

PHYSICS –II (E) (F.Y.B.Tech)
PH-15005 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.Charge carrier distribution in Semiconductors

6h

Band theory of solids, Classification of solids on the basis of band theory, Fermi-Dirac probability function, Position of Fermi level in intrinsic semiconductor, Electron and hole concentrations in semiconductors.

2. Semiconductor conductivity

8h

Intrinsic density, Intrinsic conductivity, Extrinsic conductivity, Law of mass action, Fermi level in extrinsic semiconductors, Temperature variation of carrier concentration in extrinsic semiconductors. Electrical conduction in Extrinsic semiconductors, Diffusion length and mean life time, Hall Effect.

3. Semiconductor devices

6h

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, Solar Cell.

4. Electromagnetics

10h

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

5. Dielectrics

6h

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.

6. Electrodynamics

6h

Faraday's law of electromagnetic induction, generalization of amperes law, Maxwell's equations, Electromagnetic wave equations, Maxwell's wave equation for free space, Velocity of electromagnetic wave.

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