Register Number: ……

B.E DEGREE EXAMINATIONS: JUNE 2010

Second Semester

(Common to B.Tech- Textile Technology, Fashion Technology & Biotechnology)

PHY106: APPLIED PHYSICS

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

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The quantum free electron theory is based on

   A. ohms law B. macroscopic body of finite mass

   C. wave aspect of electrons D. Newton's law of motion

2. Soft superconductors exhibits a complete Meissner effect

   A. above its transition temperature B. below its transition temperature

   C. above its critical magnetic field D. above its critical current

3. In n-type semiconductors majority charge carriers are

   A. protons B. holes C. electrons D. neutrons

4. Hall effect is used to determine

   A. nature of charge carriers in semiconductors B. strength of the semiconductors

   C. defect in the semiconductors D. mass of the semiconductors

5. Diamagnetic materials have

   A. large value – positive susceptibility B. low value – negative susceptibility

   C. no susceptibility D. negative susceptibility

6. Materials which exhibit polarization even in the absence of the applied electric field is known as

   A. ferroelectric materials B. ferromagnetic materials

   C. paramagnetic materials D. paraelectric materials

7. Polyurethane is a

   A. magnetic shape memory alloy B. shape memory alloy

   C. shape memory polymer D. metallic glass

8. A carbon nanotube is a cylindrical rolled up sheet of

   A. germanium B. silicon C. diamond D. graphene

9. The sound waves having frequencies above 20kHZ are known as

   A. ultrasonic waves B. infrasonic waves C. audible waves D. electromagnetic waves

10. The radioactive decays from the radio-isotope are _____ in nature.

    A. uniform B. regular C. random D. homogenous

PART B (10 x 2 = 20 Marks)

11. Mention any four drawbacks of classical free electron theory.
12. What is Meissner effect in superconductors?
13. The intrinsic carrier density at room temperature in Ge is 2.37×10^{19} m^3. If the electron and hole mobilities are 0.38 and 0.18 m^2/V.sec. respectively, calculate the resistivity.
14. Discuss the variation of the Fermi level of a p-type semiconductor with temperature.
15. What is hysteresis loss?
16. Define polarization.
17. What are two way shape memory alloys?
18. Mention any four applications of carbon nanotubes.
19. Define acoustic impedance.
20. Mention any two radio isotopes and their uses in nuclear medicine.

PART C (5 x 14 = 70 Marks)

21. (a) Based on the classical free electron theory, derive expressions for electrical conductivity and thermal conductivity of conducting materials and hence arrive at Wiedemann Franz law.

(OR)

(b) (i) Describe Type-I and Type-II superconductors. (7)

(ii) Explain in detail High Tc Superconductors. (7)

22. (a) Derive an expression for carrier concentration of an intrinsic semiconductor.

(OR)

(b) Give the theory of Hall effect in the case of a semiconductor. Using Hall effect how will you determine the mobility of charge carriers.

23. (a) Explain the theory of domain structure in ferromagnetic and how the hysteresis curve is explained on the basis of domain theory.

(OR)

(b) Discuss in detail the different types of dielectric breakdown mechanisms.

24. (a) Discuss the preparation, properties and applications of metallic glasses.

(OR)

(b) Explain any two methods of fabrication of carbon nanotubes.

25. (a) Discuss the different types of ultrasonic scanning and displays.

(OR)

(b) (i) Describe the construction and working of GM counter. (7)

(ii) Explain the method of obtaining nuclear image of an organ of our body using gamma camera. (7)

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