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S – 2682

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

(2018–2022 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1. What is moment of inertia?
2. Give Euler's equation of motion.
3. Define radius of gyration (K)
4. Name the physical quantity having same dimension as work?
5. Surface with zero pressure is called _____.
6. What is the unit of coefficient of viscosity?
7. The law of conservation of mass in fluid mechanics is given by _____.

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8. Give an example of a substance which show practically no elastic after effect.
9. The rotational kinetic energy of a body is E and its moment of inertia is I . The angular momentum of the body is?
10. Give the equation of motion of a simple pendulum.

(10 × 1 = 10 Marks)

SECTION – B

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

11. Discuss the types of motion of a rigid body with required explanation.
12. State parallel axis theorem.
13. What are conservative forces?
14. Explain the law of conservation of energy.
15. What do you mean by elasticity?
16. What is the physical significance of Hook's law?
17. Deduce the potential energy of a twisted cylinder.
18. Differentiate cohesive and adhesive force.
19. What are the factors that depend on angle of contact?
20. What is viscosity?
21. What is the significance of Bernoulli's theorem?
22. What is the difference between a simple pendulum and a compound pendulum?

(8 × 2 = 16 Marks)

SECTION – C

Answer any **six** questions, not exceeding a paragraph. Each carries 4 marks.

23. Calculate the moment of inertia of a Circular cylinder about an axis normal to axis of cylinder and passing through its centre of mass.
24. A solid cylinder of mass M and radius R rolls down an inclined plane from height h without slipping, the speed of its centre of mass when it reaches the bottom is?
25. A police officer fires a bullet of mass 50.0 g with speed 200 ms^{-1} on soft plywood of thickness 2.00 cm . The bullet emerges with only 10% of its initial kinetic energy. What is the emergent speed of the bullet?
26. A gold wire 0.32 mm in diameter is elongated by 1 mm when stretched by force of 330 gm wt and twists through 1 rad when equal and opposite torque of 145 dyne cm are applied to its ends. Find Poisson's ratio of gold.
27. If the volume of a wire does not change on loading, find the Poisson ratio of the wire material.
28. A heavy mass M moving horizontally strikes the end of bar of length L . cross sectional area A and modulus of elasticity E . Find maximum stress due to impact.
29. Obtain the equation for kinetic energy and potential energy of a particle in simple harmonic motion. Show that the sum of kinetic and potential energy is constant.
30. A pendulum is of length 50 cm . Find its period when it is suspended in a lift rising at the constant acceleration of 2 m/s^2 .
31. How will you determine g using a symmetric bar pendulum?

(6 × 4 = 24 Marks)

SECTION – D

Answer any **two** questions. **Each** question carries **15** marks.

32. (a) Discuss the equations of motion of a rotating rigid body.
(b) Brief the concept of Inertia tensor.

33. (a) What is surface tension? Briefly explain the molecular theory of surface tension.
- (b) Explain the variation of surface tension with temperature.
34. (a) What are fluids? What are its properties and types?
- (b) Explain the principle and working of a venturimeter to determine the flow of a liquid.
35. What is a simple harmonic motion? How will you represent a simple harmonic motion mathematically? Solve the algebraic equation of simple harmonic motion.

(2 × 15 = 30 Marks)

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