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Total No. of Questions : 09

B.Tech. (Sem.–1/2)

ENGINEERING PHYSICS

Subject Code : PH 101 (2005-2010 Batch)

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. Define Electrostatics.
   b. What do you mean by holography?
   c. Differentiate between diamagnetic and paramagnetic materials.
   d. *"Laser is an oscillator"*. Comment.
   e. What do you mean by numerical aperture?
   f. What is time dilation?
   g. Can we have universal inertial frame of reference? Comment.
   h. Define Moseley law.
   i. What is the concept of Eigen functions?
   j. What are SQUIDS?

SECTION-B

2. a) A hollow sphere of radius 20 cm is charged with a charge of 3×10^{-8} C. Find the potential
   (a) at its surface
   (b) at a distance 50 cm from the spheres centre.

   b) Derive the relationship between flux density and field intensity at a point. (4,4)

3. a) What are ferrites? Discuss their main applications.

   b) Differentiate between soft and hard magnetic materials by taking suitable example(s). (4,4)

4. a) *"Population inversion is a must for laser transitions"*. Comment and justify your answer.

   b) The half width of the gain profile of a He-Ne laser material is about 2×10^{-3}nm. What should be the maximum length of the cavity to have a single longitudinal mode oscillation? (4,4)

5. a) If fractional difference between the core and cladding refractive indices of a fibre is 0.012 and numerical aperture is 0.20, calculate the refractive index of core and cladding material.

   b) Discuss the merits and demerits of single mode and multimode fibres. (4,4)

SECTION-C

6. a) A clock keeps correct time. With what speed should it be moved relative to an observer so that it may appear to loose 4 minutes in 24 hours?

   b) What do you mean by transformation equations? Derive the Galilean transformation equations. (3,5)

7. a) The first order reflection from the plane of NaCl is obtained at an angle of 20° with the incident beam. If inter atomic spacing is 2.5A°, then calculate the wavelength of X-rays used.

   b) What do you understand by crystallography? Where do we use it? (4,4)

8. a) A particle of mass 10^{-26} Kg is accelerated to one-fifth of velocity of light. If the velocity can be measured with an accuracy of 99%, what will be the uncertainty in its position?

   b) Write down Schrödinger equation for particle in a box and find its eigen functions. (4,4)

9. a) Discuss formation of Cooper pairs in superconductors on the basis of BCS theory.

   b) Give some important applications of superconductors. (5,3)