

DEPARTMENT OF PHYSICS

QUESTION BANK

V SEM: Nuclear and Theoretical Physics

1. State postulates of special theory of relativity.
2. Define Lorentz transformation .
3. What is time dilation.
4. Derive an expression for relativistic addition of velocities.
5. Derive length contraction.
6. Derive $E=mc^2$
7. Write a note on principle of equivalence.
8. Define primary and secondary cosmic rays.
9. Explain cosmic ray showers.
10. What are particle and anti-particles.
11. Explain quarks model.
12. Give the theory of Dempster and Aston mass spectrograph.
13. Explain the construction and working of Bubble chamber.
14. Explain the principle of semiconductor detector.
15. Explain the failure of classical mechanics in the microscopic domain.
16. Derive an expression for phase velocity.
17. Derive an expression for group velocity.
18. Write the relation between phase velocity and group velocity.
19. Explain the construction and working of Davisson and Germer experiment.
20. State Heisenberg's uncertainty principle.
21. Define Eigen values and Eigen functions.
22. State the postulates of quantum mechanics.
23. Derive the time dependent Schrodinger equation.
24. Derive the time independent Schrodinger equation.
25. Explain the Born's interpretation of the wave function.
26. Derive an expression for energy eigen values for a particle in one dimensional box.
27. Explain Yukawa's theory.
28. Explain the properties of nucleus.
29. Explain proton neutron hypothesis.
30. Explain any three characteristics of nuclear forces.
31. Describe with necessary theory, the working of cyclotron.
32. Obtain an expression for the threshold energy of an endoergic reaction.
33. Give any three similarities between liquid drop and atomic nucleus.