Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages :02**

Total No. of Questions : 09

B.Tech. (2008-2010 Batches)   (Sem.–1,2)
ENGINEERING PHYSICS
Subject Code :PH-101
Paper ID : [A0122]

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :
1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B & C. have FOUR questions each.**
3. **Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.**
4. **Select atleast TWO questions from SECTION-B & C.**

SECTION-A

1. **Write briefly :**

   (a) State Gauss's law in electrostatics.

   (b) Explain the term electric susceptibility. How it is related to dielectric constant?

   (c) Define the term "magnetic anisotropy".

   (d) Define the term "Ferrimagnetism".

   (e) Define the term "population inversion".

   (f) Describe the term "holography".

   (g) How fast would a rocket have to go relative to an observer for its length to be contracted to 99% of its length at rest?

   (h) Why only x-rays are used for the crystal structure studies?

   (i) Describe "Born's interpretation".

   (j) What do you mean by Meissner effect?

SECTION-B

2. a) Write Maxwell's four equations of electromagnetic theory and briefly interpret each of them. (4)

    b) What do you mean by dielectric and dielectric polarization? Define D, E and P and establish relation between them. (4)

3. a) What is meant by "hysteresis"? Explain hysteresis loss. How would you use hysteresis curve to select materials for the construction of permanent magnets? (5)

    b) Explain the difference between ferromagnetism and antiferromagnetism. (3)

4. a) Why four level lasers are more efficient than three level lasers? (3)

    b) Describe the working of He-Ne laser with proper energy level diagram. (5)

5. a) Derive the expression for numerical aperture of an optical fibre. Discuss the relation numerical aperture and acceptance angle. (4)

    b) Describe the material dispersion and pulse dispersion in optical fibre. (4)

SECTION-C

6. a) A rocket is chasing enemy's space ship. An observer on the earth observes the speed of rocket to be 2.5×10^8 m/s and hat of space ship 2×10^8 m/s. Calculate :

    i) the velocity of enemy's ship as seen by rocket,

    ii) The velocity of rocket as seen by enemy's ship. (4)

    b) Derive the relativistic relation for variation of mass with velocity and further obtain $E = mc^2$. (4)

7. a) Describe Mosley's law and its significance. (3)

    b) What do you mean by X-ray spectra? Describe the production of characteristic x-rays. (5)

8. a) Derive the expression for time independent Schrodinger's equation. (4)

    b) Write down Schrodinger's wave equation for a particle in a box. Solve it to obtain Eigen functions and show that the Eigen functions are discrete. (4)

9. a) Give a quantitative explanation of BCS theory of superconductors. How does this theory explain major characteristics of superconductors? (4)

    b) Classify the superconductors on the basis of their behavior in magnetic field. Discuss major characteristics of each type. (4)