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Y-112-2019

FACULTY OF SCIENCE

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

NOVEMBER/DECEMBER, 2019

(CGPA Pattern)

PHYSICS

Paper XII (PHY-302)

(Quantum Mechanics)

(Friday, 20-12-2019)

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 carry their usual meanings.
 - (iv) Given Data : $h = 6.63 \times 10^{-34} \text{ Js}, m = 9.1 \times 10^{-31} \text{ kg}.$
- 1. Attempt any four:

8

- (a) Calculate de-Broglie wavelength of electron when it is accelerated through potential difference of 80v.
- (b) Write Schrödinger's equation in time independent form.
- (c) State uncertainty priciple and one of its applications.
- (d) Write an equation for energy of an Harmonic Oscillator.
- (e) What is orbital quantum number?
- (f) State Schrödinger's equation for the Hydrogen atom in spherical polar co-ordinates.
- 2. Attempt any two:

8

- (a) On the basis of uncertainty principle show that electrons can not find the place in nucleus.
- (b) Derive Schrödinger's equation in steady state form.
- (c) Explain experimental demonstration of compton effect.

P.T.O.

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3.	Attem	pt any two:	8
	(a)	State and explain photo-electric effect.	2
	(<i>b</i>)	Write a note on expectation value.	
	(c)	Derive an expression for probability current for free particle.	
4.	Attem	pt any one:	8
	(a)	Explain momentum quantisation of a particle in one-dimensional bo	X
	(<i>b</i>)	Set up Schrödinger's equation for H—atom in a spherical polar co-ordina system; and separate the variables.	ţ
5.	Write	short notes on any two:	8
	(a)	Total quantum number	
	(<i>b</i>)	Orbital quantum number	
	(c)	Energy quantisation of a particle in one-dimensional box	
	(<i>d</i>)	Particle in three dimensional box.	