C 3362

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

Second Semester

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 "Thermal Diffusivity".

2. What are the required properties of thermal insulating material?

3. Define "Fermi Level"

4. What is Meissner effect?

5. What is the effective mass of an electron?

6. How are n-type and p-type semiconductors produced?

7. What are the properties of ferromagnetic materials?

8. Name the different dielectric breakdown mechanisms.

9. Mention any four applications of ceramics.

10. What are ferroelectric ceramics? Give an example.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Show that the steady state equation of a metal bar heated at one end is $\frac{d^2\theta}{dx^2} = \mu^2 \theta$ where the symbols have the usual meaning. (10)

(ii) Derive an expression for the radial flow of heat through a spherical shell. (6)

Or

(b) (i) Derive an expression for the flow of heat through a compound media. (10)

(ii) A compound bar of Ni and Cu of equal cross-section and equal length is so arranged that the free end of Cu is in a steam chamber at 100° C and the free end of Ni is in melting ice 0° C. If there is no heat loss at the sides. Calculate the temperature of the common junction. Given K_{Cu} = 390 W/m/K and K_{Ni} = 60 W/m/K. (6)

12. (a) (i) State and prove Wiedemann- Franz law. (10)

(ii) What are the main drawbacks of classical free electron theory? (6)

Or

(b) (i) Explain Superconducting phenomena. What are its properties? (10)

(ii) Distinguish between type-I and type-II Superconductors. (6)

13. (a) (i) Derive an expression for Carrier Concentration of electrons in the conduction band of n-type semiconductor. (10)

(ii) Discuss the variation of Fermi-level with temperature in an intrinsic semiconductor. (6)

Or

(b) (i) What is Hall effect? Derive an expression for Hall coefficient. (10)

(ii) Describe an experimental set up for the measurement of Hall coefficient. (6)

14. (a) (i) Describe the structure of Ferrites. Mention its applications. (10)

(ii) Distinguish between hard and soft magnetic materials. (6)

Or

(b) (i) Explain the different types of polarisation mechanisms in dielectrics. (10)

(ii) Derive Clausius— Mosotti equation. (6)

15. (a) (i) What are metallic glasses? Explain their properties. (10)

(ii) What are the applications of metallic glasses? (6)

Or

(b) (i) What arc shape memory alloys? Write their characteristics (10)

(ii) List out any four applications of shape memory alloys. (6)