

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2024

BTech-1 Semester (CSE/IT/ECE/CE)

COURSE CODE (CREDITS): 18B11PH211 (3)

MAX. MARKS: 15

COURSE NAME: Engineering Physics-II

COURSE INSTRUCTORS: PBB, VSA, SKT, HAZ

MAX. TIME: 1 Hour

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems

Q1. Calculate the work function, stopping potential, and maximum velocity of photoelectrons for a light of wavelength 4350 \AA when it is incident on a sodium surface. Consider the threshold wavelength of the photoelectron to be 5420 \AA . [3 marks] [CO-2]

Q2. (a) What is the relation between particle velocity with group velocity and phase velocity? [2 marks] [CO-1]

(b) Show that the circumference of the Bohr orbit is an integral multiple of the de-Broglie wavelength. [1 marks] [CO-1]

Q3. (a) Show that the Compton effect is not observable in the visible region [2 marks] [CO-1]

(b) A hydrogen atom is 0.53 \AA in radius. Use the uncertainty principle to estimate the minimum energy an electron can have in this atom. [1 marks] [CO-2]

Q4. Obtain the expression of momentum and energy operators. [3 marks] [CO-2]

Q5. Show that the normalization factor for a particle in a box (of width y) is $\sqrt{(2/y)}$ [3 marks] [CO-1]

$h=6.626 \times 10^{-34} \text{ Js}$; $m=9.1 \times 10^{-31} \text{ kg}$; $c=3 \times 10^8 \text{ m/s}$; $e=1.6 \times 10^{-19} \text{ C}$