

BACHELOR OF TECHNOLOGY (CBCS - 2023)
B. Tech. Sem-II Information Technology : WINTER: 2025
SUBJECT: ENGINEERING PHYSICS

Day : Monday
Date : 24/11/2025

W-27743-2025

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:

Planck's constant (h) = 6.63×10^{-34} J-S
Mass of electron (m_e) = 9.1×10^{-31} kg
Charge on electron (e) = 1.6×10^{-19} C
Avogadro's number = 6.022×10^{23} /mole

Q.1 Explain principle, construction of Bain bridge mass spectrograph and explain its application for isotope detection. (10)

OR

Q.1 Derive the derivation for velocity and displacement of an electron moving in a parallel electric field. (10)

An electron of energy 1.13×10^{-17} joule revolves in a perpendicular magnetic field of 0.05 T. Calculate the radius of its path in given field.

Q.2 State piezoelectric effect. Explain piezoelectric oscillator for production of ultrasonic waves. (10)

OR

Q.2 Define musical sound and noise? What are the different types of noise? Give their remedies. (10)

Q.3 State and explain (10)

i) Matter waves ii) Wave function (ψ) and probability density ($|\psi|^2$)
Calculate the kinetic energy of an electron if wavelength of 5890 \AA is associated with it.

OR

Q.3 Explain motion of an electron in a rigid box. Derive the derivation for energy of an electron inside the rigid box. (10)

Q.4 With a neat labelled diagram explain interference due to wedge shape thin film. Derive the conditions for constructive and destructive interference. (10)

OR

Q.4 What is diffraction? Distinguish between Fraunhofer and Fresnel diffraction. (10)
A monochromatic wavelength of 6328 \AA incident on a plane diffraction grating. A spectral line is diffracted at an angle of 20° from the normal. Calculate the grating element if $n=1$.

Q.5 Explain Nicol Prism i) As a polarizer and ii) As an analyzer (10)

OR

Q.5 With neat labelled diagram explain construction and working of He-Ne LASER. (10)

Q.6 Explain in detail synthesis of nanoparticles by physical method. (10)

OR

Q.6 With the help of energy level diagram explain fermi energy level in p-type semiconductor at i) $T = 0 \text{ K}$ and ii) $T \neq 0 \text{ K}$ (10)
