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**B.Tech. (Sem. - 1<sup>st</sup>/2<sup>nd</sup>)**  
**ENGINEERING PHYSICS**  
**SUBJECT CODE : PH - 101 (2K4 & Onwards)**  
**Paper ID : [A0113]**

[Note : Please fill subject code and paper ID on OMR]

**Time : 03 Hours**

**Maximum Marks : 60**

**Instruction to Candidates:**

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

**Section - A**

**Q1)**

**(Marks : 2 Each)**

- a) Explain the term time dilatation?
- b) What is the wavelength of He-Ne Laser, Semiconductor Laser?
- c) Explain the term permittivity.
- d) What is the significance of V-numbers in OFC's.
- e) Define the importance of doping in semiconductors.
- f) Explain the Isotopic effect in case of superconductors.
- g) Define LASERS.
- h) Explain the concept of ether.
- i) Plot the graphs for soft and hard superconductors.
- j) Differentiate between group velocity and phase velocity.

**Section - B**

**(Marks : 8 Each)**

- Q2)** (a) Explain the significance of Maxwell's equations.
- (b) Explain the term current density and calculate the expression for it.

- Q3)** (a) Differentiate between Step Index and Graded Index Fibers.  
(b) Calculate the numerical aperture, acceptance angle and the critical angle of a fiber having core refractive index 1.5 and the cladding refractive index 1.45.
- Q4)** (a) Explain the working, construction and energy level diagram for Ruby laser.  
(b) Explain the term spatial and temporal coherence.
- Q5)** (a) Differentiate between hard and soft magnetic materials.  
(b) Mention some applications of Ferrite materials.

### Section - C

*(Marks : 8 Each)*

- Q6)** (a) Explain Michelson Morley experiment and discuss its significance.  
(b) Explain various postulates of Special theory of Relativity.
- Q7)** (a) Differentiate between hard and soft X-Rays.  
(b) Define Wave function and calculate the expression for Time dependent Schrodinger Wave Equation.
- Q8)** Differentiate between photo electric effect and Compton effect and calculate the expression for Compton Shift.
- Q9)** (a) Explain BCS theory of superconductivity.  
(b) Calculate the expression for penetration depth in superconductors.

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