Reg. No. : ....
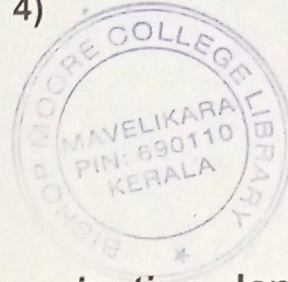
Name : ....

First Semester B.Sc. Degree Examination, January 2024

First Degree Programme under CBCSS

Physics

Complementary Course for Chemistry

PY 1131.2 : ROTATIONAL DYNAMICS AND PROPERTIES OF MATTER

(2018 – 2022 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

Answer **all** the questions in **one** or **two** sentences. Each question carries **1** mark.

1. Write any two examples of rotatory motion.

2. State the theorem of parallel axes.

3. Write the equation for the kinetic energy of a rotating body.

4. Define progressive harmonic wave.

5. What is the expression of a spherical wave?

6. What is a beam?

7. Define bending moment.

8. What is surface tension?

9. Define viscosity.

10. State surface energy.

SECTION – B

Answer any **eight** questions, not exceeding a paragraph. Each question carries **2 marks**.

11. What are the factors depending on the moment of inertia of a body?

12. What are the practical applications of flywheel?

13. Define simple harmonic motion.

14. Write the characteristics of simple harmonic motion.

15. What is a torsion pendulum?

16. Define wave. Write the general equation of wave motion.

17. Explain bending moment.

18. Define torsional rigidity of a material of bar. Writs its equation.

19. What is a cantilever? Write the expression for the depression of the loaded end of a cantilever.

20. Differentiate cohesive and adhesive forces.

21. What are the factors affecting surface tension?

22. How does the viscosity of a liquid vary with temperature?

SECTION – C

Answer any **six** questions. Each question carries **4** marks.

23. Find the moment of inertia of an annular disc about an axis passing through its centre and perpendicular to its plane.

24. A flywheel rotating at the rate of 150 rpm can just raise a load of 100 kg through 2 m before coming to rest. Neglecting the friction at the bearings. Calculate the moment of inertia of the flywheel.

25. Plane waves of frequency 521 Hz and amplitude 1×10^{-3} mm are produced in air. Calculate the energy radiated per unit volume of the medium. [Given : density of air = 0.00129 g/cc]

26. A solid cylinder of radius 5 cm is suspended by a vertical wire as a torsion pendulum. The axis of the cylinder is along the wire. Find the couple per unit twist of the wire, if mass of the cylinder is 2kg and period of oscillation is 2 s.

27. A bar of length 1.2 m, breadth 3 cm and thickness 4 mm is used as a cantilever. When a load of 0.25 kg is attached to the free end and the depression at the free end is 10 mm. calculate the young's modulus of the material.

28. A brass bar 1 cm^2 in cross section in supported on knife edges 100 cm apart. A load of 1 kg at the centre of the bar depresses that point by 2.51 mm. What is the young's modulus for brass?

29. Calculate the excess pressure inside a soap bubble of radius 2 mm. Surface tension of soap solution is 20×10^{-3}N/m.

30. Obtain an expression for the excess pressure inside a spherical liquid drop.

31. Water flows through a horizontal capillary tube of 1 mm internal diameter and length 70 cm under pressure of a column of water 30 cm height. Find the rate of flow of water through the capillary tube.

(6 × 4 = 24 Marks)

SECTION – D

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

32. Calculate the moment of inertia of a solid sphere: (a) about a diameter (b) about a tangent.

33. Obtain an expression for the period of oscillation of a compound pendulum.

34. Describe with theory and experiment to determine the Young's modulus of a bar having rectangular cross section by uniform bending.

35. Derive Poiseuille's formula for the flow of a liquid through a narrow tube.

$(2 \times 15 = 30$ **Marks)**

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