

PHY. 201/21
II Semester Examination
M.Sc. (Physics)
Quantum Mechanics
Paper -I

Section-A

Very Short answer type question (2×8=16)

- 1) Write down minimum uncertainty product?
- 2) Write down relation between phase and group velocity?
- 3) Explain dynamical variable?
- 4) What is completeness of eigen function?
- 5) Define parity with example?
- 6) Write down commutation relation of position and angular momentum?
- 7) What is stark effect?
- 8) Explain non degenerate case?

Section-B

Short answer type question (4×6=24)

- 1) Give the law of photoelectric emission. Define Einstein's photoelectric equation and show how this explain this law?
Or
Give probabilistic interpretation of Schrodinger equation?
- 2) Explain harmonic oscillator and its solution by matrix method?
Or
Explain Dirac delta function and its physical significance?
- 3) Discuss spin angular momentum and Pauli matrices?
Or
Discuss Clebsch Gorden coefficient?
- 4) Explain stark effect with single particle problem?
Or
Write down solution of radials equation of Hydrogen atom with energy levels?

Section-C

Long answer type question (4×10=40)

- 1) What is physical interpretation of the wave function? How a free particle wave function signifies particle in space and momentum?
Or
How do you obtain the expectation value of dynamical variable? Explain with example?
- 2) Write short notes on following:
a) Bra and ket notations
b) Representation of states and dynamical variable?
Or
Give the matrix representation of an operator. Prove Heisenberg 's equation of motion?
- 3) Find the eigenvalues and eigen function of L^2 and L_z .
Or
Separate the wave function in spherically symmetric potential?
- 4) Discuss Zeeman effect without spin and energy?
Or
Discuss solution of first order and second order perturbation of an oscillator?