2023BEE012

ABV-IIITM, GWALIOR
Major Exam (Nov- 2023)

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

TIME: 3 Hrs **MM.** 50

IMPORTANT INSTRUCTIONS:
Attempt all questions in the same sequence as given below. All questions carry equal marks.

1. Fill in the blanks 2x5=10
   a) The energy of a particle in infinite potential well is proportional to _____
   b) Poynting theorem relating the electric field intensity E, magnetic field intensity H and the rate of energy flow per unit area at a point P is given by _____
   c) The nearest neighbor distance in bcc structure is _____
   d) Carbon nanotubes are hollow cylinders of _____sheets.
   e) The most important characteristic of a laser beam is _____

2. How was the concept of displacement current helpful in removing discrepancy in Ampere's law? Prove that $\nabla \times H = J + D$
   Or 10
   Calculate the energy density carried by electromagnetic waves with the help of Maxwell's equations and hence define Poynting vector and Poynting theorem.

3. (a) Describe Compton effect. Derive an expression for the change in wavelength of a photon when it is scattered by an electron with suitable diagram. 5
   (b) What is the physical significance of wave function Ψ ? Derive an expression for Schrodinger time independent equation. 5

4. (a) Explain the concept of space lattice, lattice points, unit cell, basis and crystal structure. 5
   (b) What is the difference between crystalline and amorphous solids? Explain with suitable examples 5

5. What do you mean by LASER ? Explain the terms absorption, spontaneous and stimulated emission of radiation with diagrams. What is population inversion? 10

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