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S 4060

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

Second Semester^x

Civil Engineering

PH 1152 — PHYSICS — II

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term "Coefficient of thermal conductivity".
2. What are the applications of heat conduction and convection?
3. What are the drawbacks of classical free electron theory?
4. What is SQUID?
5. What is meant by the effective mass of an electron?
6. State the applications of solar cell.
7. Mention the applications of ferrites.
8. What is meant by dielectric loss?
9. Mention some of the modern ceramic materials.
10. What is isostatic pressing?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive an expression for rectilinear flow of heat along a bar. (12)
- (ii) A copper rod 0.19 m long and of $785 \times 10^{-7} \text{ m}^2$ area of cross-section which is thermally insulated is heated at one end through 100° , while the other end is kept at 30°C . Calculate the amount of heat flow in 10 minutes along the way if the thermal conductivity of copper is 380 W/m/K . (4)

Or

- (b) (i) Derive an expression for the rate of flow of heat through the walls of spherical shell. (12)
- (ii) Give a method for finding thermal conductivity of a material synthesized in the powder form. (4)
12. (a) (i) State and prove Wiedemann-Franz law. (12)
- (ii) The thermal and electrical conductivities of copper at 20°C are 390 W/m/K and $5.87 \times 10^7 \Omega^{-1}\text{m}^{-1}$ respectively. Calculate Lorentz number. (4)

Or

- (b) (i) Explain superconducting phenomena. What are its properties and applications? (12)
- (ii) Superconducting tin has a critical temperature of 3.7 K at zero magnetic field and a critical field of 0.0306 tesla at 0 K. Find their critical field at 2 K. (4)
13. (a) (i) Derive an expression for density of holes in the valence band of an intrinsic semiconductor. (12)
- (ii) Discuss the variation of Fermi level with temperature in n-type semiconductor. (4)

Or

- (b) (i) What is Hall effect? Derive an expression of Hall coefficient. Describe an experimental set up for the measurement of the Hall coefficient. (12)
- (ii) Mention any four applications of Hall effect. (4)

14. (a) (i) Give the classification of magnetic material and explain their properties. (12)
- (ii) Distinguish between hard and soft magnetic materials. (4)

Or

- (b) (i) Explain 'internal field' in a solid dielectric. Obtain Clausius-Mosotti formula. (12)
- (ii) How does the dielectric constant of a solid vary with frequency of the applied voltage? (4)
15. (a) (i) What are metallic glasses? How are they prepared? Explain their properties and applications. (12)
- (ii) List out the applications of shape memory alloys. (4)

Or

- (b) (i) Give the classification of ceramic materials and explain their characteristics. (12)
- (ii) Mention some of the applications of ceramic materials. (4)