QP CODE: 23124541

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, MAY 2023

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

17B76B20

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. How are the mechanical waves broadly classified? Give an example each.
2. What does the differential equation for a one-dimensional wave travelling along the positive x-direction signify?
3. What do you understand by fundamental frequency in strings?
4. Write down the expression for the differential equation of a simple harmonic motion and explain its symbols.
5. Define angular displacement. Give its unit.
6. Write down the expression for moment inertia of a solid sphere about its diameter.
7. What happens when the stress applied to the body is increased beyond the elastic limit and is removed after some time?
8. Define bending moment.
9. Define flexural rigidity.
10. Explain a method to introduce torsion in a small cylindrical rod.
11. What is meant by torsional oscillations?
12. Define coefficient of viscosity. What is its unit?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. The frequency of the tunning fork B is 512 Hz. It is sounded with another tunning fork A, so that 4 beats are heard. Find the frequency of the tunning fork A if it is filled and when sounded with B, beats occur at shorter intervals.

14. A mass of 2 kg oscillating on a spring with constant 4 N/m passes through its equilibrium point with a velocity of 8 m/s. What is the energy of the system at this point? From your answer derive the maximum displacement, xm of the mass.

15. A metal disc of radius r and mass m oscillates in its own plane about an axis passing through a point on its edge. Calculate the length of the equivalent simple pendulum.

16. A uniform meter scale has a mass 150g. What is its moment of inertia if the scale is rotated about its axis perpendicular to its length and passes through (a) the centre and (b) the 75cm mark?

17. Calculate the torque applied to a flywheel having M.I about its axis of rotation as 200 kgm^2, to increase the angular velocity by 10 rad/s in 2s from its rest position.

18. A rod having a diameter of 1.26cm is placed on two knife edges separated by a distance of 0.7m. A load of 0.9kg is hanged on the road at its midpoint and the corresponding depression is 0.025cm. Calculate the Young's modulus of the material of the rod.

19. A large bottle is fitted with a siphon made of capillary glass tubing. Compare the coefficient of viscosity of water and petrol if the time taken to empty the bottle in the two cases is in the ratio 2:5. Density of petrol is 0.8 times that of water.

20. A liquid drop of radius R breaks up into 64 small drops having a radius r. Calculate the change in energy.

21. Calculate the work done in blowing a soap bubble of radius 1cm to 10cm? Surface tension of soap solution = 0.026N/m.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. Write down the differential equation of a damped harmonic oscillator. Discuss the solution to the equation and the three conditions surrounding it.

23. State and prove parallel axis and perpendicular axis theorem.

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

25. State Bernoulli's Theorem and derive the Bernoulli's equation.

(2×10=20)