

Roll No.

Total No. of Questions : 09]

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Paper ID [PH101]

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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.

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- 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 $\lambda_{K\alpha}$ and $\lambda_{L\alpha}$ for a target having atomic number $Z=90$. Given that Rydberg constant $R = 1.1 \times 10^7 \text{ m}^{-1}$.
- 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.

