Course I: MECHANICS, WAVES AND OSCILLATIONS

Course outcomes:

- **Understand Newton's laws of motion and motion of variable mass system and its application to rocket motion and the concepts of impact parameter, scattering cross section.**

- **Apply the rotational kinematic relations, the principle and working of gyroscope and itapplicationsand the precessional motion of a freely rotating symmetric top.**

- **Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.**

- **Comprehend the general characteristics of central forces and the application of Kepler's laws to describe the motion of planets and satellite in circular orbit through the study of law of Gravitation.**

- **Examinephenomena of simple harmonic motionand the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.**

- **Appreciate the formulation of the problem of coupled oscillations and solve them to obtain normal modes of oscillation and their frequencies in simple mechanical systems.**

- **Figure outthe formation of harmonics and overtones in a stretched string and acquire the knowledge on Ultrasonic waves, their production and detection and their applications in different fields.**

Practical Course 1: Mechanics, Waves and Oscillations

Course outcomes (Practicals):

- **Perform experiments on Properties of matter such as the determination of moduli of elasticity *viz.*, Young's modulus, Rigidity modulus of certain materials; Surface tension of water , Coefficient of viscosity of a liquid , Moment of inertia of some regular bodies by different methods and compare the experimental values with the standard values.**
- **Know how to determine the acceleration due to gravity at a place using Compound pendulum and Simple pendulum.**
- **Notice the difference between flat resonance and sharp resonance in case of volume resonator and sonometer experiments respectively.**
- **Verify the laws of transverse vibrations in a stretched string using sonometer and comment on the relation between frequency, length and tension of a stretched string under vibration.**
- **Demonstrate the formation of stationary waves on a string in Melde's string experiment.**
- **Observe the motion of coupled oscillators and normal modes.**

Course-II: WAVE OPTICS

Course outcomes:

- **Understand the phenomenon of interference of light and its formation in (i) Lloyd's single mirror due to division of wave front and (ii) Thin films, Newton's rings and Michelson interferometer due to division of amplitude.**
- **Distinguish between Fresnel's diffraction and Fraunhoffer diffraction and observe the diffraction patterns in the case of single slit and the diffraction grating.**
- **Describe the construction and working of zone plate and make the comparison of zone plate with convex lens.**
- **Explain the various methods of production of plane, circularly and polarized light and their detection and the concept of optical activity..**
- **Comprehend the basic principle of laser, the working of He-Ne laser and Ruby lasers and their applications in different fields.**
- **Explain about the different aberrations in lenses and discuss the methods of minimizing them.**
- **Understand the basic principles of fibre optic communication and explore the field of Holography and Nonlinear optics and their applications.**

Practical Course II: Wave Optics

Course outcomes (Practicals):

- **Gain hands-on experience of using various optical instruments like spectrometer, polarimeter and making finer measurements of wavelength of light using Newton Rings experiment, diffraction grating etc.**
- **Understand the principle of working of polarimeter and the measurement of specific rotatory power of sugar solution**
- **Know the techniques involved in measuring the resolving power of telescope and dispersive power of the material of the prism.**
- **Be familiar with the determination of refractive index of liquid by Boy's method and the determination of thickness of a thin wire by wedge method.**

Course-III: HEAT AND THERMODYNAMICS

Course outcomes:

- **Understand the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equipartition of energies, mean free path of molecular collisions and the transport phenomenon in ideal gases**
- **Gain knowledge on the basic concepts of thermodynamics, the first and the second law of thermodynamics, the basic principles of refrigeration, the concept of entropy, the thermodynamic potentials and their physical interpretations.**
- **Understand the working of Carnot's ideal heat engine, Carnot cycle and its efficiency**
- **Develop critical understanding of concept of Thermodynamic potentials, the formulation of Maxwell's equations and its applications.**
- **Differentiate between principles and methods to produce low temperature and liquefy air and also understand the practical applications of substances at low temperatures.**
- **Examine the nature of black body radiations and the basic theories.**

Practical Course-III: Heat and Thermodynamics

Course outcomes (Practicals):

