Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 81083

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Second Semester

Civil Engineering

PH 2161/PH 23/080040002 — ENGINEERING PHYSICS — II

(Common to All Branches)

(Regulations 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define mean free path of an electron.

2. Define Fermi level.

3. Compared with Germanium, Silicon is widely used to manufacture the elemental device. Why?

4. Draw the graph for variation of Fermi level with temperature in p-type semiconductor.

5. What is Bohr magneton?

6. What are the advantages of SQUID?

7. Define : oriental polarization.

8. What are dielectric losses?

9. What is shape memory effect?

10. What are the different crystalline forms of carbon?

PART B — ($5 \times 16 = 80$ marks)

11. (a) Deduce mathematical expressions for electrical conductivity and thermal conductivity of a conducting material and hence obtain Wiedemann-Franz law. (6 + 6 + 4)

Or

(b) (i) Explain qualitatively the effect of temperature on Fermi function. (4)

(ii) Derive an expression for the density of energy states. (8)

(iii) Calculate the number of states per unit volume in an energy interval of 0.01 eV above the Fermi energy of sodium metal. The Fermi energy of sodium at 0° K = 3.0 eV. (Given Plank's constant $h = 6.62 \times 10^{-34}$ Js). (4)

12. (a) Obtain an expression for carrier concentration of charges in an *n*-type semiconductor Describe the variations of Fermi-level with Temp and impurity concentration. (12 + 4)

Or

(b) (i) Define Hall effect. Derive the Hall co-efficient. Any four applications of Hall effect. (2 + 6 + 4)

(ii) An n-type Germanium sample has a donar density of $10^{21}/m^3$.

It is arranged in a Hall experiment having B = 0.5 W/m^2 and J = 500 A/m^2. Find the Hall voltage if the sample is 3mm thick. (4)

13. (a) (i) Explain the domain theory of Ferromagnetism. Using that theory, explain the formation of hysteresis in ferromagnetic materials. (8)

(ii) The magnetic field strength of Silicon is 1500 A/m. If the magnetic susceptibility is -0.3×10^{-5} calculate the magnetization and flux density in Silicon. (4)

(iii) Differentiate a soft magnetic material front a hard magnetic material. (4)

Or

(b) (i) Explain any four properties of superconductors. (8)

(ii) Differentiate between Type I and Type II superconductors. (4)

(iii) Describe high temperature superconductors. (4)

14. (a) (i) Describe in detail the different types of polarization present in dielectrics. (10)

(ii) Explain the variation of polarization with frequency and temperature. (6)

Or

(b) (i) Define local field and derive Clausius Mosotti relation. (10)

(ii) Discuss the applications of dielectric materials. (6)

15. (a) Explain the characteristics of Shape Memory Alloy and mention its advantages and disadvantages. (16)

Or

(b) (i) Describe plasma arcing technique with a diagram to fabricate nano particles. (8)

(ii) Explain how are carbon nano particles fabricated using Laser deposition method. (8)

———————