

I B. Tech I Sem Supple & II Sem Regular Examinations, June, 2015
Engineering Physics
(Common to BME, ECE, EEE, CSE, IT)

Time: 3 hours

Max Marks: 70

PART – A**Answer ALL questions. All questions carry equal marks**

10 * 2 Marks = 20 Marks

- 1). a What are the properties of Matter Waves? [2]
- b Define the following: i) Co-ordination number ii) Packing factor [2]
- c What are the failures of Classical free electron theory of metals? [2]
- d What are the applications of Hall Effect? [2]
- e Define the following: i) Polarizability ii) Electric susceptibility [2]
- f What are the differences between Soft and Hard Magnetic Materials? [2]
- g What is Population Inversion and Optical Pumping in a Laser? [2]
- h Write down advantages of Fiber Optics in Communication Systems. [2]
- i Briefly write about Surface to Volume Ratio and its importance in Nanotechnology. [2]
- j What are the applications of Nano Structured Materials? [2]

PART – B**Answer any FIVE questions. All questions carry equal marks**

5 * 10 Marks = 50 Marks

2. a) Elucidate the atomic arrangement in FCC crystal and obtain an expression for its Packing Factor [4] [10]
- b) Deduce Schrödinger's Time Independent wave equation and give the physical significance of wave function. [6]
3. a) Elucidate the Fermi-Dirac distribution function of electrons and discuss the effect of temperature on the distribution [10]
- b) Derive an expression for the carrier concentration of electrons in the conduction band of intrinsic semiconductors

4. a) Define Electronic Polarization and obtain the relevant mathematical expressions for Electronic Polarization in terms of the radius of the atoms. (8) [10]
- b) A paramagnetic material has a magnetic field intensity of 10^4 A/m. If the Susceptibility of the material at room temperature is 3.7×10^{-3} calculate the magnetization and flux density of the material. (2)
5. a) Illustrate on the construction and working principle of a He-Ne Laser giving its energy level diagram. (5) [10]
- b) Write down any four applications of Lasers. (2)
- c) Derive an expression for acceptance angle for an optical fiber? How it is related to numerical aperture. (3)
6. a) What are the properties of Nano Materials? (4) [10]
- b) How the Nano Materials are fabricated using bottom-up, top-down and chemical vapour deposition methods. (6)
7. a) Briefly explain about Edge and Screw Dislocations. (4) [10]
- b) Explain band theory of solids qualitatively and use it for classification of the Materials. (4)
- c) Mobilities of electrons and holes in a sample of intrinsic germanium at room temperature are $4600 \text{ cm}^2/\text{volt-second}$ and $2700 \text{ cm}^2/\text{volt-second}$ respectively. If the electron and hole densities are each equal to 3×10^{13} per cm^2 , calculate the conductivity. (2)
8. a) Give an account of domain structure and how the hysteresis curve is explained on the basis of Domain theory of ferromagnetism. [10]
- b) Explain the following
- i) Single mode optical fiber
 - ii) Multimode optical fiber
 - iii) Step index optical fiber
 - iv) Graded index optical fiber
