

(6 pages)

Reg. No. :

Code No. : 30744 E Sub. Code : EMPH 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2024.

First Semester

Physics — Core

PROPERTIES OF MATTER AND ACOUSTICS

(For those who joined in July 2023 onwards)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer.

1. The unit of strain _____.
(a) N/m^2 (b) Nm
(c) No unit (d) N^2m
2. The Young's modulus for a perfect rigid body is
(a) 0 (b) 1
(c) 0.5 (d) infinity

3. In uniform bending, the elevation (y) is related to Young's modulus (q) by the relation
(a) $y \propto q$ (b) $y \propto q^2$
(c) $y \propto \frac{1}{q}$ (d) none
4. The least count of a traveling microscope is
(a) 0.1 cm (b) 0.01 cm
(c) 0.001 cm (d) 0.0001 cm
5. The force between the like molecules which holds the liquid together is called _____.
(a) cohesive force
(b) adhesive force
(c) sphere of influence
(d) none
6. The unit for coefficient of viscosity is
(a) Nsm^{-2} (b) Nsm^{-1}
(c) Nsm^2 (d) None
7. In simple harmonic motion, the displacement $y =$
(a) $A^2 \sin \omega t$ (b) $A \sin \omega t$
(c) $A^3 \sin \omega t$ (d) $\sin \omega t$

8. The S.I. unit for frequency is

- (a) second
- (b) Hertz
- (c) (second)²
- (d) none

9. Our ear can detect the sound with intensity level ranges from

- (a) $10^{-2} Wm^{-2}$ to $20 Wm^{-2}$
- (b) $10^{-2} Wm^{-2}$ to $10 Wm^{-2}$
- (c) $1^{-2} Wm^{-2}$ to $20 Wm^{-2}$
- (d) $10 Wm^{-2}$ to $20 Wm^{-2}$

10. The frequency range of ultrasonic waves is

- (a) below 20 Hz
- (b) above 20000 Hz
- (c) 20 Hz to 20000 Hz
- (d) none

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) Define Hooke's law. Write a short note on Stress-strain diagram.

Or

(b) Derive the expression for twisting couple on a cylinder.

12. (a) Derive an expression for oscillations of a Cantilever.

Or

(b) Explain the determination of Young's modulus by Koenig's method.

13. (a) Explain the variation of surface tension of a liquid with temperature.

Or

(b) Define :

- (i) Streamline flow
- (ii) Turbulent flow.

14. (a) Define : Simple harmonic motion. State the characteristics of Simple harmonic motion.

Or

- (b) State and explain the laws of transverse vibrations of strings.
15. (a) Give any five factors which are affecting the acoustics of buildings.

Or

- (b) Describe the application of ultrasonic waves.

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) Explain the determination of rigidity modulus using static torsion.

Or

- (b) Describe the determination of rigidity modulus using torsion pendulum (with masses)

Page 5 Code No. : 30744 E

17. (a) Describe the pin and microscope experiment for the determination of Young's modulus of a beam by Non-Uniform bending method.

Or

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

18. (a) Explain the Jaeger's method of studying the effect of temperature on Surface tension.

Or

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

19. (a) Explain in detail of damped vibrations.

Or

- (b) Explain the determination of A.C. frequency using sonometer.

20. (a) Derive Sabine's formula for the reverberation time.

Or

- (b) Explain the production of ultrasonic waves by Piezo - electric method.

Page 6 Code No. : 30744 E