- **Perform some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, variation of thermo-emf of athermocouple with temperature difference at its two junctions, calibration of a thermocouple and Specific heat of a liquid.**

Course-IV: ELECTRICITY, MAGNETISM AND ELECTRONICS

Course outcomes:

- **Understand the Gauss law and its application to obtain electric field in different cases and formulate the relationship between electric displacement vector, electric polarization, Susceptibility, Permittivity and Dielectric constant.**
- **Distinguish between the magnetic effect of electric current and electromagnetic induction and apply the related laws in appropriate circumstances.**
- **Understand Biot and Savart's law and Ampere's circuital law to describe and explain the generation of magnetic fields by electrical currents.**
- **Develop an understanding on the unification of electric and magnetic fields and Maxwell's equations governing electromagnetic waves.**
- **Phenomenon of resonance in LCR AC-circuits, sharpness of resonance, Q- factor, Power factor and the comparative study of series and parallel resonant circuits.**
- **Describe the operation of p-n junction diodes, zener diodes, light emitting diodes and transistors**
- **Understand the operation of basic logic gates and universal gates and their truth tables.**

Practical CourseIV:Electricity, Magnetism and Electronics

Course outcomes (Practicals):

- **Measure the current sensitivity and figure of merit of a moving coil galvanometer.**
- **Observe the resonance condition in LCR series and parallel circuit**
- **Learn how a sonometer can be used to determine the frequency of AC-supply.**
- **Observe the variation of magnetic field along the axis of a circular coil carrying current using Stewart and Gee's apparatus.**
- **Understand the operation of PN junction diode, Zener diode and a transistor and their V-I characteristics.**
- **Construct the basic logic gates, half adder and full adder and verify their truth tables. Further, the student will understand how NAND and NOR gates can be used as universal building blocks.**

Course V: MODERN PHYSICS

Course outcomes:

- **Develop an understanding on the concepts of Atomic and Modern Physics, basic elementary quantum mechanics and nuclear physics.**
- **Develop critical understanding of concept of Matter waves and Uncertainty principle.**
- **Get familiarized with the principles of quantum mechanics and the formulation of Schrodinger wave equation and its applications.**
- **Examine the basic properties of nuclei, characteristics of Nuclear forces, salient features of Nuclear models and different nuclear radiation detectors.**
- **Classify Elementary particles based on their mass, charge, spin, half life and interaction.**
- **Get familiarized with the nano materials, their unique properties and applications.**
- **Increase the awareness and appreciation of superconductors and their practical applications.**

Practical Course V:Modern Physics

Course outcomes (Practicals):

- **Measure charge of an electron and e/m value of an electron by Thomson method.**
- **Understand how the Planck's constant can be determined using Photocell and LEDs.**
- **Study the absorption of α-rays and β-rays, Range of β-particles and the characteristics of GM counter**
- **Determine the Energy gap of a semiconductor using thermistor and junction diode.**

Renewable Energy

Course outcomes:

After successful completion of the course, students will be able to:

- **1. Acquire knowledge on solar radiation principles with respect to solar energy estimation.**
- **2. Get familiarized with various renewable energy resources, collecting techniques**
- **3. Learn the solar photovoltaic technology principles and different types of solar cells for energy conversion and different photovoltaic applications.**
- **4.Understand the working principles of several solar appliances like Solar cookers, Solar hot water systems.**
- **5. Understand the working Principles of wind energy resources like wind turbines, wind mills.**
- **6.Under stand the concepts of Ocen energy and techniques.**
- **7. Under stand bio energy resources as alternate renewable energy.**

solar energy

Learning Outcomes:

After successful completion of the course, students will be able to:

- **1. Acquire knowledge on solar radiation principles with respect to solar energy estimation.**
- **2. Get familiarized with various collecting techniques of solar energy and its storage**
- **3. Learn the solar photovoltaic technology principles and different types of solar cells for energy conversion and different photovoltaic applications.**
- **4.Understand the working principles of several solar appliances like Solar cookers, Solar hot water systems, Solar dryers, Solar Distillation, Solar greenhouses**