SB—38—2022

FACULTY OF SCIENCE

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

MAY/JUNE, 2022

(CBCS/New Pattern)

PHYSICS

Paper-XII

(Quantum Mechanics)

(Friday, 10-06-2022)   **Time : 10.00 a.m. to 12.30 p.m.**

Time— 2½ *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 meaning.

1.   State and explain De-Broglie's hypothesis of matter waves. Obtain the relation for De-Broglie's wavelength and describe G.P. Thomson's Experiment to confirm De-Broglie's hypothesis of matter waves.   15

Or

(*a*)   Derive time dependent Schrodinger's wave equation.   8

(*b*)   Explain Eigen value and Eigen function.   7

2.   Derive Schrodinger's equation for hydrogen atom in spherical polar co-ordinate system and separate the variables.   15

Or

(*a*)   Derive an expression for energy of a particle in one-dimensional box.   8

(*b*)   Show that the expectation value of momentum of a particle in a box is zero.   7

P.T.O.

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

   (*a*) The Uncertainty Principle

   (*b*) Energy Operator

   (*c*) The particle in a Box-wave function.

   (*d*) Orbital Quantum Number.