

(6 pages)

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 — ( $10 \times 1 = 10$  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)  $6\pi \eta r v^2$

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

PART B — (5 × 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.
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