Department of Physics
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Course Outcomes (NEP Curriculum)

Semester I: Mechanics (Theory)
Course Code: PHSMIN101T/PHSCOR101T

On successful completion of this practical course, the student will be able to:

- Use an understanding of elementary mathematics along with physical principles to effectively solve problems encountered in everyday life, further study in science, and in the professional world.
- 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 it applications and the processional 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.
- Examine phenomena of simple harmonic motion and the distinction between undamped, damped and forced oscillations and the concepts of resonance and quality factor with reference to damped harmonic oscillator.

Semester I: Mechanics (Practical)
Course Code: PHSCOR101P

On successful completion of this practical course, the student will be able to:

- 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.

Semester II: Electricity and Magnetism (Theory)
Course Code: PHSMIN202T/PHSCOR202T

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

- 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.

Semester II: Electricity and Magnetism (Practical)
Course Code: PHSCOR202P

On successful completion of this practical course the student will be able to:

- 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.

Semester III: Fluids and Waves (Theory)
Course Code: PHSMIN303T/PHSCOR303T

On successful completion of this course, the student will be able to:

- 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.

Semester III: Fluids and Waves (Practical)
Course Code: PHSMIN303P+PHSCOR303P

On successful completion of this practical course the student will be able to:

- 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.

Semester IV: Thermal Physics and Statistical Mechanics (Theory)
Course Code: PHSMIN404T/PHSCOR404T

On successful completion of this course, the student will be able to:

- 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.

Semester IV: Thermal Physics and Statistical Mechanics (Practical)
Course Code: PHSCOR404P

On successful completion of this practical course, the student will be able to:

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

Semester V: Modern Physics (Theory)
Course Code: PHSCOR505T

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

- 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.

Semester VI: Analog and Digital Electronics (Theory)
Course Code: PHSCOR606T

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

- Explain fundamental concepts of decimal number systems and represent them in powers of the base.
- Understand the implementation of Boolean Algebra to circuits.
- Identify almost all electronic components and their working principles.
- Explain basic circuit concepts and responses.
- Describe the working of few special purpose diodes.

Skill Enhancement Courses (SEC)
Semester I: Basic Instrumentation Skills

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

- Understand the basic concepts of Current, Electricity and Voltage.
- Understand the working and usage of basic circuit components in circuits.
- Implement various safety measures and precautions when handling electrical appliances
- Have a knowledge of the working principles of few home-electrical appliances
- Make comprehensive use of the technical knowledge gained from hands on training to undertake simple electrical repair works

Skill Enhancement Courses (SEC)
Semester II: Computational Physics Skills

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

- Understand basics elements of communication systems
- Analyse the various types of modulation principles
- Apply the concepts of communication techniques to various modes of communication
- Demonstrate understanding of various modulation and demodulation techniques
- Recognize and classify the structures of optical fibre

MDC: Current Perspectives of Physics

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

- Demonstrate conceptual understanding of the fundamental Physics principles.
- Explain the behaviour of light in different mediums
- Understand the basic concepts of Current, Electricity and Voltage.
- Apply the basics laws of mechanics to understand the working of simple machines.
- Appreciate the usage of the basic concepts of Physics in everyday life.