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Total No. of Questions : 09] [Total No. of Pages : 02

Paper ID [PH101]

(Please fill this Paper ID in OMR Sheet)

B.Tech. (Sem. - 1st/2nd)

ENGINEERING PHYSICS (PH - 101)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Five** questions from Section - B and C.
3) Select atleast **Two** questions from Section - B and C.

Section - A

Q1) *(10 × 2 = 20)*

a) Is displacement current like conduction current a source of magnetic field?

b) What is the significance of gradient of a scalar?

c) Why ferromagnetism is lost on heating?

d) Define population inversion. How it is achieved?

e) Explain 'spiking' in Ruby Laser.

f) Why focusing of Laser light is better than ordinary light?

g) What are the advantages of optical fibres in communication systems?

h) Explain why a particle cannot move faster than velocity of light.

i) Explain the meaning of Compton shift?

j) Why super conductors are perfectly diamagnetic in nature?

Section - B

(Marks : 8 Each)

Q2) (a) What is dielectric polarization? Explain it for parallel plate capacitor having a dielectric in between.

(b) State and explain Ampere's circuital law.

Q3) (a) Discuss the domain theory of ferromagnetism.

(b) What are ferrites? Give their applications.

Q4) (a) Explain the construction and working of He-Ne laser.

(b) Explain why we prefer four-level laser over three-level laser even if its efficiency is low?

Q5) (a) What are various kinds of losses in optical fibres? Explain the different mechanisms of dispersion in fibres.

(b) An optical fibre has a N.A. of 0.15 and a cladding refractive index is equal to 1.50. Find the N.A. of the fibre in a liquid of refractive index 1.30.

Section - C

(Marks : 8 Each)

Q6) Explain Michelson-Morley experiment in detail and give the significance of negative results.

Q7) (a) Derive the Bragg's equation for diffraction of X-Rays and discuss its application in X-Ray Crystallography.

(b) Calculate the ratio of λ_{K_α} and λ_{L_α} for a target having atomic number Z=90. Given that Rydberg constant R = $1.1 \times 10^7\ m^{-1}$.

Q8) Derive the Schrodinger equation for a linear harmonic oscillator. Determine the normalized wave function and the energy levels of the oscillator.

Q9) (a) What is Critical Field? Write down the expression for H_c, and differentiate between Type-I and Type-II Superconductors.

(b) Derive First London Equation and give its physical significance.