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

Question Paper Code : 97110

B.E./B.Tech. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016.

Second Semester

Civil Engineering

HS 1152 — ENGINEERING PHYSICS — II

(Common to all branches)

(Regulation 2008)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Fermi energy and give its physical significance.

2. Find the drift velocity of free electrons with mobility 3.5×10^{-3} m^2/VS in copper for an electric field of 2 V/m.

3. Draw the variation of Fermi level with temperature and impurity concentration in P-type and N-types semiconductors.

4. A silicon plate of thickness 2 mm, breadth 15 mm and length 150 cm is placed in a magnetic field of 1 Wb/m^2 acting perpendicular to its thickness. If 10^{-2} A current flows along its length, calculate the Hall voltage developed if the Hall co-efficient is 3.7×10^{-4} m^2/coulomb.

5. Distinguish diamagnetism from para-magnetism.

6. What is called Cooper pair?

7. What is the effect of frequency of a.c. electric field on polarization?

8. Mention two important properties of ferro electric materials.

9. What is meant by super plasticity?

10. Give any two applications of metallic glasses.

PART B — (5 × 16 = 80 marks)

11. (a) Using the classical free electron theory, derive the mathematical expressions for the electrical conductivity and thermal conductivity of metals and hence deduce Wiedemann-Franz law. (16)

Or

(b) Describe the Fermi-Dirac distribution function and explain the effect of temperature on the Fermi function and hence derive an expression for the carrier concentration of metals. (16)

12. (a) (i) Derive the expression for density of holes in an Intrinsic Semiconductor. (8)

(ii) Determine the Band gap of an Intrinsic Semiconductor. (8)

Or

(b) (i) Derive an expression for the density of electrons in the conduction band for an *n*-type semiconductor. (8)

(ii) Explain Hall effect and use it to determine the Hall Coefficient. (8)

13. (a) Describe the various classification of magnetic materials. (16)

Or

(b) (i) Explain BCS theory of superconductivity. (6)

(ii) Differentiate Type I and Type II superconductors. (6)

(iii) Explain SQUIDS. (4)

14. (a) Derive the Langevin–Debye equation for the dielectric materials. (16)

Or

(b) Deduce Claussius-Mosotti equation and explain its use in predicting the dielectric constant of solids. (16)

15. (a) Explain the preparation, properties and applications of metallic glasses. (16)

Or

(b) (i) Explain any two methods of preparing nano-materials. (10)

(ii) Discuss briefly the industrial applications of nano-materials. (6)