



भौतिकी विभाग
मोतीलाल नेहरू राष्ट्रीय प्रौद्योगिकी संस्थान इलाहाबाद
प्रयागराज - 211004 (उ०प्र०), भारत
Department of Physics
Motilal Nehru National Institute of Technology Allahabad
Prayagraj - 211004 (U.P.), India

Syllabus
for
Engineering Physics - III

Program	: B.Tech.
Year	: First
Branch	: Chemical Engineering, and Biotechnology
Course Code	: PHN11503 (in first semester) or PHN12503 (in second semester)
L-T-P	: 2-1-2
Credit	: 4

Thermodynamics

Concept of heat. Laws of thermodynamics. Entropy. adiabatic isothermal and isobaric process. Carnot cycle and its efficiency. Refrigerator. Clausius-Clapeyron's equation. latent heat. specific heat of solids and gases. thermal conductivity. Maxwell's equations

Solid State Physics

Crystal structure. Space lattice. Unit cell. Miller indices. Interplaner spacing. Characteristic and Continuous. X-ray spectra. Mosley's law. X-ray diffraction and Bragg's law.

Diamagnetism. Paramagnetism. Ferromagnetism. Hysteresis curve. Curie-Weiss Law.

Semiconductors: intrinsic and extrinsic semiconductors, p-type and n-type semiconductors, p-n junction.

Acoustics

Production and detection of ultrasonic waves. Velocity of ultrasonics in liquids and gases. Applications of ultrasonic waves. Acoustics of buildings. Reverberation. Absorption coefficient. Sabines's formula for reverberation time.

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 study variation of magnetic field along axis of Helmholtz coil.
7. To measure surface tension using the "break-away" method.
8. To determine specific heat of copper, lead and glass.

Reference Books

1. M. W. Zemansky and R. Dittman, *Heat and Thermodynamics* (McGraw-Hill, New York, 1997)

2. B. Lal and N. Subrahmanyam, *Heat Thermodynamics and Statistical Physics* (S. Chand & Company, New Delhi, 1996)
3. C. Kittel, *Introduction to Solid State Physics* (John Wiley & Sons, New York, 1953)
4. B. Ghosh, *Principles Of Acoustics* (Sreedhar Publishers, Kolkata, 2010)

Course outcomes from the course

- CO-1** To introduce concepts of thermodynamics required for engineering applications.
- CO-2** To provide an understanding of solid-state physics to address the engineering-based problems.
- CO-3** To introduce the phenomenon and applications of ultrasonics as well as acoustics of buildings.