C 3364

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Second Semester

Electronics and Communication Engineering

PH 1154 — PHYSICS – II

(Regulation 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define Relaxation Time and Collision Time of free electrons in a metal.

2. What is meant by contact potential and write down the formula for the same.

3. What are diffusion and drift current in a semiconductor?

4. What are SQUIDS? What are their uses?

5. An insulating material is kept inside the parallel plate capacitor. The distance between the plates is 1 mm and the area of each plate is 10^4 mm^2. The resistivity of the dielectric is 10^{10} ohm-m. Calculate the dielectric loss for DC voltage of 1 kV.

6. What is meant by fluorescence?

7. In a magnetic material, the field strength is found to be 10^6 amp./mt. If the magnetic susceptibility of the material is 0.5×10^{-5}, calculate the intensity of magnetization and flux density of the material.

8. Write down any two examples of ferrite materials that are used as magnetic storage memories.

9. Write down any four advantages of Integrated circuits.

10. Define LSI Circuits.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Write down the Fermi Dirac distribution function. Explain how the function varies with temperature. (12)

(ii) Calculate the velocity of the electron when it reaches the anode which is at a potential of 100 V with respect to cathode. Given that mass of electron is 9.1×10^{-31} kg and charge of the electron is 1.6×10^{-19} Coulomb. (4)

Or

(b) Discuss in detail the classification of solids into conductors, semiconductors and insulators. (16)

12. (a) (i) Derive an expression for density of electrons in intrinsic semiconductors. (12)

(ii) Calculate the conductivity of intrinsic germanium at 300°K using the following data : (4)

$N_i - 2.4 \times 10^{19} m^{-3}$ $\mu_e = 0.39 m^2 V^{-1} s^{-1}$ $\mu_h = 0.19 m^2 V^{-1} s^{-1}$.

Or

(b) Explain the effect of magnetic field, current and isotopic properties of superconductors. (16)

13. (a) (i) Obtain an expression for Lorentz field in a dielectric material. (12)

(ii) Deduce Classius Mossotti relation. (4)

Or

(b) Explain in detail the Optical properties of semi conducting materials. (16)

14. (a) Discuss Langevin's theory of paramagnetism and obtain an expression for paramagnetic susceptibility. (16)

Or

(b) Discuss in detail various types of magnetic storage media. (16)

15. (a) (i) Describe in detail the Horizontal Bridgmann technique. (8)

(ii) Explain the method of growing bulk crystals by Czochralski method. (8)

Or

(b) (i) Explain the fabrication of diffused p-n junction on a substrate by the method of masking, etching and selective diffusion. Draw diagrams for different steps involved. (8)

(ii) Write a short note on thin film and thick film technologies. (8)
