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PA—22—2024

FACULTY OF SCIENCE

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

MARCH/APRIL, 2024

(CBCS/New Pattern)

PHYSICS

Paper XII

(Quantum Mechanics)

(Friday, 12-04-2024)

Time : 10.00 a.m. to 12.00 noon

Time—2 Hours

Maximum Marks—40

Note :— (i) *All questions are compulsory.*

(ii) *Each symbols have their own usual meaning.*

(iii) *Given :*

(a) *Charge of electron (e) = $1.6 \times 10^{-19}C$*

(b) *Mass of electron (m) = $9.1 \times 10^{-31}kg$*

(c) *Planck's constant (h) = $6.6205 \times 10^{-34} J.s.$*

1. *State and explain Heisenberg's uncertainty principle with any one suitable application.*

15

P.T.O.

Or

- (a) Explain Schrodinger's time dependent wave equation and show that :

8

$$H\Psi = E\Psi.$$

- (b) Explain quantum mechanical operators and describe momentum operator.

7

- 2 Derive an expression for energy of a particle in three-dimensional box.

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Or

- (a) What is quantum number for H-atom ? Explain principle quantum number.

8

- (b) Obtain an expression for Schrodinger wave equation of hydrogen atom.

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3. Write short notes on (any two) :

10

- (a) Quantum theory of light

- (b) Eigen value and eigen function

- (c) Particle in one-dimensional box : momentum quantization

- (d) Orbital quantum number.