KUMARAGURU college of technology
character is life

Register Number: ……..

B.TECH DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2009)

Second Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

PHY105: Materials Science

Time: Three Hours **Maximum Marks: 100**

PART A (10 x 1 = 10 Marks)

Answer all the Questions:-

1. If the mobility of electrons in a metal increases, the resistivity

a) Increases b) Remains the same

c) Decreases d) Equals to the conductivity

2. A normal conductor and a superconductor are classified on the basis of

a) Availability of conducting electrons at low temperature b) Availability of conducting electrons in pairs at low temperature

c) Nonzero resistance at low temperature d) Zero resistance at critical temperature

3. Compound semiconductors are

a) Direct band gap semiconductors b) Semiconductors with band gap5 eV

c) Zero band gap semiconductors d) Indirect band gap semiconductors

4. The number of circuits in VLSI is

a) Between 30 and 100 b) Above 10^5

c) Between 100 and 10^5 d) Below 30

5. Ionic polarization

a) Decreases with increase in temperature b) Is independent of temperature

c) Increases with temperature d) First increases, then decreases with temperature

6. Diamagnetic substances when placed in a magnetic field are

a) Strongly attracted b) Repelled

c) Weakly attracted d) Neither attracted nor repelled

7. Carbon nano tubes are

a) Nano particles b) Carbon only

c) Rolled sheet of grapheme d) Crystalline solids

8. Austenite and Martensite phases are obtained for

a) Metallic glasses b) Dielectrics

c) Shape memory alloys
d) Carbon nanotubes

9. The Liquid Crystal Display works
   a) When the electric field is applied
   b) In the absence of electric field
   c) When the magnetic field is applied
   d) Independent of electric and magnetic fields

10. The trapping of electron in a negative ion vacancy in NaCl is known as
   a) C – centre
   b) V – centre
   c) F- centre
   d) M - centre

PART B (10 x 2 = 20 Marks)

11. What are density of energy states?
12. Explain isotopic effect of superconductor.
13. Distinguish between monolithic and hybrid ICs.
14. Mention the merits of thin film components over thick film components.
15. What are soft and hard magnetic materials?
16. What is meant by dielectric loss?
17. What are carbon nano tubes?
18. Give the different structures of carbon nano tubes?
19. What are Excitons?
20. Give the advantages of IC packaging materials.

PART C (5 x 14 = 70 Marks)

21. a) i) Explain the postulates of classical free electron theory and also derive the expression for electrical conductivity of a conducting material. (10)
    ii) Explain the drawbacks of classical free electron theory. (4)

(OR)

b) i) Discuss in detail the different properties of superconductors. (10)
    ii) Explain high T_c superconductors with examples. (4)

22. a) i) Discuss in detail the different steps involved in the fabrication of monolithic IC. (10)
    ii) Explain the metal-semiconductor contact as rectifying contact and ohmic contact. (4)

(OR)

b) i) Discuss in detail the diffusion of impurities in the fabrication of ICs. (10)
    ii) Explain the meaning of masking and etching in the fabrication of ICs. (4)

23. a) Discuss in detail the Langevin's theory of paramagnetism and derive necessary formula for the same.

(OR)

b) i) What is dielectric breakdown and explain different types of breakdown mechanism. (10)

ii) Explain the storage of magnetic data in floppy discs. (4)

24. a) i) Discuss in detail the theory, properties and applications of metallic glasses. (10)

ii) Explain the applications of shape memory alloys. (4)

(OR)

b) i) Explain preparation of nano particles by chemical vapour deposition and also give its advantages. (7)

ii) Explain the preparation of carbon nano tubes by pulsed laser technique. (7)

25. a) i) Explain the different types of colour centres. (7)

ii) Explain fluorescence and phosphorescence and their differences. (7)

(OR)

b) i) Explain the working of twisted nematic crystal display and also its advantages and disadvantages. (10)

ii) Explain the theory of second harmonic generation. (4)

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