Question Paper Code: 21004

B.E. / B.Tech. DEGREE EXAMINATION, OCTOBER 2014.

Second Semester

Computer Science and Engineering

01UPH204 - APPLIED PHYSICS

(Common to EEE, ECE, EIE, ICE and IT branches)

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. State Wiedemann - Franz law.

2. Define drift velocity. How is it different from thermal velocity of an electron?

3. Calculate the conductivity of intrinsic germanium with a carrier concentration of 2.4 x 10^{19} m^{-3} kept at 400K, if the mobilities of electrons and holes in it are 0.41 $m^2/V\text{-}s$ and 0.19 $m^2/V\text{-}s$ respectively.

4. What is Hall Effect? Give any two uses?

5. What are magnetic domains?

6. What is the effect of magnetic field on a superconductor?

7. What are colour centres? Give any two significances.

8. What is the effect of temperature on polarization?

9. What are metallic glasses? Mention any one of its applications.

10. Mention any four properties of nanomaterials.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive an expression for electrical and thermal conductivities and hence deduce Wiedemann – Franz law. Also verify the Lorentz number using quantum free electron theory. (16)

Or

(b) (i) Derive the expression for density of states. (12)

(ii) Use the Fermi distribution function to obtain the value of F(E) for $E-E_F = 0.01$ eV at 350K. (4)

12. (a) (i) Obtain an expression for carrier concentration in p-type semiconductor. (10)

(ii) Explain the variation of Fermi level with temperature and impurity concentration in p-type semiconductor. (6)

Or

(b) (i) Derive an expression for Hall coefficient in n-type semiconductors. (10)

(ii) Describe an experimental setup for the measurement of Hall coefficient. (6)

13. (a) (i) What are ferrites? Describe their structure with a neat diagram. (10)

(ii) Give any six applications of ferrites. (6)

Or

(b) (i) Define superconductivity. Give an account of BCS theory on superconductivity. (10)

(ii) Differentiate between type-I and type-II superconductors. (6)

14. (a) Describe the construction and working of liquid crystal displays. Mention its advantages and disadvantages. (16)

Or

(b) Explain the different types of polarization mechanisms in dielectrics and obtain the expression for electronic polarizabilities. (16)

15. (a) What are Shape Memory alloys? Explain their characteristics with necessary diagrams. Give its advantages. (16)

Or

(b) Describe the ball milling technique and chemical vapour deposition method for the synthesis of nanomaterials. (16)

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