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WT—43—2024

FACULTY OF SCIENCE

M.Sc. (First Year) (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

(New/CBCS Pattern)

PHYSICS

Paper PH-201

(Quantum Mechanics)

(Wednesday, 11-12-2024)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours   *Maximum Marks—75*

N.B. :—   (i)   *All* questions are compulsory.

      (ii)   *All* questions carry equal marks.

1. Derive an expression for time dependent Schrodinger equation and explain in brief "Quantum Numbers".   15

Or

(a) Write any *four* postulates of quantum mechanics.

(b) Define Dirac-Delta function and state any *five* properties of it.

2. Write in detail theory of calculation of C.G. coefficient.   15

Or

(a) Explain Rotational Symmetry and Conservation of angular momentum.

(b) Find the eigen value of angular momentum operator $\hat{L}_2$.

P.T.O.

3. Explain Stark effect in ground state of H-atom. 15

Or

(*a*) Write application to bound state of WKB approximation.

(*b*) Explain in brief Fermi-Golden rule.

4. Derive relation angles and scattering cross-section in laboratory and centre of mass systems. 15

Or

(*a*) What are symmetric and asymmetric wave function and their construction for N-particle system.

(*b*) Derive an expression for differential scattering cross-section.

5. Write short notes on any *three* (each carries **5** marks) : 15

(*a*) Unitary transformation

(*b*) Reflection invariance

(*c*) Degenerate case-stark effect

(*d*) Scattering amplitude.