PVP 12

Code: CS1T3, EC1T2, EM1T3, IT1T5

I B.Tech-I Semester – Regular Examinations-February 2014

ENGINEERING PHYSICS
(Common for CSE, ECE, ECM, IT)

Duration: 3 hours Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1 a) Apply Schrodinger's wave equation to obtain the eigen values (permitted energy values) and eigen functions for a particle in a one-dimensional potential box. Comment on the obtained eigen values. 10 M

b) Calculate the minimum energy of an electron which is bound in a one-dimensional box of width 4×10^{-10}m. 2 M

c) Explain the physical significance of wave function ψ. 2 M

2 a) What are miller indices? Draw the following planes in a cubic unit cell: (110), (311), and (011). 6 M

b) Discuss in detail the theory, principle and working of Laue's X-ray diffraction technique. 4 M

c) The lattice constant a = 8.5Å. Determine the angle of diffraction for first order reflections can occur from the planes of (111), assuming that the potential difference across the X-ray tube is 30kV. 4 M

3 a) Deduce an expression for Fermi-Dirac distribution. 4 M

b) Discuss the classical theory of motion of free electrons in a periodic lattice. 6 M

c) What is the concept of effective mass? Explain the significance of negative effective mass. 4 M

4 a) Derive the Clausius-Mossotti relation and mention its significance. 6 M

b) Discuss the effect of frequency of applied field on dielectric constant. 4 M

c) Write a note on: 4 M

(i) ferroelectric materials
(ii) piezoelectric materials

5 a) Classify magnetic materials on the basis of atomic dipole moment. 6 M

b) A paramagnetic material of relative permeability 1.0036 is placed in a magnetic field of intensity 10^4 A/m. Calculate the intensity of magnetization. 2 M

c) Explain Meissner effect and classify superconductors on the basis of this effect. 6 M

6 a) Describe in detail the Einstein relation between diffusivity and mobility. 4 M

b) Derive continuity equation in semiconductors. 6 M

c) Discuss the forward and reverse biasing of a pn junction diode. 4 M

7 a) Mention the properties of lasers that distinguish it from ordinary light. 2 M

b) Describe the construction and working of a Ruby laser with relevant energy level diagram. 6 M

c) Describe in detail the working of fibre optics communication system. 6 M

8 a) Explain fundamental concepts of nanotechnology. 4 M

b) Write detailed notes on: 6 M

(i) Scanning Electron Microscope (SEM)
(ii) Transmission Electron Microscope (TEM)

c) Mention the applications of nano materials. 4 M