



Date: 27-04-2018
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

PART A (10X 2 = 20 marks)

Answer ALL questions

1. Determine the de Broglie wavelength of an electron of energy 1eV.
2. State Heisenberg's uncertainty principle.
3. Define Hermitian operator.
4. Write the time dependent form of Schrodinger's equation.
5. What are eigen functions and eigen values of the operator $-i \frac{\partial}{\partial x}$?
6. Evaluate $[L_x, L_y]$.
7. Define inertial and non –inertial frames of reference.
8. A rod 1 m long is moving along its length with a velocity 0.9c. Calculate its length as it appears to an observer on the earth.
9. State equivalence principle in general relativity.
10. Explain variation of mass with velocity.

PART B (4 x7.5 = 30 marks)

Answer any FOUR questions.

11. Explain the distribution of energy in the spectrum of a black body.
12. Obtain the equation for the conservation of probability density.
13. Establish Schrodinger's equation for a linear harmonic oscillator and solve it to obtain its eigen values and eigen functions..
14. Discuss length contraction and time dilation..
15. Derive Einstein's mass energy relation..
16. Describe Davisson and Germer experiments for the study of electron diffraction..

PART C 4 x 12.5 = 50)

Answer any FOUR questions

17. (i) Explain the principle and working of an electron microscope. (ii) Outline an idealised experiment to bring out the significance of Heisenberg's uncertainty principle.
18. State and prove Ehrenfest's theorem
19. Deduce expressions for the Eigen values of the square of the total angular momentum and its z – component.
20. Describe the Michelson- Morley experiment. Explain the physical significance of negative results.
21. What is general theory of relativity? Discuss the important conclusions derived from it. Explain gravitational red shift.
22. With necessary theory explain alpha decay quantum mechanically.
