ABV-IIITM, GWALIOR

2023BEE012

Mid-term-test - (Sept. 2023)

Engg. Physics –B.Tech. 2023 (CSE/EEE/MSC)

TIME: 2 Hrs MM: 30

NB: Attempt all questions. All questions carry equal marks.

1. Discuss and derive Planck's radiation formula. Explain Wien's law and Rayleigh-Jeans.

2. Distinguish between phase velocity and group velocity. Show that for a non-relativistic free particle the phase velocity is half of the group velocity.

3. State and explain Compton effect? Derive the expression for Compton wavelength shift.

4. Write down Schrödinger equation for a particle in a one-dimensional box. Solve it to obtain eigen functions and show that the eigen values are discrete.

5. For a particle in the states n= 1,2 and 3 of a one-dimensional box of length L, find the probability that the particle is in the region $0 < x < a/4$.

6. X-rays with $\lambda = 1$ Å are scattered from a carbon block. The scattered radiation is viewed at 90° to the incident beam. Calculate the Compton shift $\Delta\lambda$ and the kinetic energy imparted to the recoil electron?

****