



B.Sc. V Semester Degree Examination, April/May - 2024

PHYSICS

**5.1 : Classical Mechanics and Quantum Mechanics - I
(NEP)**

Time : 2 Hours

Maximum Marks : 60

Note : (i) Answer **all** the questions.
(ii) Non-programmed scientific calculators are allowed.

I. Answer all questions : 10x1=10

- (a) Define Non-Inertial frame of Reference.
- (b) State law of conservation of Linear momentum.
- (c) State D'Alembert's principle.
- (d) Mention expression for Coriolis Force.
- (e) Mention the relation of variation of mass with velocity.
- (f) Mention one failure of classical mechanics.
- (g) State Heisenberg's Uncertainty Principle.
- (h) What is Wave Packet ?
- (i) What is Zero Point Energy ?
- (j) State Ehrenfest Theorem.

II. Answer any four of the following : 4x5=20

1. State and explain law of conservation of Angular momentum.
2. Derive an expression for Time-Dilation.
3. Derive the relation between Phase velocity and Group velocity.
4. Write a note on Normalisation and Orthogonality of wave function.
5. State and explain Law of Conservation of Energy.
6. Derive an expression for apparent frequency in case of Longitudinal Doppler Effect.



III. Answer **any three** of the following.

3x10=30

1. (a) With neat diagram derive an expression for displacement of Atwood's machine. **7+3**
(b) Write a note on constraints.
2. With neat diagram explain Michelson's Morley experiment and write its negative results.
3. (a) Derive an expression for Compton Shift. **7+3**
(b) X-ray of wavelength 2 \AA are scattered from a block. The scattered photon are absorbed at Right angle to deviation of incident beam. Find the wavelength of scattered photon.
4. Derive an expression for Energy Eigen value of a particle in a one dimensional infinite potential well.
5. (a) Derive an expression for time dependent Schrodinger Wave Equation. **5+5**
(b) With neat diagram explain G.P. Thomson's Experiment.

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