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B.Sc. 3rd Semester (Hons) New Scheme Examination,
December-2015

PHYSICS

Paper-PHY-304

Quantum Mechanics

Time allowed : 3 hours]

[Maximum marks : 40

Note : Attempt five questions in all, selecting at least two questions from each unit.

Unit-I

1. What do you understand by wave particle dualism ? Describe Davisson and Germer's experiment to illustrate the wave nature of matter. 8
2. (a) State Heisenberg's uncertainty principle and explain it in view of de-Broglie wave concept. 5
(b) An electron has a speed of 1.05×10^4 m/s within the accuracy of 0.01%. Calculate uncertainty in the position of the electron. 3
3. Derive both time independent and time dependent Schroedinger equation for a non-relativistic free particle. 8

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- (2)
4. (a) Explain Frank-Hertz experiment. 4
(b) What are group and phase velocities? Explain. 4

Unit-II

5. What is potential step? Find the reflection and transmission coefficient for a potential step of height V_0 when total energy E of the particle is such that $0 < E < V_0$. 8
6. What are eigen values and energy levels of a linear harmonic oscillator? Give the normalised wave function of linear harmonic oscillator. 8
7. Discuss orbital angular momentum and azimuthal quantum number. 8
8. Solve Schrodinger's equation for hydrogen atom and show that the expression obtained for energy levels is in agreement with Bohr's theory. 8

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