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Reg. No. : .....

Name : .....

First Semester B.Sc. Degree Examination, June 2022

First Degree Programme under CBCSS

Physics

Complementary Course for Chemistry

PY 1131.2 : ROTATIONAL DYNAMICS AND PROPERTIES OF MATTER

(2020 Admission Onwards)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** ten questions. **Each** carry 1 mark.

1. What are rigid bodies?
2. What is the kinetic energy of a rotating body?
3. Give the equation of motion of a simple pendulum.
4. What is the moment of inertia around the axis perpendicular to the plane of the ring and passing through the centre?
5. Write down the general equation of wave motion
6. Surface with zero pressure is called _____
7. What happens to viscosity, if temperature is decreased?
8. What is the instrument used to measure viscosity?

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9. What is the rotational analogue of force?

10. What is the ratio of tensile stress (σ) to tensile strain (ε)?

(10 × 1 = 10 Marks)

SECTION – B

Answer any **eight** questions, carrying **2** marks each.

11. State parallel axis theorem.

12. Define radius of gyration.

13. What are the advantages of compound pendulum over simple pendulum?

14. How will you find out the time period of a torsion pendulum?

15. Write any two application of surface tension.

16. Define frequency of a wave motion.

17. Distinguish longitudinal and transverse waves

18. What is a plane progressive harmonic wave?

19. What is viscosity?

20. What is a fly wheel?

21. What is angle of shear?

22. Define bending moment.

23. What is uniform bending?

24. What do you mean by cantilever?

25. Explain the term surface tension.

26. Why liquid drops are spherical in shape?

(8 × 2 = 16 Marks)

SECTION – C

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

27. Find out the moment of inertia of a solid circular disc with axis perpendicular to its plane and passing through centre.

28. Calculate the moment of inertia of a solid cylinder about an axis normal to axis of cylinder and passing through its centre of mass.

29. A cube of mass M and each side a is rotating with angular velocity w around one of its edges, called the x-axis. Find expressions for its kinetic energy.

30. Find the time period and the frequency of a block of mass one kg attached to a spring and stretches the spring by 7cm.

31. A pendulum is of length 50 cm. Find its period when it is suspended in a lift rising at the constant acceleration of $2m/s^2$.

32. Obtain the expression of depression at loaded end of a cantilever, with weight of the cantilever not neglected.

33. Surface tension of a soap solution is 0.03n/m. How much work is done to produce the soap bubble of radius 0.05m?

34. A uniform beam of length / is supported symmetrically on two knife edges in same horizontal plane and loaded a weight W in the middle. Deduce the equation for depression of the beam.

35. How will you determine the moment of inertia of a fly wheel experimentally?

36. In a horizontal tube 4km long and 8cm diameter, water flows at a rate of 20 litres per sec against the viscous resistance. If viscosity of water is 0.01 CGS units, calculate pressure required to maintain the flow.

37. Write a note on bending of beams. What are the measures taken to minimise bending?

38. A circular disc of mass 25kg and radius 50cm is mounted co-axially and made to rotate. Calculate KE when executing 2 revolutions/sec.

(6 × 4 = 24 Marks)

SECTION – D

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

39. What is moment of inertia? How will you calculate moment of inertia? Calculate the moment of inertia of a uniform solid sphere with axis passing through centre.

40. (a) What are waves? What are the characteristics of wave motion?

    (b) Obtain the general equation of wave motion.

41. Give a brief note on different types of simple harmonic oscillators.

42. (a) What is surface tension? Briefly explain the theory and experiment to find surface tension.

    (b) Explain the variation of surface tension with temperature.

43. What is viscosity? Derive the Poiseuille's formula. What are its significance and limitations?

44. What is meant by Young's modulus? Derive an expression for the depression produced at the free end of cantilever loaded at its free end.

(2 × 15 = 30 Marks)
