Register Number: ……..

B.E DEGREE EXAMINATIONS: MAY/JUNE 2014

(Regulation 2009)

Second Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

PHY105:Materials science

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. The drift velocity of an electron is
   a) The random velocity of an electron
   b) The steady velocity of an electron under the applied electric field
   c) Velocity with inelastic condition
   d) The minimum velocity of an electron
2. The current required to destroy the superconducting property is equal to
   a) $I_C = 2\pi r H_O$
   b) $I_C = 2\pi r H_C$
   c) $I_C = 2\pi H_O$
   d) $I_C = 2r H_O$
3. The number of circuits in LSI is
   a) Between 30 and 100
   b) Less than 30
   c) Between 100 and 100000
   d) More than 10^6
4. An electronic circuit in which transistors, diodes, resistors, capacitors are fabricated on a single silicon chip is known as
   a) An integrated circuit
   b) Diode circuit
   c) Capacitor circuit
   d) Silicon circuit
5. The magnetic susceptibility of a diamagnetic material is
   a) zero
   b) Negative and small value
   c) Positive and small value
   d) Positive and large value
6. In a dielectric, the polarization is
   a) Linear function of applied field
   b) Exponential function of applied field
   c) Square function of applied field
   d) Logarithmic function of applied field
7. Metallic glasses are
   a) Amorphous metal alloys
   b) Amorphous glasses
   c) Crystalline metals
   d) Dielectrics

8. Carbon nano tubes are
   a) Carbon sheets
   b) Carbon wires
   c) Carbon dots
   d) Cylindrical form of graphene
9. The trapping of electron in a negative ion vacancy is
   a) V- centre
   b) M- centre
   c) F- centre
   d) R- centre
10. In second harmonic generation, the frequency is
    a) Not changed
    b) Doubled
    c) tripled
    d) Independent of incident frequency

PART B (10 x 2 = 20 Marks)

11. What is Fermi distribution function and give its significance.
12. Show that Superconductor behaves like a diamagnet.
13. Explain epitaxy.
14. What are the advantages of thick and thin film technology?
15. Distinguish paramagnetic and ferromagnetic materials.
16. What is meant by dielectric loss?
17. Give any two applications of Metallic glasses.
18. What are the different structures of carbon nano tubes?
19. What is the principle of nonlinear effect?
20. What are traps and excitons?

PART C (5 x 14 = 70 Marks)

21. a) (i) What is density of energy states and derive an expression for the same. (10)
    (ii) The thermal and electrical conductivity of copper at 20^0 C are 380 $Wm^{-1}K^{-1}$ and 5.87×10^7 $ohm^{-1}m^{-1}$ respectively. Calculate the Lorenz number. (4)

(OR)

    b) (i) Explain the effect of current and magnetic field on superconductors and also explain type-I and type-II semiconductors with examples. (10)
    (ii) Explain the applications of superconductors as cryotron and magnetic levitation. (4)

22. a) (i) Explain the principle of Liquid Phase Epitaxy growth. (4)
    (ii) Explain in detail the Vapour Phase Epitaxy growth technique with suitable example and also give its advantages. (10)

(OR)

b) Explain the Monolithic technique of preparation of diodes for integrated circuits and also explain its characteristics.

23. a) Discuss in detail the Langevin's theory of paramagnetism and also derive the expression for its susceptibility.

(OR)

b) Discuss in detail the different polarization mechanism of dielectric material and also explain its dependence on frequency and temperature.

24. a) (i) Discuss in detail the theory of Shape Memory Alloys and also explain the properties of NiTi alloy. (10)

(ii) Explain the applications of Shape Memory Alloys. (4)

(OR)

b) (i) What is top down approach in preparing nano particles and explain the ball milling method of preparing nano particles. (10)

(ii) Explain the properties and applications of nano particles. (4)

25. a) (i) What is colour centre and explain different types of colour centres with examples. (7)

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

(OR)

b) (i) Discuss in detail the working of twisted nematic crystal display and its advantages. (10)

(ii) Explain IC packaging materials and its advantages. (4)

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