

**BACHELOR OF TECHNOLOGY (CBCS - 2023)**  
**B. Tech. Sem-II COMPUTER SCIENCE & ENGINEERING : SUMMER : 2024**  
**SUBJECT: ENGINEERING PHYSICS**

Day : Friday  
Date : 24/05/2024

S-27694-2024

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) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

**Given**

Mass of electron ( $m_e$ ) =  $9.1 \times 10^{-31}$  kg  
Charge on electron ( $e$ ) =  $1.6 \times 10^{-19}$  C  
Planck's constant ( $h$ ) =  $6.625 \times 10^{-34}$  J-s  
Mass of proton ( $m_p$ ) =  $1.67 \times 10^{-27}$  kg.

- Q.1** Derive an expression for the displacement of an electron, due to magnetic field (limited) perpendicular to the electron entering the field. (10)  
An electron describes a helix of radius 6cm and pitch of 2cm in a magnetic field of 0.023 tesla. Calculate the component of velocity perpendicular to the magnetic field.
- OR**
- Q.1** Explain principal, construction and working of transmission electron microscope. (10)
- Q.2** Explain the principle behind the Magnetostriction Oscillator. Discuss construction and working of magnetostriction oscillator. (10)
- OR**
- Q.2** What are the basic requirements for acoustically good hall (Explain any four). (10)  
Calculate the sound intensity produced by a sound source of 80 decibel.  
(Given:  $I_0 = 10^{-12}$  watt/m<sup>2</sup>)
- Q.3** Derive Schrodinger's time independent wave equation in three dimension. (10)
- OR**
- Q.3** What are matter waves? Explain any three properties of matter waves. (10)  
Calculate the De Broglie's wavelength associated with an electron of energy 35 J.
- Q.4** What is diffraction? Explain Fraunhofer diffraction in detail. (10)  
A monochromatic beam of light diffracts from plane diffraction grating having 5500 lines per cm. Calculate wavelength of incident light if second maxima is observed at  $25^\circ$  from central maxima.
- OR**
- Q.4** Explain interference due to uniform thickness thin film. Derive the derivation for conditions of constructive and destructive interference for reflection region. (10)
- Q.5** What is stimulated emission? With the help of energy level diagram explain construction and working of semiconductor laser. (10)
- OR**
- Q.5** Explain principle and construction of Nicol prism. Discuss Nicol prism as a polarizer. (10)
- Q.6** What do you mean by nanotechnology? Explain any three properties of nanoparticles. (10)
- OR**
- Q.6** With the help of energy band structure. Explain effect of temperature and doping on position of Fermi energy level. (10)

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