Course outcome Semester wise

Course: BSc

Subject: Physics

I Semester

Mechanics, properties of matter and Waves

- Familiarisation of the fundamental principles of formulations in mechanics the frames of references, vector derivatives, laws of conservation, properties of matter, fluid mechanics and simple harmonic motion and wave motion, complex waves analysis and development of applications skills.

II Semester

Thermal Physics, Sound and Electrostatics

- Clarity in the basic principles of thermodynamics, thermodynamic potentials, sound waves and electrostatics etc and development of problem solving skills.

III Semester

Electricity and Electromagnetic theory

- Clarity and good understanding in the basic principles of thermoelectricity, magnetism and electromagnetic theory, network theorems, analysis and AC circuits development of problem solving skills.

IV Semester

Optics, Atomic and Molecular Spectroscopy

- Clarity in the basic principles of phenomenon interference, diffraction, polarization etc and development of problem solving and application skills.

V Semester

Relativity, Nuclear Physics and Quantum Mechanics
(Elective Paper1)

- Clarity in the basic principles theoretical explanation of the special theory of relativity, cosmic rays and particle physics, nuclear Physics and quantum mechanics.

Mathematical physics
(Elective Paper2)

- Students will be able to solve problems of different mathematical series.

Lasers and Fibre Optics
(Compulsory Paper1)

- Familiarity with Optical components and devices and communication methods.

Astronomy and Astrophysics
(Compulsory Paper2)

- Familiarity with an introduction of astrophysics, measuring scales and units, stars and their characteristics and Cosmology.

Nano Materials
(Compulsory Paper3)

- Familiarity with an introduction of Nanotechnology, nanoscale, synthesis of nano materials, modern instrumentation and optical properties.

VI Semester
Solid State Physics, Electronics and communication
(Elective paper 1)

- Clarity in the basic principles theoretical explanation of the concepts, construction and working of semiconducting devices, their identification. About communication system

Medical physics
(Elective paper 2)

- Clarity in the mechanics, acoustics optical systems diagnostic and therapeutic systems related to human body.

Optoelectronics
(Compulsory Paper1)

- Familiarity with opto electronic devices, its working and their application.

Renewable Energy Sources
(Compulsory Paper2)

- Familiarity with renewable energy sources, uses and applications.

Solving Problems in Physics
(Compulsory Paper3)

- Students will be able to solve problems under different branches of physics.

Subject: Chemistry
I Semester

- The fundamental properties and basic model of atoms, simple quantum mechanical treatments of atoms and shapes of the orbitals which are important to understand the reaction mechanism and formation of molecule.
- The arrangement of elements in the periodic table in different blocks and the variation of different properties in the periodic table and the factors responsible for the variation.
- Basic concept of organic chemistry identify basic types of chemical reactions in organic chemistry.
- Types of indicators used in different reactions and the theory involved in it, miscibility of different liquid mixtures at respective temperatures, principles of fractional distillation and applications, distribution laws and applications and the students will be able to work out numerical problems.
- Use of the concept of the mole in quantitative chemical calculations, understand stoichiometric relationshipinvolved in reactions.
- Use of different methods of purification of compound and naming of different organic compounds in IUPAC system. Role of organic compounds in daily life.

II Semester

- The bonding fundamentals of ionic and covalent compounds, including bond energies using MO diagrams.
- Predicting geometries of simple molecules with the use of theory.
- Stability of conformational isomers of cycloalkanes, naming of different aromatic hydrocarbons different naming reactions aromatic derivatives, and effect of nature of alkyl groups, leaving groups, nucleophiles and solvents on nucleophilic substitution reaction.
  Students learn how reaction rates are measured and represented in rates laws and application of chemical kinetics.
- Ionic equilibria; theory of strong electrolytes, degree of hydrolysis, effect of temperature and dilution on degree of hydrolysis.
- Preparation and synthetic applications of organic reagents, types and classification of polymers, solving numerical problems on determination of molar mass of polymer.
- Comparison of organic and inorganic precipitates how soaps and detergents act on dirt in cleaning process.

III Semester

- Position of the transition elements in the periodic table, chemistry of inner transition elements, chemistry of organometallic compounds and structures of few rare organometallic compounds.
- Types of alcohols and their preparations and uses, classification of phenols, why phenol is corrosive and few naming reaction associated with phenols, chemistry of ethers, epoxides, crown ethers and carbonyl compounds and the mechanism involved with few important reactions.
- Need for the thermodynamics of second law, significance of entropy, calculating bond energy, bond dissociation energy and resonance energy using thermodynamic data.
- X-ray crystallographycal studies and numerical problems in solving the crystals, different cromatographycal techniques and its use in separation, knowledge of different energy sources, fundamental uniqueness of the chemical and physical properties of nanomaterials and their potential impact in science, methods of nanomaterials preparation, aminoacids which are the building blocks of proteins and one can think of constructing new peptide bonds at nano level.

