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S 4062

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Second Semester

Electronics and Communication Engineering

PH 1154 — PHYSICS — II

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the effect of parallel electric and magnetic fields on an electron at rest?

2. How are energy bands formed in solids?

3. Compare the variation of conductivity of metals with that of semiconductors as temperature increases.

4. Mention the isotope effect of superconductors.

5. What is the effect of temperature on dielectric polarization?

6. Calculate the cut off wavelength of a silicon photodiode whose bandgap is 1.1 eV. (Planck's constant = 6.626×10^{-34} J.s. Velocity of light = 3×10^{8} m/s).

7. Distinguish between the spin alignments of antiferro-and ferri-magnetic materials.

8. Mention the general formula and structure of ferrites.

9. Mention the methods of bulk crystal growth.

10. Define : SSI, MSI, LSI and VLSI circuits.

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PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive an expression for the electrical conductivity of a metal in terms of electron concentration, its mass and relaxation time. (8)

(ii) Obtain a relation for the displacement of an electron due to a perpendicular electric field if the electron has non-zero initial velocity. (8)

Or

(b) Define density of states of electrons. Derive an expression for it. (2 + 14)

12. (a) Discuss the theory of diffusion in semiconductors. Hence deduce the equation of continuity for any one type of carrier. (6 + 10)

Or

(b) Explain the theory and applications of Hall effect. (8 + 8)

13. (a) (i) What is dielectric loss? Deduce an expression for it. (6)

(ii) Discuss the different dielectric breakdown mechanisms. (10)

Or

(b) (i) Distinguish between direct and indirect band gap semiconductors. (6)

(ii) Explain the construction and working of a twisted nematic liquid crystal display device. (10)

14. (a) (i) In a magnetic material, the field strength applied is 10^6 amperes/m. If the magnetic susceptibility of the material is 0.5×10^{-5}. Calculate the intensity of magnetization and flux density in the material. ($\mu_0 = 4\pi \times 10^{-7}$ Henry/m). (4)

(ii) Discuss the processes of domain magnetization and the various contributions to domain energy of a ferromagnetic material. (12)

Or

(b) (i) Explain the method of recording in and reproduction from magnetic tapes. (8)

(ii) Explain the magnetic bubble storage devices and their working. (8)

15. (a) Discuss the liquid phase, vapour phase and molecular beam epitaxial growth techniques with necessary schematic diagrams. (6 + 6 + 4)

Or

(b) Write short notes :

(i) Selective diffusion method. (6)

(ii) Thin film technology. (5)

(iii) Thick film technology. (5)

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