QP CODE: 20101108

20101108

Reg No : ....

Name : ....

B.Sc. DEGREE (CBCS) EXAMINATION, NOVEMBER 2020

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

B1D2D6E9

Time: 3 Hours | Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. What do you understand by a stationary wave?
2. What is the source of sound behind musical instruments like guitar and violin?
3. Given an object oscillating horizontally in simple harmonic motion, where in the course of its motion are the magnitudes of potential energy and kinetic energy equal to zero? Where do they become equal and have their maximum value?
4. What is meant by resonance?
5. Write down the expression for moment inertia of a annular disc about an axis passing through its centre and perpendicular to its plane. And explain the terms.
6. Write down the expression for moment inertia of a solid sphere about its diameter
7. Write down the expression for work done in deforming a body under longitudinal strain.
8. Distinguish between uniform and non-uniform bending of beams.
9. Explain streamline flow of a liquid.
10. Define coefficient of viscosity. What is its unit?
11. What is the role of temperature in washing clothes?
12. Why the excess pressure inside a bubble is double that inside a liquid drop?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. The wavelength of sound wave in air is 0.25m. Find its wavelength in metal rod. Velocity of sound in air is 345 m/s and in metals is 4850 m/s. Also find the corresponding frequencies in air and metal rod.

14. A musical instrument emits a sound of frequency 512 Hz with an amplitude 10^{-4} m. Calculate the energy flux, if the speed of sound in air is 332 m/s and density of air is 1.29 kg/m^3

15. A square board of side 4m is joined along its upper edge and oscillates in a vertical plane. Calculate its period of oscillation.

16. Prove parallel axis theorem

17. A thin cord is wound 3 times on the axle of a flywheel. A mass of 2kg is suspended from its free end which is at a height of 25cm from the ground. The flywheel makes 20 revolutions in 4 sec after the chord slips from the peg. If the radius of the axle is 1.0cm. Find the M.I of the wheel about its axle.

18. A metal plate having 1cm thickness is 1m in breadth and 1m in length. One face of the large area is fixed and a tangential force is applied to the opposite face. The displacement of the edge produced thereby is 0.005cm. Find the shearing stress, strain and magnitude of the tangential force applied. Modulus of rigidity of the metal is 8.4×10^{10} Nm^{-2}.

19. A square bar of length 1m and cross section 1cm^2 is clamped horizontally at one end and a weight of 1kg is applied at the other end. Neglecting weight of the bar, calculate the depression at the loaded end. Given Young's modulus of the material of the bar = 9.78×10^{10}N/m^2 and g = 9.78m/s^2.

20. Two capillaries of radii R_1 and R_2 and length L_1 and L_2 are joined in series. If P_1 and P_2 are the pressure difference between the ends of the first and second capillary tubes, derive an expression for the rate of flow of the liquid through the arrangement using Poiseuille's formula.

21. In a horizontal pipe line of uniform area of cross section, the pressure falls by 5Nm^{-2} between two points separated by a distance of 1km. What is the change in kinetic energy per kg of the oil flowing at these points? Density of oil = 800kg/m^3.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. What do you understand by a periodic motion? Are all periodic motions oscillatory, give reasons. What are the charteristics of a simple harmonic motion, frame the differential equation for the same and thus obtain its solution. Discuss conditions of velocity and acceleration atthe mean and extreme positions.

23. Define the following and give their formula and explain: i. Angular velocity ii. angular acceleration iii. angular momentum iv. Torque v. moment of inertia

24. Derive the expression for moment of torsional couple for a cylindrical rod. Also explain how static torsion apparatus can be used to measure the rigidity modulus of the material of the rod.

25. Discuss the static torsion method and torsion pendulum method to measure the rigidity modulus of a material.

(2×10=20)