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Question Paper Code: 21004

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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. Write any two drawbacks of classical free electron theory.
3. The intrinsic carrier density is $1.5 \times 10^{16} \text{ m}^{-3}$. If the mobility of electron and hole are 0.13 and $0.05 \text{ m}^2 \text{ v}^{-1} \text{ s}^{-1}$ respectively, calculate the conductivity.
4. What are p-type and n-type semiconductors?
5. What is Bohr magneton?
6. What is Meissner effect?
7. Define dielectric constant.
8. Calculate the electronic polarizability of an isolated Se atom. The atomic radius of an atom is 0.12 nm.
9. What are shape memory alloys?
10. In a Ball mill, steel ball is used as grinding media than porcelain balls. Why?

PART - B (5 x 16 = 80 Marks)

11. (a) Derive an expression for electrical and thermal conductivity of a metal on the basis of classical free electron theory. (16)

Or

- (b) Derive an expression for density of energy states in a metal and hence deduce the expression for carrier concentration in metals. (16)

12. (a) (i) What is Hall effect? Derive an expression for Hall co-efficient. (12)
(ii) Describe an experimental set up for the determination of Hall co-efficient. (4)

Or

- (b) (i) Obtain the expression for carrier concentration in an intrinsic semiconductor. (12)
(ii) Explain how does the Fermi level varies with respect to the temperature in the case of intrinsic semiconductor. (4)

13. (a) (i) Explain the hysteresis on the basis of domain theory. (10)
(ii) Distinguish between soft and hard magnetic materials. (6)

Or

- (b) (i) Explain type-I and type-II superconductor. (10)
(ii) Write any six applications of superconductor. (6)

14. (a) (i) Derive an expression for electronic and ionic polarizability in dielectric materials. (10)
(ii) Explain the frequency dependence of polarization in dielectric material. (6)

Or

- (b) Derive an expression for local field in a dielectric material and hence deduce Claussius- Mosotti equation. (16)

15. (a) What are metallic glasses? Explain the preparation, properties and write their applications. (16)

Or

- (b) Explain the principle, construction and working of ball milling method for synthesis of nanoparticles and write the advantages and disadvantages of the ball milling method. (16)