IV Semester

- Bonding in complexes and types, Concept of VBT and CFT in understanding the geometry of complexes, application of complexes in treating cancer and heavy metal poisoning, Ligan field theory which is the evidence for cbonding in complexes.
- Sterochemistry of organic compounds, types of isomerism in organic chemistry, classification of carbohydrates, structural elucidation of carbohydrates like glucose fructose.

- Partial structure of polysaccharides.
- Elemental quantum mechanics, concept of black body radiation, to determine equivalent conductance at infinite dilution for weak electrolyte, transport number, application of conductance measurements and conductometric titrations.
- Classification of acids and bases as Hard and Soft, gravimetric estimations and its advantages.
- Structure and synthesis of dyes.
- Concept of viscosity measurements, intermolecular forces, size and weight of the molecules, surface tension and parachor.

V Semester

- Industrial applications of inorganic chemistry in manufacturing of glass, ceramics, cements, study of paints in dept.
- Synthetic method of preparing terpenes, Synthesis of different class of heterocyles which play a very important role in pharmaceutical chemistry.
- Structure and classification of alkaloids, uric acids, vitamins, harmones, different chemotherapeutic agents and their synthesis.
- Photochemistry and radiation chemistry, new spectroscopic methods like IR, Raman Spectroscopy, molecular spectroscopy, electronic spectra.

VI Semester

- Types of metallurgy and metallurgical applications of inorganic chemistry in manufacturing of different metals and their purification.
- Production of ferro alloys.
- structure and role of metal ion in biological system with reference to Na^+, K^+ and Ca^{2+}, Mg^{2+} ions , enzymatic role of metals in heamoglobin and myoglobin. Natyral pigments, hydroxyl
- synthesis of organic polymers by utilizing special techniques, classification and synthesis of nucleic acids, hydroxyl acids, diazonium compounds.
- Spectroscopic method of identification of compounds; IR, UV visible and NMR spectroscopy in depth.
- Electrochemistry ; cell construction, applications of EMF measurements, concept of phase equilibria, adsorption and kinetics of fast reactions and principles of techniques stopped flow method, flash photolysis, temperature jump method and pressure jump method.

Subject: Mathematics
I Semester

- Get the concept of symmetric, skew symmetric matrices, elementary row operations, echelon form, Solving homogeneous, Non homogeneous system of linear equations and Cayley-Hamilton theorem.
- Understand the concept of successive differentiation, homogeneous functions, Euler's theorem, Jacobian and properties.

- Memorize the concept of Reduction formulas for both Indefinite and definite integrals.

II Semester

- Able to define groups, abelian group, permutation groups, subgroups and understand the general properties.
- Understand the concept of polar co-ordinate system, pedal equations.
- Understand to solve problems on finding the curvature, radius of curvature, centre of curvature and general rules for various forms of curves tracing.
- Identify the applications of Integral calculus including volume of solids of revolutions.
- Learning the concepts of ordinary differential equations(O.D.E) and recognize the methods of solving Linear, Exact, Homogeneous and non Homogeneous differential equations.

III Semester

- Understand the concept of order of an element, Coset of a group, Cyclic group, index group and their properties.
- Learning the concept of different sequences and their properties.
- Able to determine different types of series and whether they converges.
- Memorise the concept of types of discontinuities, knowledge of mean value theorems and indeterminate forms.
- Able to represent a periodic function as a Fourier series.

IV Semester

- Able to define Normal subgroups, homomorphism, isomorphism and their properties.
- Understand the basic concept of Laplace transforms of some functions and standard results.
- Learning the concept of second and higher order ordinary linear differential equations.
- Analysing the convergence of sequence and series of functions.

V Semester
(Paper1)

- Understand the concept of calculus of variation.
- Compute line and multiple integrals and their applications.
- Indentify the concept of integral theorems and applications of triple integral.
- Learning the concept of vector space, linear transformation and properties.

(Paper2)

- Indentify the important classes of rings, integral domain, fields and properties.
- Able to calculate the gradient of a scalar, curl of a vector field, identify Solenoidal and irrotational vector fields.
- Get the knowledge of finite differences and variation of functions with equal and unequal intervals and numerical integration.

VI Semester

(Paper 1)

- Understand the fundamental concepts of complex analysis and the role in modern mathematics.
- Compute complex integration and bilinear transformation.
- Get the concept of numerical solutions of algebraic and transcendental equations.
- Learning solutions of initial value problems for first order ordinary linear differential equations.

(Paper2)

- Knowledge of vector space which is the foundation of linear algebra and its results.
- Learning linear transformations and standard properties.
- Able to determine the Fourier transformation of a given function and properties.