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SA—22—2025

FACULTY OF SCIENCE

B.Sc. (Third Year) (Fifth Semester) EXAMINATION

APRIL/MAY, 2025

(CBCS/New Pattern)

PHYSICS

Paper–XII

(Quantum Mechanics)

(Saturday, 12-4-2025) **Time : 10.00 a.m. to 12.00 noon**

Time—2 *Hours* *Maximum Marks*—40

N.B. :— (*i*) *All* questions are compulsory.

(*ii*) Figures to the right indicate full marks.

(*iii*) All symbols have their usual meanings.

(*iv*) Given : $h = 6.63 \times 10^{-34}$ Js.

$m = 9.1 \times 10^{-31}$ kg.

1. What is Compton effect ? Give the expression for Compton shift. 15

Or

(*a*) Derive Schrodinger wave equation in time dependent form and show $H\psi = E\psi$. 8

(*b*) What is probability current ? Explain it. 7

P.T.O.

2. Derive an expression for energy of particle in one-dimensional box and calculate the energy value of electron confined in a box having 2Å width. 15

Or

(*a*) Derive an expression for orbital quantum number. 8

(*b*) Deduce the Schrodinger wave equation in spherical polar form for hydrogen atom. 7

3. Write notes on (any *two*) : 10

(*a*) Uncertainty principle

(*b*) Expectation values

(*c*) Particle in a box energy quantization

(*d*) Magnetic quantum number.