegetative reproduction, Pollination, Fertilisation

CO2- Male gametophyte: Microsporogenesis, Pollen germination, allergy storage Female gametophyte: Ovule, embryosac

CO3- Seed, Polyembryony, apomixes and fruit development, maturation

CO4- Utilization of resources, Origin of agriculture, green revolution, ethanobotanical and centre for domesticated plants

Paper II Pollution and Biodiversity Conservation

CO5- Climate, soil and vegetation pattern of the world

CO6- Pollution, climate change and ecosystems

CO7- Biological diversity, biodiversity hotspots, IUCN categories of threat

CO8- Conservation strategies: In situ and ex situ conservation

Paper III Plant cell, tissue culture and organ culture

CO9- Plant cell and tissue culture, clonal propagation, organogenesis

CO10- Somatic embryogenesis, androgenesis and somatic hybridization

CO11- Cryopreservation and germplasm storage, intellectual property rights

CO12- Application of plant tissue culture, production of secondary metabolites/natural products, transgenics in crop improvement

Paper IV Elective Paper- Molecular Plant Pathology

CO13- Epidemiology and disease forecasting, genera principle of plant disease control

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CO14- Defense mechanism, resistant and susceptibility.

CO15- Wilt disease, disease due to fungi, disease due to bacteria

CO16- Disease due to viruses, mycoplasma and nematodes.

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