

Roll No. 

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Sem.-1 &amp; 2)

**ENGINEERING PHYSICS**

Subject Code : PH-101 (2005-2010 Batches)

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. Answer briefly :**

- (a) What do you mean by displacement current?
- (b) Define retentivity and coercivity.
- (c) What is the fundamental principle of a hologram?
- (d) What do you mean by index profile of a fibre?
- (e) What are postulates of special theory of relativity?
- (f) An electron ( $m_0 = 0.511 \text{ MeV}/c^2$ ) have momentum of  $2 \text{ MeV}/c$ . Find its total energy in terms of MeV.
- (g) An X-ray tube operates at 13.6 kV. Find the maximum speed of electron striking the target.
- (h) What is de-Broglie hypothesis?
- (i) What is the difference between phase and group velocities?
- (j) What is isotopic effect in superconductors?

### SECTION-B

2. (a) What is meant by dielectric polarization? Define the electric field vectors **E**, **D** and **P**. Show how they are related for an isotropic dielectric?  
(b) State and Prove Gauss's law in electrostatics. (5,3)
3. (a) Explain magnetic flux density B. magnetic flux intensity H. and magnetization M. How are they related to each other?  
(b) What is magnetic anisotropy? How anisotropy can be induced by magnetic annealing? (4,4)
4. (a) What are Einstein's coefficients? Derive relation between them.  
(b) Draw a neat diagram of He-Ne laser and describe the method of its working. (4,4)
5. (a) Explain the difference between a step-index fibre and graded index fibre.  
(b) What is meant by modes? Compare a single mode and multimode fibre. (4,4)

### SECTION-C

6. (a) A stationary body explodes into two fragment each of rest mass 1 Kg that move apart at speeds of  $0.6c$  relative to the original body. Find the mass of the original body.  
(b) Calculate the percentage contraction of a rod moving with a velocity  $0.8c$  in a direction inclined at  $60^\circ$  to its own length. (3,5)
7. (a) What is X-ray diffraction? Deduce Bragg's Law for the diffraction of X-ray in a crystal. What are Bragg's conditions for X-ray diffraction?  
(b) Distinguish between continuous X-rays spectrum and characteristic X-rays spectrum. (5,3)
8. (a) Derive time-dependent Schrodinger wave equation. Give a physical interpretation of the wave function.  
(b) An electron is bound in one dimensional box size  $4 \times 10^{-10}$  m. What will be the minimum energy? (6,2)
9. (a) Derive London equation and discuss how they explain Meissner effect and flux penetration.  
(b) What do you mean by critical field in superconductivity? (6,2)