



K24U 4029

Reg. No. :

Name :

3

**First Semester B.Sc. Degree (C.B.C.S.S.-OBE – Supplementary/
Improvement) Examination, November 2024
(2019 to 2023 Admission)
COMPLEMENTARY ELECTIVE COURSE IN PHYSICS
1C01PHY : Mechanics**

Time : 3 Hours

Max. Marks : 32

SECTION – A

Answer **all** questions, **each** carries **1** mark.

1. A and B are two wires. The radius of A is twice that of B. If same force is acting on them, the ratio of the stress on A to that of B is _____
2. In oil lamps, the oil rises up in the wicks due to _____
3. Write the relation connecting radius of gyration and moment of inertia.
4. The square of period of oscillation of a simple pendulum is proportional to _____
5. A mechanical transverse wave cannot pass through _____ medium. (5×1=5)

SECTION – B

Answer **any four** questions, **each** carries **2** marks.

6. Distinguish between streamline flow and turbulent flow.
 7. What is meant by flexural rigidity ? What is its expression ?
 8. Write the expression of torque and show that in the absence of external torque, angular momentum about the axis of rotation is conserved.
 9. Discuss the characteristics of a simple harmonic oscillator. Give an example.
 10. Define quality factor of a damped oscillator. Give the expression for it.
 11. What are stationary waves ? What are nodes and antinodes ? (4×2=8)
- P.T.O.

K24U 4029



SECTION – C

Answer **any three** questions, **each** carries **3** marks.

12. Calculate the work done in twisting a steel wire of radius 10^{-3} m and length of 0.25 m through an angle of 45° . The modulus of rigidity of the material is 8×10^{10} N/m².
13. A soap bubble is spherical in shape and has a diameter of 10 cm. If the surface tension of the surface separating soap solution and air is 40×10^{-3} N/m, what is the excess of pressure of the air inside the bubble over the atmospheric pressure ?
14. A circular metal loop of mass 1 kg and radius 0.2 m makes 10 revolutions per second about its centre. The axis of rotation being normal to the plane of the loop.
 - a) What is the moment of inertia about this axis ?
 - b) What is the angular momentum about the same axis ?
 - c) Calculate the torque which will increase the angular momentum by 25% in 10 sec.
15. Plane waves of frequency 500 Hz are produced in air with amplitude 10^{-3} cm. Deduce energy density. (Density of air is 1.29 kg/m³)
16. A condenser of capacity $1\mu\text{F}$ and an inductance of 0.2 H and a resistance of 800Ω are joined in series. Is the circuit oscillatory ? (3×3=9)

SECTION – D

Answer **any two** questions, **each** carries **5** marks.

17. What is bending moment ? Find the expression for the depression at a point 'x' from the fixed end of a cantilever.
18. Derive the expression for the rate of flow of a viscous liquid through a capillary tube.
19. State and prove (i) Parallel axes theorem and (ii) Perpendicular axes theorem.
20. Obtain the differential equation for the longitudinal waves in gases. Hence deduce an expression for velocity of sound in a gas. (2×5=10)