

Roll No. ....

Total No. of Questions : 09]

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## Paper ID [PH101]

(Please fill this Paper ID in OMR Sheet)

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

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.

