QP CODE: 26020949

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Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REAPPEARANCE/ MERCY CHANCE EXAMINATIONS, APRIL 2026

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

8D1DAF6E

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

Each question carries 1 mark.

1. What does the differential equation for a one-dimensional wave travelling along the positive x-direction signify?
2. Describe with a diagran nodes and anti nodes.
3. What do you understand by fundamental frequency in strings?
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. Define radius of gyration associated with a rotating body.
6. Discuss the anlogy between translatory and rotatory motions.
7. Write down the expression for work done in deforming a body under volume strain.

8. Graphically represent the relation between the distance between the knife edges l and elevation δ at the middle of a beam supported by two knife edges and symmetrically loaded.

9. What is a cantilever?

10. Nowadays rectangular steel pipes are commonly used for construction purpose. Why?

11. Explain a method to introduce torsion in a small cylindrical rod.

12. Explain streamline flow of a liquid.

(10×1=10)

Part B

*Answer any **six** questions.*
*Each question carries **5** marks.*

13. A particle executes simple harmonic motion. Its velocity at the equilibrium position is 9 cm/s and makes 90 oscillations per minute. Find the length of the path of the particle and its velocity at a point midway between the equilibrium and extreme position.

14. Obtain the maximum and minimum time periods of a compound pendulum.

15. Calculate the time in which the amplitude of the damped harmonic oscillator having damping constant 0.02 is reduced to 1/e2 of its original value .

16. A circular metal ring has a mass 1 kg and radius 30cm. It makes 10 revolutions per second about an axis passing through the centre and normal to its plane of the hoop. A.) Find the M.I about the axis B.) Angular momentum about the axis C) Torque required to increase the angular momentum by 25% in 10sec and D) The tangential force required to produce the above torque on the rim of the ring.

17. Show that the moment of inertia of a solid sphere about a tangent is 7/5 MR^2.where M and R are the mass and radius of the sphere.

18. The modulus of rigidity and Poisson's ratio of the material of a wire are $2.87\times10^{11}N/m^2$ and 0.379 respectively. Calculate the value of Young's modulus and bulk modulus of the material.

19. A metal plate$100cm^2$ in area rests on a layer of castor oil 2mm thick whose coefficient of viscosity is 1.55 Nsm^{-2}. Calculate the horizontal force required to move the plate with a speed of $0.03ms^{-1}$.

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. A sphere of water of radius 0.1mm is sprayed into a million drops, all of the same size. Find the energy expended in doing so. Surface tension of water is 0.072N/m.

(6×5=30)

Part C

*Answer any **two** questions.*
*Each question carries **10** marks.*

22. What are the different types of mechanical waves? Explain. Given a wave what all can you find from it. With Give proper diagram and explain.

23. State parallel and perpendicular axis theorems. Derive the expression for moment of inertia of a straight rod about an axis passing through its centre and perpendicular to its 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 a water drop.

(2×10=20)