Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

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?

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)

3 a) Explain diamagnetism and ferromagnetism on the basis of magnetic domains of the atom. (4)

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

6 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 $5\times10^{-26}Kg$ 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)