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Reg. No. : .....

Code No. : 10432 E **Sub. Code : CMPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2023

First Semester

Physics — Core

PROPERTIES OF MATTERS AND MECHANICS

(For those who joined in July 2021 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Stress = ————

(a) Force/Volume (b) Force/Area

(c) Volume/Force (d) Area/Force

2. The unit for elastic modulus is ————

(a) N/m (b) Nm

(c) N/m^2 (d) Nm^2

3. The layer of a beam which is neither elongated nor contracted is known as ————

(a) neutral layer (b) bending layer

(c) bending axis (d) none of the above

4. In a beam

(a) length is very large compared to its breadth and thickness

(b) length is same as thickness

(c) length is less than thickness

(d) none of the above

5. The dimension of surface tension is

(a) MLT^{-2} (b) MLT^{-3}

(c) MT^{-2} (d) ML^2T^{-2}

6. If the pressure head is large, the resultant motion of the liquid in a narrow tube is

(a) stream lined motion

(b) turbulent motion

(c) steady motion

(d) none of the above

7. The motion of a wheel is an example of ——— motion.

(a) translational (b) rotational

(c) elliptical (d) none of the above

8. An unbalanced torque is the cause of ———

(a) Vibrational motion

(b) Translational motion

(c) Rotational motion

(d) None of the above

9. The pressure of an ideal fluid is ——— in all directions when the fluid is in motion.

(a) different

(b) same

(c) sometimes same sometimes different

(d) none of the above

10. Bouyancy is ——— force.

(a) an upward (b) a downward

(c) a neutral (d) none of the above

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Explain stress-strain diagram.

Or

(b) Find an expression for the work done in streching a wire.

12. (a) Derive an expression for the internal bending moment of a bar.

Or

(b) Determine the Young's modulus of the material of a bar by uniform bending.

13. (a) Explain the variation of surface tension with viscosity using Jaegar's method.

Or

(b) Describe Quincke's method of determining surface tension and angle of contact of mercury with glass.

14. (a) Give the period of oscillation of a compound pendulum.

Or

(b) Prove that rotational kinetic energy, $T = 1/2Iw^2$.

15. (a) Calculate the thrust on a plane surface immersed in a liquid at rest.

Or

(b) Give the difference between streamlined and turbulent motion.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Describe with necessary theory, how to determine the rigidity modulus of a wire experimentally using torsion pendulum.

Or

(b) Determine the rigidity modulus of the material for a rod by static torsion method.

17. (a) Derive an expression for the depression at the loaded end of a cantilever.

Or

(b) Explain with theory, the experiment to determine the Young's modulus of the material of a bar by non-uniform bending.

18. (a) Obtain an expression for the excess of pressure in a synclastic and anticlastic surface.

Or

(b) Derive Poiseuille's formula for the rate of flow of the liquid in a capillary tube.

19. (a) Obtain an expression for moment of inertia and radius of gyration of a rotating rigid body.

Or

(b) Derive an expression for acceleration of a uniform body rolling down an inclined plane.

20. (a) Define metacentric height. Explain how metacentric height of a ship could be determined.

Or

(b) Explain how Bernoulli's theorem is applicable to Pitot's tube for measurement of velocity of fluid flow in a horizontal pipe.

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