ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : JUNE / JULY 2009

REGULATIONS : 2008

SECOND SEMESTER

080040002 - ENGINEERING PHYSICS - II

(COMMON TO ALL BRANCHES)

TIME : 3 Hours **Max.Marks : 100**

PART – A

**(20 x 2 = 40 MARKS)**

ANSWER ALL QUESTIONS

1. Define the terms 'mean free path' and 'mean collision time'.
2. Why $J = E / \rho$ is called microscopic form of Ohm's law?
3. Evaluate the value of Fermi distribution function for an energy kT above the Fermi energy.
4. What do you mean by carrier concentration in metals?
5. State any two properties of semiconductor.
6. Distinguish between intrinsic and extrinsic semiconductor.
7. Why do we prefer Si for transistors and Ga As for LASER diodes?
8. For an intrinsic germanium at 300 K, $n_i = 2.4 \times 10^{19} / m^3$, $\mu_e$ and $\mu_h$ are 0.39 $m^2 V^{-1}s^{-1}$ and 0.19 $m^2 V^{-1}s^{-1}$ respectively. Calculate its electrical conductivity.
9. On the basis of spin how the magnetic materials are classified?
10. What is energy product? Give its importance.
11. Mention the condition for a material to behave as a superconductor.
12. Calculate the critical current which can pass through a long thin superconducting wire of aluminum of diameter 1 mm. The critical magnetic field for aluminum is $7.9 \times 10^5$ A/m.
13. List two desired characteristics of a good dielectric material.



14. How does polarization vary with temperature?
15. Compare active and passive dielectrics.
16. What are the various sources by which power loss occurs in a dielectric?
17. Why metallic glasses are preferred for transformer core materials?
18. How shape memory alloys are trained?
19. Write down any two properties of nano particles.
20. Write the various forms of carbon nano tubes.

PART – B

**(5 x 12 = 60 MARKS)**

ANSWER ANY FIVE QUESTIONS

21. a) Deduce a mathematical expression for electrical conductivity of a conducting material based on classical free electron theory 8
    b) State any four demerits of classical free electron theory. 4

22. a) Derive an expression for the Fermi energy of electrons in solids at 0K. 8
    b) Show that at 0K the average energy of an electron is 3/5 of the Fermi energy. 4

23. a) Obtain an expression for density of electrons in the conduction band of an intrinsic semiconductor. 8
    b) Briefly describe the variation of Fermi level with temperature in the case of n-type semiconductor. 4

24. a) Draw the B-H curve for a ferro magnetic material and explain the same on the basis of domain theory. 8
    b) Differentiate between hard and soft magnetic materials. 4

25. a) Discuss Type-I and Type-II superconductors with suitable examples. 8
    b) List any four applications of superconductors. 4

26. a) Derive the expressions for electronic and ionic polarisability in dielectric materials. 8

b) Mention any four applications of ferro electric materials. 4

27. a) What is meant by internal field in a solid dielectric? Deduce an expression for the local field for structures with cubic symmetry. 8

b) Obtain Clausius-Mosotti relation. 4

28. a) Describe the plasma arcing method of producing nano particles. 8

b) Mention any four applications of carbon nano tubes. 4

*****THE END*****