This question paper contains **2** printed pages]

AO—84—2018

FACULTY OF SCIENCE

B.Sc. (Fifth Semester) EXAMINATION

MARCH/APRIL, 2018

PHYSICS

Paper XII (PHY-302)

(Quantum Mechanics)

(Saturday, 31-3-2018) **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 carry their usual meaning.

1. Attempt any *four* : 8

(*a*) Define photoelectric effect.

(*b*) State uncertainty principle

(*c*) Write down an expression for momentum operator and energy operator.

(*d*) Write down an expression for expectation values of any general parameter G(*x*)

(*e*) Write down an expression for quantised energy for a particle in one-dimensional box.

(*f*) State an expression for electron angular momentum.

2. Solve any *two* : 8

(*a*) Explain the variation of stopping potential with frequency of incident rediation.

(*b*) Derive an expression for De Broglie's wave volecity.

(*c*) Derive an expression for steady state form of Schrodinger's equation.

P.T.O.

3. Solve any *two* : 8

(*a*) Explain Eigen values and Eigen functions.

(*b*) Describe G.P. Thomson's experiment for the verification of matter waves.

(*c*) Derive an expression for wave function of a particle in one-dimensional box.

4. Attempt any *one* : 8

(*a*) Using the method of separation of variables solve the Schrodinger's equation in spherical polar co-ordinates.

(*b*) Derive an expression for energy and wave function of a particle in three-dimensional box.

5. Write notes on any *two* : 8

(*a*) Momentum quantisation for a particle in one-dimensional box.

(*b*) Expectation values.

(*c*) Orbital quantum number

(*d*) Magnetic quantum number.