

(6 pages)

Reg. No. :

Code No. : 33004 E Sub. Code : AMPH 11

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

First Semester

Physics – Core

PROPERTIES OF MATTER AND MECHANICS

(For those who joined in July 2020 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. The unit for strain is _____
(a) N/m^2 (b) Nm^2
(c) N/m (d) No unit
2. When a wire elongates along the length, its radius?
(a) increases (b) decreases
(c) no change (d) none of the above

3. In the case of bending of a rod
- (a) Young's modulus comes into play
 - (b) Rigidity modulus comes into play
 - (c) Bulk modulus comes into play
 - (d) None of the above
4. Shearing strain is also known as _____
- (a) angle of twist (b) angle of shear
 - (c) angle of strain (d) none
5. As the temperature of a liquid increases, the surface tension of the liquid
- (a) increases
 - (b) decreases
 - (c) no change
 - (d) none of the above
6. In a narrow tube, the velocity of the liquid in contact with the walls is
- (a) zero
 - (b) maximum
 - (c) critical velocity
 - (d) none of the above

7. In a rigid body, the relative position of particles are _____.
- (a) movable
 - (b) fixed
 - (c) change with time
 - (d) none of the above
8. Power, $P =$
- (a) $\tau \cdot w$
 - (b) $\tau \cdot \gamma$
 - (c) $I \cdot \omega$
 - (d) $I \cdot w$
9. High pressure is expressed in
- (a) Pascal
 - (b) N/m^2
 - (c) Bar
 - (d) None of the above
10. The flow of liquid through a pipe is streamlined
- (a) above critical velocity
 - (b) below critical velocity
 - (c) at critical velocity
 - (d) none of the above

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain Bulk modulus and Poisson's ratio.

Or

- (b) Obtain an expression for the couple per unit twist.

12. (a) Derive an expression for the depression at the mid point of a beam subjected to non-uniform bending.

Or

- (b) Determine the period of oscillation of a cantilever.

13. (a) Write a short notes on lubricants.

Or

- (b) Derive the expression for the excess of pressure in a soap bubble.

14. (a) Derive an expression for the kinetic energy of a rotating object.

Or

- (b) Define equivalent simple pendulum. Show that the center of suspension and centre of oscillations are interchangeable.

15. (a) Derive an expression for centre of pressure in a liquid.

Or

- (b) Obtain the equation of continuity of flow of liquid.

PART C — ($5 \times 8 = 40$ marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Describe an experiment with necessary theory to determine the Poisson's ratio of rubber.

Or

- (b) Find an expression for the work done in twisting a wire. Also find the expression for the period of oscillation of a torsion pendulum.

17. (a) Describe with theory, the oscillation method to determine the Young's modulus for the material of a cantilever.

Or

- (b) Describe the relevant theory, an experiment to determine the Young's modulus of the material of a bar by uniform bending.

18. (a) Describe Poiseuille's method for determining the coefficient of viscosity of a liquid.

Or

- (b) Describe Jaeger's method to study the variation of surface tension of water with temperature.
19. (a) State and explain Newton's second law for rotation. Prove that $T = I \cdot \alpha$.

Or

- (b) Explain with neat diagram, precessional motion. Derive an expression for precession velocity.
20. (a) State and prove Bernoulli's theorem.

Or

- (b) Derive the position of the centre of pressure of a vertical rectangular lamina and vertical triangular lamina immersed vertically in a liquid at rest.
