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Reg. No. :

Code No. : 20389 E Sub. Code : CMPH 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

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. The expression for stress is _____

($F \rightarrow$ Force, $A \rightarrow$ Area)

- (a) F/A (b) A/F
(c) $F.A.$ (d) None

2. The rise in temperature of a metal _____ the elasticity.

- (a) Increases (b) Decreases
(c) Constant (d) None

3. When a beam is bending, the surface which does not undergo any change is _____

- (a) Neutral surface
(b) Flat surface
(c) Cross-sectional surface
(d) None of these

4. A beam is a rod whose length is _____ thickness.

- (a) Lesser than
(b) Greater than
(c) Much greater than
(d) None of these

5. The viscous forces, F is

- (a) $6\pi \eta r v$ (b) $6\pi \eta r^2 v$
(c) $6\pi \eta r^2 v^2$ (d) $6\pi \eta r v^2$

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6. The lubricants have _____ coefficient of Viscosities.

- (a) Low (b) Negative
(c) High (d) None of these

7. The unit of angular momentum is

- (a) $kg.m.s^{-1}$ (b) $kg.m^2.s^{-1}$
(c) $kg^{-1}.m^2.s$ (d) $kg.m^{-2}.s^{-1}$

8. Work is a _____ quantity.

- (a) Vector (b) Scalar
(c) Vector and scalar (d) None of these

9. The working principle of a rocket is based on

- (a) Newton's first law of motion
(b) Newton's second law of motion
(c) Newton's third law of motion
(d) None of these

10. The Ventriometer works on the principle of _____

- (a) Bernoulli's theorem
(b) Boyle's law
(c) Newton's third law
(d) None of these

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PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) A steel wire 5m long and of diameter 5mm is stretched by a load of 5kg. Find the elongation of the wire. Young's modulus $q = 2.4 \times 10^{11}$ Pascal; $g = 9.8 ms^{-2}$.

Or

- (b) Write a short note on torsional Oscillations of a body.

12. (a) Distinguish uniform and non-uniform bending.

Or

- (b) Derive an expression for the depression of a cantilever.

13. (a) What are the applications of a capillary rise?

Or

- (b) Derive an expression for excess of pressure of a spherical bubble.

14. (a) State and explain work-energy theorem.

Or

- (b) State and explain the types of energy.

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15. (a) Derive an expression for the centre of pressure on a triangular lamina.

Or

- (b) Explain the determination of meta-centric height of a ship.

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) Obtain the relation between the elastic constants.

Or

- (b) Describe the experiment to find the Young's modulus of a given bar using uniform bending.

17. (a) Explain the determination of Young's modulus using Cantilever.

Or

- (b) Derive an expression for the Young's modulus of a beam by non-uniform bending.

18. (a) Define : excess of pressure. Explain the applications of excess of pressure to soap bubbles.

Or

- (b) Derive the Poiseuille's formula for the coefficient of viscosity of a liquid.

19. (a) Define : Work and energy. State and prove work-energy theorem.

Or

- (b) Derive an expression for the moment of inertia of a diatomic molecule and its rotational kinetic energy.

20. (a) State and prove Bernoulli's theorem.

Or

- (b) Explain the working of Pitot's tube.

