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Reg. No. : .....

Code No. : 41314 E Sub. Code : SMPH 12

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2018.

First Semester

Physics — Main

PROPERTIES OF MATTER AND ACOUSTICS

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Rigidity modulus ( $n$ ) is the ratio between \_\_\_\_\_ and \_\_\_\_\_

- (a) linear stress and linear strain
- (b) volume stress and volume strain
- (c) tangential stress and shearing strain
- (d) none

2. The unit for elastic modulus is
- (a)  $\text{Nm}^{-2}$
  - (b)  $\text{Nm}^{-1}$
  - (c)  $\text{Nm}^2$
  - (d) none
3. The bending moment produced in a beam is \_\_\_\_\_ to moment of inertia
- (a) directly proportional
  - (b) inversely proportional
  - (c) equal
  - (d) none
4. In non-uniform bending the depression ( $\delta$ ) is related to thickness ( $d$ ) of the beam by
- (a)  $\delta \propto \frac{1}{d}$
  - (b)  $\propto d$
  - (c)  $\delta \propto \frac{1}{d^3}$
  - (d) none
5. Soap bubble is spherical due to
- (a) viscosity
  - (b) elasticity
  - (c) surface tension
  - (d) none
6. The coefficient of viscosity of lubricants should be \_\_\_\_\_
- (a) zero
  - (b) low
  - (c) high
  - (d) none



7. The third law of transverse vibrations of strings state that, the frequency is inversely proportional to \_\_\_\_\_ of linear density (when  $\mu$  and  $T$  are constants)
- (a) square (b) square root  
(c) cube (d) none
8. The distance between two successive anti-nodes is \_\_\_\_\_
- (a)  $\lambda$  (b)  $\lambda/4$   
(c)  $\pi/2$  (d) 0
9. The loudness of sound is measured in \_\_\_\_\_
- (a) decibel (b) pascal  
(c) coulomb (d) none
10. The frequency range of ultrasonic waves is \_\_\_\_\_
- (a) below 20Hz  
(b) above 20000 Hz  
(c) 20 Hz to 20000Hz  
(d) none

PART B — ( $5 \times 5 = 25$  marks)

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

Answer should not exceed 250 words.

11. (a) Define the three elastic moduli.  
Or  
(b) Derive the expression for work done in twisting a wire.
12. (a) Derive the expression for the bending moment of beam.  
Or  
(b) Compare uniform bending and non-uniform bending.
13. (a) Define surface tension. Derive its unit.  
Or  
(b) Write short note on lubricants.
14. (a) Define simple harmonic motion. What are the characteristics of simple harmonic motion?  
Or  
(b) State and explain the laws of transverse vibrations of strings.



15. (a) Explain any one of the method of detecting ultrasonic waves.

Or

- (b) Give any five factors which are affecting the acoustics of buildings.

PART C — ( $5 \times 8 = 40$  marks)

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

Answer should not exceeding 600 words.

16. (a) Derive the relation between three elastic moduli.

Or

- (b) Explain the determination of rigidity modulus using torsion pendulum.

17. (a) Describe the pin and microscope experiment for the determination of young's modulus of a beam by uniform bending method.

Or

- (b) What is a cantilever? Derive the expression for the depression of a cantilever.

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18. (a) Explain the determination of surface tension by capillary rise method.

Or

- (b) Explain the determination of viscosity of a liquid by capillary flow method.

19. (a) Explain the determination of A.C. frequency using sonometer.

Or

- (b) Explain Melde's string method of determining the frequency of a tuning fork by longitudinal mode.

20. (a) Explain the production of ultrasonic waves by magnetostriction method.

Or

- (b) Derive Sabine's formula for the reverberation time.

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