भौतिकी विभाग
मोतीलाल नेहरू राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद
प्रयागराज - 211004 (उ0प्र0), भारत
Department of Physics
Motilal Nehru National Institute of Technology Allahabad
Prayagraj - 211004 (U.P.), India

Syllabus
for
Engineering Physics - I

Program	:	B.Tech.
Year	:	First
Branch	:	Electrical Engineering, Electronics and Communications Engineering, Computer Science & Engineering, Civil Engineering
Course Code	:	PHN11501 (in first semester) or PHN12501 (in second semester)
L-T-P	:	2-1-2
Credit	:	4

Electrodynamics

Gradient, divergence and curl operations. Spherical and Cylindrical Coordinates. Gauss divergence theorem and Stoke's theorem. Poisson's and Laplace equations. Working of Helmholtz galvanometer. Magnetic vector potential. Displacement current. Maxwell's equations (integral and differential forms) in free space, Propagation of electromagnetic waves in free space.

Quantum Mechanics

Wave particle duality. Wave packets. Phase and group velocity. Heisenberg's uncertainty principle and its applications. Wave function and its physical interpretation. Probabilities and Normalization. Time independent and dependent Schrödinger wave equation and its simple applications.

Solid State Physics

Crystal structure. Space lattice. Unit cell. Miller indices. Interplaner spacing. X-ray diffraction and Bragg's law. Diamagnetism, Paramagnetism and Ferromagnetism. Hysteresis curve. Curie-Weiss Law.

List of experiments in practicals

1. To measure height of a building using Sextant.
2. To measure coefficient of thermal conductivity of rubber by Lee's disc method.
3. To study variation of magnetic field along the axis of a current carrying coil.
4. Magnetic field distribution due to Helmholtz coil setup.
5. To determine resistivity by four probe method.
6. To measure surface tension using the "break-away" method.
7. To determine specific heat of copper, lead and glass.

Reference Books

1. D. J. Griffths, *Introduction to Electrodynamics* (Pearson, New York, 2013)
2. S. Gasiorowicz, *Quantum Physics* (John Wiley & Sons, New Jersey, 2003)
3. R. Eisberg and R. Resnick, *Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles* (John Wiley & Sons, New York, 1985)

4. A. Beiser, *Concepts of Modern Physics* (McGraw-Hill, New York, 2003)

5. C. Kittel, *Introduction to Solid State Physics* (John Wiley & Sons, New York, 1953)

Course outcomes from the course

CO-1 The course provides the basics of electromagnetism and electrodynamics required by all branches of engineering professionals for the development of advanced technology.

CO-2 The course provides a basic understanding of quantum mechanics to address engineering-based problems at the molecular level required for all branches of engineering professionals for the development of advanced technologies and electronic devices.

CO-3 The course provides a basic understanding of solid-state physics to address engineering-based problems. It also helps in the development of new materials.