Roll No. | | | | | | | | | | | | **Total No. of Pages : 02**

Total No. of Questions : 09

B.Sc (Non-Medical) (Sem.–5)

ELEMENTS OF MODERN PHYSICS

Subject Code : BSNM-503-18

M.Code : 78617

Date of Examination : 21-12-22

Time : 3 Hrs. **Max. Marks : 50**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying ONE mark each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) What is Compton Effect?

b) State Heisenberg uncertainty principle.

c) Find the energy of the photon having wavelength 4000A.

d) What is the importance of the normalization of the wave function?

e) Why Schrodinger's wave equation is not valid for relativistic particles?

f) Explain the term '*eigen value'*.

g) What is the significance of Stern Gerlach experiment?

h) What is meant by '*time dilation*'?

i) What are the basic postulates of special theory of relativity?

j) At what speed must a particle move for its mass to be four times its rest mass?

SECTION -B

2. Calculate the de Broglie wavelength of 1 MeV electron.

3. By applying uncertainty principle, explain non-existence of electrons in the atomic nucleus.

4. Show that change in probability density in a region of space is equal to the net change in probability current into that region.

5. Define total angular momentum J and show that it's z- component is quantized.

6. On the basis of Lorentz transformation derive an expression for length contraction.

SECTION-C

7. State Schrodinger wave equation for a free particle in a one dimensional closed box with infinitely hard walls. State the boundary conditions and solve it to obtain normalized wave function for the particle. Calculate the eigen functions and corresponding energy eigen values.

8. What is the spin orbit coupling? Find the total angular momentum for one electron atom.

9. Describe Michelson Morley experiment and obtain the expected fringe shift. Explain, how negative results obtained there from are interpreted.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.