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S – 2683

Reg. No. :

Name :

First Semester B.Sc. Degree Examination, January 2024

First Degree Programme under CBCSS

Physics

Core Course I

PY 1141 : BASIC MECHANICS AND PROPERTIES OF MATTER

(2023 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries **1** mark.

1. Explain the principle of conservation of mechanical energy.
2. Define simple harmonic motion.
3. Define moment of Inertia.
4. What is the formula for the period of a simple pendulum?
5. Discuss the properties of matter related to elasticity.
6. Differentiate between transverse and longitudinal waves.
7. State surface energy.
8. Explain streamline flow.
9. Define fluid dynamics and its significance.
10. Describe the concept of center of mass.

(10 × 1 = 10 Marks)

P.T.O.

SECTION – B

Answer any **eight** questions. Each carries **2** marks.

11. Describe the difference between conservative and non-conservative forces.
12. Explain bending moment.
13. Discuss the various types of damping in oscillatory systems.
14. Explain the behavior of matter under different states of stress and strain.
15. Compare the properties of matter based on molecular theories.
16. Differentiate between surface tension and capillary action.
17. Explain the behaviour of fluids in a turbulent flow.
18. Explain elasticity.
19. Describe the concept of angular momentum in rigid body dynamics.
20. Explain the concept of a plane progressive wave.
21. Discuss the laws of motion and their applications.
22. State stoke's theorem.

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** of the following questions. Each question carries **4** marks.

23. Calculate the period of oscillation for a simple pendulum with a length of 2 meters.
24. State and prove work energy theorem.

25. Discuss the behaviour of matter under elastic and plastic deformation. Include material properties and stress-strain curves.
26. Describe the significance of surface tension in various phenomena.
27. State and prove perpendicular axis theorem.
28. Explain the variation of surface tension with temperature.
29. Derive the expression for excess pressure on a curved liquid surface.
30. Explain the concept of center of mass, its calculation and its importance in dynamics.
31. Discuss the conservation of energy in mechanical systems. Provide examples of energy transformations.

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** of the following questions. **Each** question carries **15** marks.

32. Describe the principles of conservation of energy and how they relate to different forms of energy. Provide examples to illustrate the concept.
33. Derive the relations connecting the three elastic moduli. Explain Poisson's ratio.
34. State and prove Bernoulli's theorem.
35. Derive Poiseuille's formula.

(2 × 15 = 30 Marks)