Reg. No. : _____

(6 pages)

Code No. : 20658 E **Sub. Code : EMPH 11**

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2023.

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 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which law is also called as the elasticity law?
   (a) Bernoulli's law
   (b) Stress law
   (c) Hooke's law
   (d) Poisson's law

2. As the elastic limit reaches, tensile strain _____
   (a) Increases more rapidly
   (b) Decreases more rapidly
   (c) Increases in proportion to the stress
   (d) Decreases in proportion to the stress

3. In cantilever beam the deflection occurs at _____
   (a) Free end
   (b) Point of loading
   (c) Through out
   (d) Fixed end

4. At the neutral axis bending stress is
   (a) minimum (b) maximum
   (c) zero (d) constant

5. Raindrops are spherical in shape because of
   (a) Capillary
   (b) Surface Tension
   (c) Downward motion
   (d) Acceleration due to gravity

6. What is the SI unit of viscosity?
   (a) Candela (b) Poiseiulle
   (c) Newton/m (d) No units

7. Motion of the particle is
   (a) Simple Harmonic Motion (SHM)
   (b) Non uniform
   (c) Periodic
   (d) Straight line

8. In SHM, what is the phase difference between velocity and acceleration?
   (a) 0 (b) π
   (c) $\pi/2$ (d) $\pi/3$

9. Velocity of sound in air
   (a) 300 m (b) 330 m/s
   (c) 1130 m/s (d) 340 m/s

10. Required time for any sound to decay to 60dB
    (a) a Echo time
    (b) Delay time
    (c) Reverberation time
    (d) Transient time

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Obtain an expression for Poisson ratio in terms of elastic constants.

Or

(b) Derive the expression for the period of oscillation of a torsion pendulum.

12. (a) Derive an expression for bending moment.

Or

(b) Describe the experiment to determine Young's modulus using microscope.

13. (a) Derive the expression for excess of pressure inside a cylindrical bubble.

Or

(b) Discuss the effect of temperature and pressure on viscosity.

14. (a) Explain the theory of forced vibrations. Write a note on resonance and sharpness of resonance.

Or

(b) Explain the method of finding the frequency of a tuning fork using a Sonometer.

15. (a) Describe the factors affecting the acoustics of buildings.

Or

(b) State the various applications of Ultrasonic waves.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Explain three moduli of Elasticity.

Or

(b) Determine rigidity modulus of a rod by using Static torsion.

17. (a) Derive an expression for depression at the loaded end of the cantilever.

Or

(b) Describe an experiment to determine Young's modulus of a bar by non uniform bending method.

18. (a) Describe Jaegers method of studying the variation of surface tension of water with temperature.

Or

(b) Derive Poiseuilles formula for the rate of flow of a liquid through a capillary tube.

19. (a) What are Lissajous figures? Describe how they are produced.

Or

(b) What is Damped and Undamped vibrations? Derive the differential equation and general solution of damped harmonic motion

20. (a) Obtain Sabine's reverberation formula.

Or

(b) What is Piezoelectric effect? Explain the production of Ultrasonic waves.

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