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

Question Paper Code: 31024

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

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. Define the terms mean free path and mobility of charge carries.
2. Mention the drawbacks of classical free electron theory.
3. Compare elemental and compound semiconductors.
4. Write any four applications of Hall effect.
5. Differentiate soft and hard magnetic materials.
6. What do you understand by the terms critical temperature and critical field of a superconductor?
7. Distinguish between fluorescence and phosphorescence.
8. Define dielectric loss and loss tangent.
9. Define pseudo-elasticity.
10. List out the classification of carbon nano tubes.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive the expressions for electrical conductivity and thermal conductivity of a metal based on Drude and Lorentz theory and also derive Wiedeman-Franz law. (16)

Or

(b) Derive the expression for the density of energy states and obtain the relation for electron concentration in a metal. (16)

12. (a) Derive the expression for the density of electrons in the conduction band, density of holes in the valence band of intrinsic semiconductor and also derive the expression for intrinsic carrier concentration. (16)

Or

(b) (i) What is Hall Effect? Derive the expression for Hall coefficient of N-Type semiconductor and also derive Hall coefficient in terms of Hall voltage. (10)

(ii) The Hall coefficient of a specimen of doped silicon is found to be $3.66 \times 10^{-4} m^3 / C$. The resistivity of the specimen is $8.93 \times 10^{-3} ohm\ m$. Find the mobility of charge carriers. (6)

13. (a) Write the theory of Ferromagnetic domains and discuss the various energies involved in ferromagnetic domains. Explain Hysteresis loop based on domain theory. (16)

Or

(b) Discuss the properties (i) Effect of magnetic field, (ii) Meissner Effect, (iii) Persistant current (iv) Isotope effect and the applications (i) SQUID, (ii) Magnetic levitated trains of superconductors. (16)

14. (a) (i) Explain the properties of optical materials briefly. (8)

(ii) Write short notes on (i) Excitons, (ii) Traps and (iii) Colour centres. (8)

Or

(b) What is meant by local field in a dielectric material and how is it calculated for a cubic structure. Deduce the Clausius – Mosotti equation. (16)

15. (a) (i) Discuss any one method to produce Metallic glasses. Write the important properties and the applications of metallic glasses. (8)

(ii) Describe the Shape Memory alloys stating the martensite and austenite phases. Write the advantages and disadvantages of SMAs. (8)

Or

(b) Write any one method to fabricate nanophase materials. Explain how the physical properties vary with geometry for nanophase materials. Write the applications of nanophase materials. (16)

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