Roll No. 219018371

Total No. of Questions : 9] (2032)

[Total No. of Printed Pages : 4

# UG (CBCS) IIIrd Year (Annual) Examination **3226**

## **B.Sc. PHYSICS**

(Elements of Modern Physics) (DSE-1A) Paper : PHYS 301 TH

### Time : 3 Hours]

# [Maximum Marks : 50

Note :- Attempt *five* questions in all, selecting *one* question from each Section-B, C, D and E. Question No. 1 (Section-A) is compulsory.

#### Section-A

# (Compulsory Question)

2 each

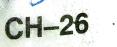


Why Compton Shift is not observed with visible light ?

Why retarding potential applied to plate in Franck-Hertz Experiment ?

(1)

E,d (c) What is an Operator ?



Turn Over

(d) Give *two* reasons that electron cannot exist inside the Nucleous.

(e) What is Internal Conversion ?.

(f)

What is relation between activity and half life of radioactive substance ?

What are properties of a good moderator ?

#### Section-B

(a) Deduce relation between angle of scattering of a photon and direction of recoil electron in Compton scattering.

A photon of wavelength 1.02 Å is scattered through 90° by free electron. Calculate change in wavelength of photon.

6.3

Describe Franck-Hertz Experiment. How does this experiment shows discrete energy levels in an atom ?

State and prove Bohr's correspondence principle

(2)

#### Section-C

- 4. (a) What is Heisenberg's uncertainty principle ? Apply this principle to calculate minimum energy of harmonic oscillator.
  - (b) Using uncertainty principle calculate energy of particle confined to region of space. 5,4
- 5. (a) Derive time independent Schrödinger equation.(b) Normalize the wave function given by :

$$\psi(x) = \begin{cases} A \sin \frac{\pi x}{a}, & \text{for } 0 < x < a \\ 0, & \text{outside} \end{cases}$$
5,4

9

## Section-D

6. What do you mean by particle in a box ? Determine energy levels and normalized wave functions for particle in a box.
7. (a) What is binding energy ? Explain variation of

(b

CH-26

binding energy per nucleon with mass number

(A).
What are magic numbers ? Give experimental
what are magic numbers ? Give experimental
what are magic numbers ? Give experimental
to their existance.
(3)

## Section-E

What are different modes of β-decay ? Under what conditions do they occur ?
Explain Geiger-Nuttal Law. Discuss its importance. 5,4
What is a chain reaction ? What are factors on which escape of neutrons depends ?

Discuss construction and working of a nuclear reactor.

5,4



(a)

b)