

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-I Computer Science & Engineering AI & ML : WINTER : 2024**  
**SUBJECT: PHYSICS FOR COMPUTING SYSTEMS**

Day : Wednesday  
Date : 04/12/2024

**W-27615-2024**

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Draw neat and labeled diagrams **wherever** necessary.
- 4) Use of non - programmable **calculator** is allowed.
- 5) Assume suitable data if **necessary**.

- Q.1**
- a) Explain electrostatic focusing and magneto static focusing, with neat label diagram. (06)
  - b) Explain motion of electron in transverse magnetic field. (04)
- OR**
- a) Explain construction and working of scanning electron microscope. (SEM) with neat diagram. (06)
  - b) Calculate velocity of proton accelerated through potential difference of 21 KV. Mass of proton =  $1.66 \times 10^{-27}$  kg. (04)
- Q.2**
- a) What is polarization? Explain principle and working of Nicol prism. (06)
  - b) White light falls normally on a soap film of thickness 0.32 micrometer and Refractive index 1.21 which wavelength in the visible region will be reflected most strongly. (04)
- OR**
- a) With suitable diagram explain formation of Newton's Ring in reflected light. Prove that the diameter of the  $n^{\text{th}}$  dark Ring is proportional to the square Root of natural number. (06)
  - b) A plane transmitting grating having 5700 lines per centimeter. Gives an angle of diffraction of a  $20^\circ$  in  $1^{\text{st}}$  order find the wavelength of the line. (04)
- Q.3**
- a) With neat energy level diagram explain the construction and working of  $\text{He-Ne}$  laser. (06)
  - b) Explain metastable state and stimulated emission. Explain population inversion. (04)
- OR**
- a) With neat labeled diagram explain construction and working of  $\text{Co}_2$  laser (06)
  - b) Write properties and application of laser. (04)
- Q.4**
- a) Draw a suitable diagram and derive an expression for numerical aperture of a step index fiber. (06)
  - b) Calculate the numerical aperture and acceptance angle of optical fiber of refractive index of core and cladding is 1.556 and 1.481. (04)
- OR**
- a) Explain types of optical fiber. Distinguish between step index and graded index fibre. (06)
  - b) If refractive index of core is 1.56 and fractional refractive index difference is 0.001. Find refractive index of cladding and numerical aperture. (04)

**P.T.O.**

- Q.5 a) Derive Schrodinger time dependent wave equation in one dimension (06)  
b) Calculate the energy of neutron in eV whose de Broglie wavelength is  $0.15 \text{ \AA}$  (04)

OR

- a) Write physical significance of wave function .write properties of matter waves ,prove electron cannot pre exit in free state of nucleus (06)  
b) State and explain Heisenberg uncertainty principle (04)
- Q.6 a) What is Hall effect? State its significance .How can mobility be determined by using Hall effect. (06)  
b) Write application of Hall effect. (04)

OR

- a) Explain Fermi level in intrinsic semiconductor. (06)  
b) What is Fermi energy and Fermi -Dirac distribution function? (04)

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