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

Question Paper Code : 63232

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Second Semester

Civil Engineering

HS 1152 — 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. Give the microscopic form of ohm's law in a metallic conductor. Whether the ohm's law is true at all temperatures?

2. What is Fermi energy? What is its important?

3. With increase of temperature the conductivity of semiconductor increases while that of metals decreases. Give reasons.

4. The intrinsic carrier concentration of Ge at 300 K is 2.5×10^{19} m^{-3}, Calculate its resistivity if electron and hole mobilities are 0.39 m^2 V^{-1} s^{-1} and 0.19 $m^2 V^{-1} s^{-1}$.

5. What is the origin of magnetism in materials?

6. The critical temperature for a material with isotopic mass 222.69 is 13.05 K. Calculate the isotopic mass if the critical temperature falls to 12.88 K. Given that $\alpha = 0.4$.

7. What is the effect of temperature on dielectric polarization?

8. What is the use of dielectric materials in transformers?

9. What is shape memory effect?

10. Mention any two properties of Carbon Nanotubes.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Based on the classical theory of free electrons, derive the Wiedmann-Franz law. What are the drawbacks of this theory? (10)

(ii) A silver wire has a resistivity of 2.48×10^{-8} Ω m at room temperature. For an electric field of 1.5 V/m, calculate :

(1) Drift velocity

(2) Mobility and

(3) Relaxation time of electrons assuming that there are 3.1×10^{28} conduction electrons/m^3. (6)

Or

(b) (i) Derive an expression for the density of states and based on that calculate the carrier concentration in metals. (12)

(ii) Calculate the number of states lying in an energy interval of 0.03 eV above the Fermi energy (5.5 eV) of gold crystal of unit volume. (4)

12. (a) (i) Explain clearly the mechanism of intrinsic conduction in semiconductors.

(ii) Derive the equation for the conductivity of an intrinsic semiconductor in terms of carrier concentrations. (4 + 12)

Or

(b) (i) Give the theory of Hall effect.

(ii) Describe the experiment to find the concentration of charge carriers in *n* type semiconductor using Hall effect (4 + 12)

13. (a) (i) Explain the domain theory of ferromagnetism with hysterisis. (10)

(ii) Explain the use of ferrites in bubble memory devices. (6)

Or

(b) (i) What is called Meissner effect? Explain the properties of Type-I and Type-II superconductors. (2 + 8)

(ii) Briefly discuss the applications of superconductors. (6)

14. (a) Describe the different types of polarization in dielectric materials.

Or

(b) (i) Derive expression for the internal field in a dielectric material. (10)

(ii) Describe the frequency and temperature dependence of dielectric materials. (6)

15. (a) (i) Describe the properties and application of metallic glasses. (10)

(ii) Describe any two methods to produce Nano materials. (6)

Or

(b) (i) List any four applications of shape memory alloys. (4)

(ii) Write short notes on carbon nano tubes and its applications. (6)

(iii) Discuss the properties of nano materials. (6)