

B.TECH DEGREE EXAMINATIONS: MAY/JUNE 2014

(Regulation 2013)

Second Semester

BIOTECHNOLOGY

U13PHT206: Applied Physics

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Type I superconductor have
 - a) Higher critical fields than type II
 - b) Two critical fields
 - c) Lower critical field than type II
 - d) Same critical field as that of type II
2. The unit of Lorentz number is.....
3. Ge doped with Arsenic atom is
 - a) N-type semiconductor
 - b) P-type semiconductor
 - c) Superconductor
 - d) Intrinsic semiconductor
4. For intrinsic semiconductor Fermi energy lies.....
5. Materials which exhibit polarization even in the absence of the applied electric field is known as
 - a) Ferro magnetic materials
 - b) Paramagnetic materials
 - c) Para electric materials
 - d) Ferroelectric materials
6. The unit of polarization is.....
7. The method of producing metallic glasses
 - a) Twin roller technique
 - b) Vacuum evaporation
 - c) Sol-gel method
 - d) None of the above
8. The carbon nano tube is a cylindrical rolled up sheet of
9. Which is the part of Gamma Camera
 - a) Collimator
 - b) Detector
 - c) Electronic system
 - d) All the above
10. Technetium 99m emits only..... rays.

PART B (10 x 2 = 20 Marks)

(Not more than 40 words)

11. Calculate the relaxation time of the electron in silver. Given data: The resistivity is 1.54×10^{-8} Ω -m at room temperature and the electron density is $5.8 \times 10^{28} / \text{m}^3$.

12. Explain Meissner effect in superconductors.
13. With increase of temperature the conductivity of semiconductors increases while that of metals decreases. Give reasons.
14. What are the applications of Hall effect?
15. What are the properties of ferro-electric materials.
16. What is dielectric loss?
17. What are the merits and demerits of SMA?
18. What is meant by bottom-up method of Nano fabrication?
19. What is the basic principle of pulse echo system?
20. What is PMT and mention its various parts.

PART C (5 x 14 = 70 Marks)

(Not more than 400 words)

Q.No. 21 is Compulsory

21. (i) What are the postulates of free electron theory of metals (4)
(ii) Derive an expression for the electrical conductivity and thermal conductivity of a conducting material and hence obtain Weidemann-Franz law. (10)
22. a) (i) Derive an expression for the carrier concentration in a P-type semiconductor. (10)
(ii) Determine the concentration of conduction electrons per cm^3 in pure silicon, if its conductivity is $5 \times 10^{-4} \Omega/\text{m}$, electron mobility is $0.14 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$ and hole mobility is $0.05 \text{ m}^2\text{V}^{-1}\text{s}^{-1}$. (4)

(OR)

- b) (i) Discuss the concept of effective mass of an electron and explain the concept of hole. (9)
(ii) What is Hall effect? Derive an expression for the Hall Coefficient. (5)
23. a) Describe Langevin theory for a paramagnetic material and obtain an expression for the susceptibility of paramagnetic materials. (5)

(OR)

- b) (i) Describe in detail the electronic and ionic polarization in dielectrics. (8)
(ii) Discuss the intrinsic breakdown and electro chemical break down in dielectrics. (6)
24. a) What are metallic glasses and discuss in details its preparation, properties and

applications.

(OR)

- b) (i) What is top-down process in the preparation of Nano particle and explain in detail Ball Milling method of preparing Nano particle. (8)
- (ii) What is Carbon Nano tube and explain the chemical vapour deposition method of preparing Carbon Nano tubes. (6)

25. a) (i) Write a note on ultrasound picture of human body. (7)
- (ii) Briefly explain the different modes of ultrasonic scanning with suitable diagrams (7)

(OR)

- b) Explain the working principle of scintillation counter and gamma ray camera.
