



22103108

QP CODE: 22103108

Reg No : .....

Name : .....

**B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE  
EXAMINATIONS, OCTOBER 2022**

**Second Semester**

**Core Course - PH2CRT02 - MECHANICS AND PROPERTIES OF MATTER**

(Common for B.Sc Physics Model I, B.Sc Physics Model II Applied Electronics, B.Sc Physics Model II Computer Applications, B.Sc Physics Model III Electronic Equipment Maintenance)

2017 ADMISSION ONWARDS

2D5C60CE

Time: 3 Hours

Max. Marks : 60

**Part A**

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Define the intensity of a plane progressive harmonic wave travelling along the positive x-direction.
2. What are the conditions of an oscillatory motion to be simple harmonic?
3. Write down two differences of compound pendulum and simple pendulum based on the period dependence.
4. What is meant by sharpness of resonance?
5. How will the moment of inertia around a parallel axis be as compared to the moment of inertia around the centre of mass axis.
6. Write down the expression for moment inertia of a circular disc about its diameter and perpendicular to its plane. And explain the terms.
7. Define flexural rigidity.
8. Explain a method to introduce torsion in a small cylindrical rod.
9. Explain turbulent flow of a liquid.
10. Obtain the dimensions of coefficient of viscosity.
11. In the constant pressure head method to measure the coefficient of viscosity of a liquid, why a large liquid container is used?



12. What is the condition at which a growing liquid drop formed at the tip of a vertically held narrow tube detaches from it?

(10×1=10)

### Part B

Answer any **six** questions.

Each question carries **5** marks.

13. A tuning fork of frequency 256 produces 4 beats per second with another tuning fork B. When B is loaded with 1 gmwt, the number of beats is 1 per second, but when loaded with 2 gm wt it increases to 2 beats. Find the frequency of B.
14. Calculate the fundamental frequency for a string 0.45 m long, of mass 0.5 gm/metre and a tension of 75 N.
15. The potential energy of a harmonic oscillator of mass 2 kg in its mean position is 15 J. If its total energy is 9 J and its amplitude is 0.01 m, calculate its time period.
16. A circular hoop of radius 0.3m has a moment of inertia  $0.09 \text{ kg-m}^2$  about its axis, makes 10 revolutions per second. Find its angular momentum about its axis and the force that increases the angular momentum by 30 % in 10 seconds.
17. A couple of 10N is applied to a flywheel of mass 10kg and radius of gyration 50cm. Find the resultant angular acceleration.
18. The Young's moduli of three materials are in the ratio 2:2:1. Three wires made of these materials have their cross-sectional areas in the ratio 1:2:3. What will be the ratio of elongation in the three wires if an identical stretching force F is applied?
19. Calculate the work done in stretching a uniform metal wire of area of cross section  $10^{-6} \text{ m}^2$  and length 1.5m through  $4 \times 10^{-3} \text{ m}$ . Given  $Y = 2 \times 10^{11} \text{ N/m}^2$ .
20. Calculate the Young's modulus in the cantilever method from the following data. The length is 1m which is suspended with a load of 150gm at its end. The depression is found to be 4cm. The thickness of the beam is 5mm and breadth is 3cm. What will happen to the depression if the length of the same cantilever is doubled to 2m?
21. Calculate the speed at which the velocity head of a stream of water is equal to 0.5m of mercury. Given density of mercury is 13.6 times that of water.

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **10** marks.



22. What is a transverse wave? For a transverse wave, define wavelength, amplitude, period, frequency, and wave speed. What are the units of each? Explain how these characteristics are related
23. Derive the expression for the moment of inertia of a solid cylinder about an axis passing through the centre of mass and perpendicular to the length.
24. Derive the expression for moment of torsional couple for a cylindrical rod. Also explain how torsion pendulum apparatus can be used to measure the rigidity modulus of the material of the rod.
25. Derive the expression for the excess pressure inside an air bubble inside a liquid.

(2×10=20)