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

Question Paper Code : 77276

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Civil Engineering

PH 6251 — ENGINEERING PHYSICS – II

(Common to all branches except Biotechnology and Pharmaceutical Technology)

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define mobility of electrons. Write its unit.

2. Fermi temperature of a metal is 24600 K. Calculate the Fermi velocity of electrons.

   Given : $k = 1.38 \times 10^{-23}$ J K^{-1}, $m = 9.1 \times 10^{-31}$ kg.

3. What are elemental semiconductors and compound semiconductors?

4. With increase of temperature, the conductivity of a semiconductor increases. Why?

5. What are the applications of ferrites?

6. What is the principle of SQUID?

7. What are the uses of dielectric material?

8. Define dielectric loss.

9. What do you understand by the term quenching?

10. What are nanomaterials?

PART B — (5 × 16 = 80 marks)

11. (a) (i) On the basis of free electron theory, derive an expression for electrical conductivity of metals. (12)

(ii) What are the drawbacks of classical free electron theory of metals? (4)

Or

(b) (i) Explain the concept of density of energy states. Derive an expression of density of energy states. (12)

(ii) Find the expression for carrier concentration in metals. (4)

12. (a) Obtain an expression for density of holes in the valence band of p-type semiconductor. (16)

Or

(b) What is Hall effect? Derive an expression of hall co-efficient. Describe an experimental setup for the measurement of hall co-efficient. (2+8+6)

13. (a) (i) Briefly explain different types of magnetic materials and their properties. (12)

(ii) Distinguish between soft and hard magnetic materials. (4)

Or

(b) (i) Explain Meissner effect, type I and type II superconductors. (4+4+4)

(ii) Calculate the critical current for a wire of lead having a diameter of 1 mm at 4.2 K. Critical temperature of lead is 7.18 K and H_c at 0K is 6.5×10^4 A/m. (4)

14. (a) Derive the expression for electronic and ionic polarisabilities. (8+8)

Or

(b) Discuss in detail the various dielectric breakdown mechanisms. (16)

15. (a) What are metallic glasses? Explain how they are prepared by melt spinning method. Also mention their application. (2+7+7)

Or

(b) Explain with necessary diagrams the synthesis of nanomaterials using the following methods.

(i) Chemical vapour deposition (8)

(ii) Pulsed laser deposition. (8)

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