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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Second Semester

Chemical Engineering

PH 1156 — PHYSICS — II

(Common to Polymer, Textile Technology, Bio–Technology, Textile Technology (Fashion Technology) and Textile Technology (Textile Chemistry))

(Regulations 2004)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. State Wiedemann–Franz law.

2. Calculate the value of Fermic distribution function for an electron with energy :

   (a) far less than fermi energy, and

   (b) far greater than fermi energy

   at absolute zero Kevin temperature.

3. What is known as the 'effective mss' of an electron? What is its value for an electron when it is at the top and at the bottom of an energy band?

4. The Hall coefficient of a semiconductor was obtained as -3.68×10^{-5} m^3/C. What is the type of charge carries? Calculate the carrier concentration also. (Electron charge = 1.6×10^{-19} C).

5. Distinguish between the hysterisis characteristics of hard and soft magnetic materials.

6. What are called 'ferrites'? Name the common structures of ferrites.

7. Mention the advantages and disadvantages of fiber–reinforced–plastics.

8. Distinguish between crystalline and non–crystalline materials. Give an example to each.

9. Name any two radiation detectors used in clinical applications.

10. Outline the principle of positron camera used for nuclear imaging in medical field.

PART B — (5 × 16 = 80 marks)

11. Explain with necessary block diagram, the principle and working of different ultrasound scanning methods. (16)

12. (a) Define the density of states of electrons and derive an expression for it for free electrons. (16)

Or

(b) Discuss the following properties of super conductors :

(i) Meissner effect. (5)

(ii) Isotope effect. (5)

(iii) Quantum interference leading to SQUID. (6)

13. (a) Derive expressions for the electron and hole concentrations of an intrinsic semiconductor. (16)

Or

(b) Discuss the theory of Hall effect and explain an experimental procedure for the study of it. (16)

14. (a) Explain in detail the Weiss theory of paramagnetism and obtain an expression for the paramagnetic susceptibility. (16)

Or

(b) Discuss the internal (or local) field theory of dielectrics and deduce the Clausius–Mossotti equation. (10 + 6)

15. (a) What are shape memory alloys? Discuss their properties and applications. (2 + 10 + 4)

Or

(b) Explain the different classifications of ceramics along with their properties. (16)

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