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Total No. of Questions: 09

B.Tech. (2009-2010 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 at least TWO questions from SECTION B &C.

SECTION-A

1. Write briefly:

- a. Define Electrodynamics.
- b. What do you mean by spatial coherence?
- c. Differentiate between ferromagnetic and ferrimagnetic materials.
- d. What is Isotope effect?
- e. What do you mean by Couplers?
- f. "Is earth an inertial frame of reference"? Comment.
- g. What is non-destructive testing?
- h. What do you understand by expectation values?
- i. "Can we synthesise superconducting wires"? Comment.
- j. What do you mean by orthogonal wave function?

1 | M C o d e 5 4 0 1 6 (S 1) - 3 6 9

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SECTION-B

- 2 a) A hollow sphere of radius 10 cm is charged with a charge of 1×10^{-8} C. Find the potential (i) at its surface (ii) at a distance 30 cm from the spheres centre. (3)
 - b) State and explain modified Ampere's law and discuss its importance in reference to electrodynamics. (5)
- a) Explain diamagnetism and ferromagnetism on the basis of magnetic domains of the atom.
 - b) "Soft magnetic materials have thin hysteresis loop". Comment and justify your answer. (4)
- 4 a) "Stimulated emission is a must for laser transitions". Comment and justify your answer. (4)
 - b) The half width of the gain profile of a laser material is about 10^{-3} nm. What should be the maximum length of the cavity to have a single longitudinal mode oscillation? (4)
- 5 a) If fractional difference between the core and cladding refractive indices of a fibre is 0.015 and numerical aperture is 0.25, calculate the refractive index of core and cladding material. (4)
 - b) Explain how a glass fibre guides light from one end to the other. (4)

SECTION-C

- a) A clock keeps correct time. With what speed should it be moved relative to an observer so that it may appear to lose 1 minute in 20 hours? (3)
 - b) Deduce the expression of length contraction using concept of Lorentz transformations. (5)
- 7. a) The first order reflection from the plane of a crystal is obtained at an angle of 25° with the incident beam. If inter atomic spacing is 3A°, then calculate the wavelength of X-rays used. (4)
 - b) What do you understand by crystallography? Where do we use it? (4)
- 8 a) A particle of mass $5 \times 10^{-26} Kg$ is accelerated to one-fifth of velocity of light. If the velocity can be measured with an accuracy of 98%, what will be the uncertainty in its position? (4)
 - b) Develop the Hamiltonian operator of free particle moving in one dimension under the influence of zero potential energy. (4)
- 9 a) Define Meissner effect and discuss its usefulness in reference to superconductivity. (4)
 - b) Write a brief note on high temperature superconductors. (4)

2 | M C o d e 5 4 0 1 6 (S 1) - 3 6 9