

Roll No _____

930023

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NS5S-1875-A-24

B.Sc. V Semester (NEP) Degree Examination

PHYSICS

Classical Mechanics and Quantum Mechanics

Paper : PHY Cg-T

Time : 2 Hours

Maximum Marks :60

Instructions to Candidates:

- 1) *Answer any Five from section-A.*
- 2) *Answer any Four from Section-B.*
- 3) *Answer any Three from Section-C.*

SECTION-A

I. Answer any Five of the following.

(5×2=10)

1. State the Law of conservation of energy.
2. Define scleronomous and Rheonomous constraints.
3. What are Inertial and Non-Inertial frames.
4. What is twin paradox?
5. Write any two properties of de-Broglie waves.
6. What is wave packet?
7. What is probability density of a wave function.

SECTION-B

II. Answer any Four of the following.

(4×5=20)

8. State and explain the law of conservation of angular momentum.
9. What is Lorentz-Fitzgerald contraction? Derive the formula of relativistic length.
10. Mention Lorentz transformation equation, deduce the velocity addition theorem.
11. Define phase velocity and group velocity. Obtain the relation between them.
12. State and explain the Heisenberg's uncertainty principle.
13. Give the Physical significance of the wave function. What are normalized and orthogonal wave function?

SECTION-C

III. Answer any Three of the following.

(3×10=30)

14. What are constraints? Discuss holonomic and non holonomic constraints with illustrations. (10)
 15. a) State the postulates of special theory of relativity and deduce from them the Lorentz transformation equations for free space time co-ordinates. (7+3)
b) A particle with a proper life time of 1 micro second moves through the laboratory at 2.7×10^8 m/s. What is its life time as measured by an observer in the Laboratory?
 16. a) Describe construction and working of Davisson and Germer experiment for wave nature of particle. (7+3)
b) Calculate the wavelength associated with a 1 MeV photon.
 17. Write down Schrodinger's wave equation for a particle in a box. Solve it to obtain eigen function and show that the eigen values are discrete. (10)
 18. a) Derive Schrodinger's time dependent wave equation. (7+3)
b) State the postulates of quantum mechanics.
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