QP CODE: 24019215

24019215

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, MAY 2024

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

18CEA8C6

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. Define a wavelength. What is its unit?
2. Write down the acceleration of a plane progressive harmonic wave travelling along the positive x-direction.
3. "All oscillatory motions are periodic but all periodic motions are not oscillatory" Reason out with two examples.
4. A particle in A particle of mass m is executing simple harmonic motion. At what point in the displacement will the energy be half kinetic and half potential?
5. State parallel axes theorem.
6. What is flywheel? What are the uses of flywheel?
7. What is the neutral axis or neutral surface of a bend beam?
8. Graphically represent the relation between the distance between the knife edges l and depression δ at the middle of a beam loaded in the middle and supported by two knife edges.
9. What is the effect of length of a wire on its rigidity modulus?
10. What is the significance of critical velocity in fluid dynamics?
11. Prove that equation of continuity in hydrodynamics is the law of conservation of mass.

12. What is the effect of temperature on surface tension of water?

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. A tunning fork of unknown frequency gives 4 beats per second when sounded with a fork of frequency 320 Hz. When loaded with a little wax gives 3 beats per second. Find the unknown frequency.

14. A wire 0.9 m long and mass 1.2 gm is makes 256 vibrations per second when under a tension in air using a brass bar. When it is immersed in water, the length of the vibrating string has to be reduced by 5.4 cm to get the original frequency. Find the density of the brass bar.

15. The amplitude of an underdamped harmonic oscillator was reduced to 1/10th of its initial value after 100 oscillations. If its period is 1.15 s, calculate (a) the damping constant (b) the relaxation time.

16. Obtain the expression for moment of inertia of a rigid body of mass m about any axis which is at a distance 'a' from the centre of mass.

17. A circular ring has mass 120g, and radius 10cm. Determine its moment of inertia (a) about a diameter and (b) about an axis passing through its centre and perpendicular to its plane.

18. One end of a uniform wire of length L and of weight W1 is attached rigidly to a point in the roof and a weight W2 is suspended from its lower end. If A is the area of cross-section of the wire, calculate the stress in the wire at a height (3/4)L from its lower end.

19. Calculate the work done in twisting a wire of radius 1mm and length of 25cm through an angle of 450. Given the rigidity modulus of steel is $8\times10^{10}N/m^2$.

20. Calculate the mass of water flowing in 10 seconds through a horizontal capillary tube of circular cross-section of radius 1mm. The tube is fitted at the bottom of a constant level tank at a depth of 1m. Length of the tube is 30cm.

21. Height of water column in two limbs of a venturimeter differs by 0.1m. The diameters of the main pipe where the two limbs connected are 0.2m and 0.15m. Calculate the rate of flow of water through the main pipe.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. Obatin the period of oscillations of a compound pendulum and also discuss its minima and maxima conditions.

23. Show that the moment of inertia of a solid cylinder about its axis is 1/2 MR^2 and the moment of inertia about an axis passing through the centre of mass and perpendicular to its length is M ($R^2/4 + l^2/12$).

24. Derive the expression for the elevation at the middle of a symmetrically loaded beam.

25. Prove that the excess pressure inside a bubble is double that inside a liquid drop by deriving the expression for the excess pressure.

(2×10=20)