(6 pages) **Reg. No. :** .....

Code No. : 30940 E **Sub. Code : FCPH 11**

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

First Semester

Physics — Core

PROPERTIES OF MATTER AND ACOUSTICS

(For those who joined in July 2024 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following represents Hooke's law?

   (a) Stress = $K \times$ Strain

   (b) $\frac{\sqrt{\text{Stress}}}{\text{Strain}} = K$

   (c) Stress = $K \times$ (Strain)^2

   (d) Stress^2 = $K \times$ Strain

2. A solid cylinder can be subjected to

   (a) tensile stress

   (b) compressive stress

   (c) shearing stress

   (d) all the above

3. At the neutral axis bending stress is

   (a) Minimum (b) Maximum

   (c) Zero (d) Constant

4. Curvature of the beam is _____ to bending moment.

   (a) Equal

   (b) Directly proportional

   (c) Inversely proportional

   (d) Coincides

5. When a soap bubble is charged

   (a) it contracts

   (b) it expands

   (c) it does not undergo any change in size

   (d) both (a) and (b)

6. The SI unit of Viscosity is

(a) Candela (b) Poiseiulle

(c) Newton/metre (d) Nm^{-2}

7. In SHM when the particle is at mean position at that time the acceleration is

(a) one (b) two

(c) three (d) zero

8. Maximum displacement is called

(a) Amplitude (b) Velocity

(c) Oscillation (d) Time

9. The number of compressions or rarefractions per unit time gives

(a) Frequency (b) Time period

(c) Amplitude (d) Pitch

10. The principle for measurement of the velocity of ultrasonic waves

(a) Magnetostriction effect

(b) Acoustical grating

(c) Doppler effect

(d) Acceleration effect

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Obtain relation between elastic constant.

Or

(b) Derive an expression for work done in stretching a wire.

12. (a) Explain the term neutral axis and bending moment. Find an expression for the bending moment.

Or

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

13. (a) Define surface tension of a liquid. How is surface tension explained by molecular theory?

Or

(b) Derive Stoke's formula.

14. (a) Define simple harmonic motion. State its equation.

Or

(b) State the Laws of transverse vibration of strings.

15. (a) Define the intensity of sound wave and derive the expression for the same.

Or

(b) Write any four application of ultrasonics.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Explain stress, strain and Hooke's law.

Or

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

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

Or

(b) Describe the method of finding the Young's modulus by non uniform bending.

18. (a) Obtain an expression for the excess of pressure in a spherical bubble.

Or

(b) Derive Poiseuille's formula by the method of dimensions.

19. (a) Describe the composition of two SHM of equal time periods at right angles.

Or

(b) Explain resonance and sharpness of resonance.

20. (a) Define Reverberation. Discuss the factors that affect the acoustics of buildings.

Or

(b) Explain the production of ultrasonic waves by piezoelectric method.

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