

Student Strength-250

House Examination

BSc 3rd Year

Elements of Modern Physics (PHYS301TH)

Duration : 1 Hr 30 min

Max.. Marks 15

Instructions :

- i. All question carries equal marks.
- ii. Attempt Three question in total.
- iii. Section A is compulsory and Section B and C has internal choice.

SECTION A

1: Attempt any five of the following:

- a. What kind of electron takes part in Compton Scattering?
- b. What is the maximum wavelength change produced in Compton scattering?
- c. Write Einstein Photoelectric equation and give meaning of each term.
- d. What is the difference between a Light waves and the Matter wave?
- e. What is the Fine structure constant? Give its value
- f. What is the Schrodinger's Wave Equation?
- g. What is Born's interpretation of wave function? 5×1=5

SECTION B

- 2: a. Derive Einstein Photoelectric equation and explain the laws of Photoelectric effect?
- b. Calculate the expression of Impact parameter in Rutherford scattering. 2+3=5

OR

3. X-rays of wavelength 20×10^{-12} m are scattered in Compton scattering
Find
 - a. the wavelength of radiation scattered through angle 45°
 - b. The maximum Kinetic energy of Recoil electrons. 2×2.5=5

SECTION C

4. a. State and Derive Heisenberg Uncertainty Principle for position and momentum.
b. Explain the non-existence of electron inside a nucleus based on Uncertainty Principle. 3+2=5
5. a. Describe the equivalence of de-Broglie matter wave hypothesis and Bohr quantization condition for stationary orbits in an atom.
b. Derive Time Independent Schrodinger Wave equation for a particle under some potential. V. 2+3=5

-End of the Paper-