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

Question Paper Code : 22093

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

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 × 2 = 20 marks)

1. State Wiedemann-Franz law.
2. Calculate the conductivity of intrinsic semiconductor if the mobilities of electrons and holes in it are 8.6×10^6 m^2/v.s. and 1.7×10^6 m^2/v-s. respectively. The electron and hole densities in the sample is $2.2 \times 10^{19}/m^3$.
3. Mention the drawbacks of classical free electron theory.
4. Distinguish between intrinsic and extrinsic semiconductors.
5. What are antiferro magnetic materials? Give examples.
6. What is magnetic levitation?
7. What is the effect of temperature on polarization in dielectrics?
8. What is thermal breakdown in dielectrics?
9. Mention some of the applications of shape memory alloys.
10. Write any four properties of Nanomaterials.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive the expressions for electrical and thermal conductivity based on classical free electron theory. (10)

(ii) Calculate the electrical and thermal conductivities for a metal with a relaxation time of 10^{-14} second at 300 K. Also calculate the Lorentz number using the above result. [Density of electrons — $6 \times 10^{28}/m^3$] (6)

Or

(b) (i) Derive an expression for density of energy states. (10)

(ii) Give an account on Fermi-Dirac distribution function. Draw a graph showing its variation with energy at different temperature and discuss it. (6)

12. (a) (i) Derive an expression for carrier concentration in intrinsic semiconductors. (10)

(ii) Explain in detail how the band gap energy of an intrinsic semiconductor is determined. (6)

Or

(b) (i) Explain in detail the variation of Fermi level with temperature and impurity concentration in N — type semiconductors. (10)

(ii) What is Hall effect? Obtain an expression for Hall coefficient. (6)

13. (a) (i) Explain the domain theory of Ferromagnetism and hence describe the magnetic hysteresis. (10)

(ii) What are Ferrites? Explain magnetic recording and read out mechanisms. (6)

Or

(b) (i) Describe the different properties of superconductors and also explain the classification of super conductors as Type I and Type II superconductors. (10)

(ii) Explain BCS theory of superconductors. (6)

14. (a) (i) Define Electrical susceptibility. Explain electronic, ionic, orientational and space charge polarization. (10)

(ii) Give an account on the use of dielectric materials in capacitors and transformers. (6)

Or

(b) (i) What is internal field? Derive an expression for local field and hence obtain Clausius-Mosotti relation. (10)

(ii) Discuss the frequency dependence of polarization. (6)

15. (a) (i) What are metallic glasses? Explain the preparation, properties and applications of metallic glasses. (10)

(ii) What are nanomaterials? Explain the chemical vapour deposition method to synthesis nanomaterials. (6)

Or

(b) (i) What are shape memory alloys? Discuss the characteristics and properties of shape memory alloys. (10)

(ii) Explain the pulsed laser deposition method of fabricating carbon Nanotubes. Mention some of the applications of carbon nanotubes. (6)
