UNIVERSITY DEPARTMENT OF PHYSICS

DR. SHYAMA PRASAD MUKHERJEE UNIVERSITY, RANCHI

M.SC. PHYSICS

SEMESTER - II

PAPER – 201: Quantum Mechanics II

MODEL QUESTIONS

GROUP A

1. Give the condition for validity of JWKB method.
2. What are partial waves?
3. Derive the basic variational theorem.
4. Under what condition the Born's approximation is expected to be valid.
5. Write down the connection formula.
6. Explain the significance of phase shift.
7. Define scattering amplitude and cross-section.

GROUP B

1. Give a description of variational method and apply it to obtain the first excited state of a linear harmonic oscillator.
2. For a particle constrained to move between classical turning points in a potential well, how are the energies obtained by the WKB method.
3. Discuss the perturbation theory for non-degenerate levels in first and second order.
4. Give the theory of the Stark effect of hydrogen atom for n=2 levels.
5. Discuss the first order time dependent perturbation theory and derive the Fermi Golden rule.
6. Obtain the integral equation for scattering. Hence obtain Born's approximation.
7. Using the method of partial waves for the scattering of a particle by a short range spherical field, find the total scattering cross-section.

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