

PHYSICS –II (E) (F.Y.B.Tech)
PH-15004 Semiconductor Physics and Electromagnetism

Teaching Scheme

Lectures : 3hrs/week
Practical : 2hrs/week

Examination Scheme

T1- 20 Marks, T2- 20 Marks
Sem: Spring
End Sem Exam:60 Marks

1. Solid state electronics

Band theory of solids, Classification of solids on the basis of band theory, Fermi-Dirac probability function, Position of Fermi level in intrinsic semiconductor (with derivation), Temperature variation of carrier concentration in extrinsic semiconductors.

2. Semiconductor conductivity

Electron and hole concentrations in intrinsic semiconductors, Intrinsic density, Intrinsic conductivity, Extrinsic conductivity, Law of mass action, Fermi level in extrinsic semiconductors, Electrical conduction in Extrinsic semiconductors, Diffusion length and mean life time, Hall Effect.

3. Semiconductor devices

Formation of p-n junctions, position of Fermi level in equilibrium, forward and reverse bias, p-n junction diode: I-V characteristics in forward and reverse bias, Photodiode.

4. Electromagnetics

Differential and integral calculus: Concept of gradient, operator, divergence and curl. Line, surface and volume integrals, Gauss –Divergence theorem, Stokes theorem, Equation of continuity, Divergence of magnetic induction, Biot savarts law. Magnetic vector potential, Amperes circuital law,

5. Dielectric and Magnetic materials

Introduction, Nonpolar molecules, Polar molecules, Polar and nonpolar molecules in an electric field, Electric polarization of matter, Electric polarization vector, Electric field in dielectrics, Gauss's law in dielectrics, Relation between three electric vectors D, E and P, Effect of dielectric on capacitance. Magnetisation of matter (Origin of Magnetic Moment, Diamagnetism, Paramagnetism, Ferromagnetism, B, H, M), B-H curve.

6. Electrodynamics

Faraday's law of electromagnetic induction, the basic equations of electromagnetism, generalization of amperes law, Maxwell's equations.

References:

- Engineering Physics by Avdhanulu Kshirasagar
- Classical Electrodynamics, By J D Jackson, Wiley Publishers
- Introduction to Electrodynamics, D.J.Griffiths, Springer publication
- Concepts of Modern Physics – Arthur Beiser ; Tata McGraw – Hill Edition
- Modern Physics – Jeremy Bernstein , Paul m. Fishbane, Stephen Gasiorowics ; Pearson Education
- Solid State Physics – A. J. Dekkar. ; Mac Millan India Limited
- Solid State Physics - Niel W. Aschcroft & N. David Mermin, , Thomson Books Cole.
- Fundamentals of Magnetism- B. Cullity – Addison-Weseley Publishing
- Semiconductor devices, physics and technology, S. M. Sze Wiley
- *Solid State Physics*, S O Pillai, New Age International
- Introduction to solid state physics C. Kittel, Wiley