|  |
| --- |
| Bon Secours College for Women Nationally Accredited with “A” Grade by NAAC (Affiliated to Bharathidasan University, Trichy-24) Recognized by UGC Under Section 2(f) & 12 (B)    Vilar Bypass, Thanjavur-613 006. |

**DEPARTMENT OF PHYSICS**

**III B.SC., PHYSICS - ELEMENTS OF THEORETICAL PHYSICS**

**RCCSPH8**

**2 Marks**

1. State the conservation theorem of angular momentum
2. State the conservation theorem of linear momentum
3. Define constraints
4. How are constraints classified
5. Define holonomic and non-holonomic constraints
6. What is meant by generalized co-ordinates
7. Define configuration space and system point
8. What is virtual displacement
9. What is virtual work
10. Write the D’Alembert’s principle
11. State the principles of virtual work
12. What is meant by phase space
13. Write the Hamilton’s equation
14. Define cyclic coordinates
15. State the conservation theorem for energy
16. Define generalized momentum
17. What is meant by de-Broglie’s wave
18. What is meant by wave velocity
19. What is meant by group velocity
20. Write the relation connecting group velocity and phase velocity
21. State Heisenberg’s uncertainty principle
22. State the basic principle of electron microscope
23. What are the postulates of wave mechanics
24. What is an operator? Give an example
25. Write the expression for time-dependent form of schrodinger’s equation
26. Define normalized wave function
27. Define eigen value and eigen function
28. Give any one application of Schrodinger’s wave equation
29. What is tunnel effect
30. Define penetrability
31. Define zero point energy
32. Define Photoelectric effect
33. What is threshold frequency
34. State the laws of photo electric emission
35. Write Einstein’s photo electric equation
36. What is meant by photo electric cells
37. State the principle of photo voltaic cell
38. Define Compton effect
39. Define stopping potential

**5 Marks**

1. Explain constraints
2. Explain the action of Atwood machine
3. State and prove the D’Alemberts principle
4. Write a note on configuration space in a dynamical system
5. Write a note on generalized coordinates
6. State and explain the principle of Virtual Work
7. Explain the physical significance of Hamiltonian function
8. Write a note about generalized momentum
9. Derive the Hamiltonian equations of motion
10. Explain shortly about cyclic coordinates
11. State and prove the conservation of energy
12. Derive an expression for de Broglie wavelength
13. Write a note on Heisenberg’s uncertainty principles
14. Show that group velocity is equal to particle velocity
15. Explain the De-Broglie concept of matter wave
16. Explain the working of Gamma ray microscope
17. Explain the working of a electron microscope
18. Explain the basic postulates of wave mechanic
19. Derive Schordinger’s time dependent equation for matter waves
20. Derive steady state form of Schordinger’s equation for matter waves
21. Prove the normalization of wave function
22. Prove that orthogonality of the two wave functions
23. Explain shortly about the barrier penetration
24. Write a note about the energy of a linear harmonic oscillator
25. Explain the physical significance of wave function
26. Derive an expression for e/m of photoelectrons by using lenard’s method
27. Derive the Einstein’s photo electric equation
28. Write a short note about Millikan’s experiment
29. Write a note on photovoltaic cell
30. Write a short note about photo conductive cell
31. Write a short note about photo emissive cell

**10 Marks**

1. Obtain the Lagrange’s equation from D’Alembert principle
2. Using Lagrange’s equations derive the equation of motion of a simple pendulum
3. Describe the working of Atwood’s machine and deduce Lagrange’s equation for it
4. What are cyclic coordinates? Describe the theorem for generalized momentum
5. Explain when Hamiltonian is equal to the total energy of a system
6. Deduce the Hamilton’s equations from generalized coordinates qk and momenta pk
7. Obtain the Hamiltonian equation from cyclic coordinates
8. Explain the Davision and Germer Experiment for the study of matter wave
9. Explain G.P. Thomson’s experiment in detail and deduce an expression for the de Broglie wavelength of cathode rays
10. Derive the Schrodinger time independent wave equation hence obtain in the time dependent wave equation
11. Calculate the value of energy of a particle in an one dimensional box and show that only certain discrete energy states are possible
12. Give the theory of Compton effect and briefly explain its experimental verification
13. Explain Richardson and Compton experiment