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**X—43—2019**

**FACULTY OF SCIENCE**

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

**OCTOBER/NOVEMBER, 2019**

**(CBCS/New Pattern)**

**PHYSICS**

**Paper-XII**

**(Quantum Mechanics)**

**(Tuesday, 3-12-2019)**

**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 meaning.*

*(iv) Given data :*

$$h = 6.63 \times 10^{-34} \text{ J.S.}$$

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

1. Explain compton effect. Obtain an expression for compton wavelength due to scattering of electron by photon. Give experimental demonstration of the compton effect. 15

*Or*

(a) Write a note on expectation values. 8

(b) Derive Schrodinger's equation in steady-state form. 7

P.T.O.

2. Derive an expression for energy of a particle in one dimensional box. Calculate the energy values of an electron confined to a box  $1\text{Å}$  wide and draw energy level diagram. 15

Or

- (a) Derive an expression for electron angular momentum. 8
- (b) Derive Schrodinger's equation for hydrogen atom in spherical polar co-ordinate system. 7
3. Write short notes on any *two* : 10
- (a) Quantum theory of Light
- (b) Eigen values and Eigen functions
- (c) Particle in a box : wave function
- (d) Magnetic quantum number.