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Reg. No. :

Code No. : 30747 E Sub. Code : EEPH 11

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

First/Third Semester

Physics — Elective

ALLIED PHYSICS – I

(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. Time period of a simple harmonic motion is

- (a) $T = \frac{1}{2\pi} \sqrt{\frac{\text{Displacement}}{\text{Acceleration}}}$
- (b) $T = 2\pi \sqrt{\frac{\text{Displacement}}{\text{Acceleration}}}$
- (c) $T = \frac{1}{2\pi} \sqrt{\frac{\text{Acceleration}}{\text{Displacement}}}$
- (d) $T = 2\pi \sqrt{\frac{\text{Acceleration}}{\text{Displacement}}}$

2. Ultrasonic waves produce _____ effect when passed through a substance.

- (a) Cooling (b) Electric
- (c) Heating (d) Magnetic

3. Shearing strain results, when a body is subjected to

- (a) Increase in length
- (b) Increase in area
- (c) Increase in volume
- (d) Change of shape

4. Surface tension is the ratio of

- (a) $\frac{\text{Force}}{\text{Length}}$ (b) $\frac{\text{Force}}{\text{Volume}}$
- (c) $\frac{\text{Length}}{\text{Force}}$ (d) $\frac{\text{Force}}{\text{Area}}$

5. The inversion temperature $T_i =$ _____

- (a) $\frac{2a}{R}$ (b) $\frac{2a}{Rb}$
- (c) $2a$ (d) $\frac{2a}{b}$

6. Efficiency of carnot engine

- (a) $1 + \frac{T_1}{T_2}$ (b) $1 + \frac{T_2}{T_1}$
(c) $1 - \frac{T_2}{T_1}$ (d) $1 - \frac{T_1}{T_2}$

7. Example for good conductor is

- (a) plastic (b) ebonite
(c) wood (d) copper

8. Form factor = _____

- (a) $\frac{I_{rms}}{I}$ (b) $\frac{I_{rms}}{I_{mean}}$
(c) $\frac{I_{mean}}{I_{rms}}$ (d) $I_{rms} \times I_{mean}$

9. The basic logic gate is

- (a) NOR (b) NAND
(c) X-OR (d) OR

10. The Boolean expression $\overline{AB}$ is

- (a) $\overline{A} + \overline{B}$ (b) $\overline{A} - \overline{B}$
(c) $\overline{A} \cdot \overline{B}$ (d) $\overline{A \cdot B}$

PART B — (5 × 5 = 25 marks)

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

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

Or

- (b) Give any five applications of ultrasonic waves.

12. (a) Derive the expression for bending moment of a beam.

Or

- (b) Define co-efficient of viscosity. Find the dimension for viscosity.

13. (a) State and explain first and second laws of thermodynamics.

Or

- (b) Briefly explain about Carnot's cycle.

14. (a) Define Biot – Savart's law.

Or

- (b) Explain power factor.

15. (a) Describe the operation of NOR and EX-OR gates.

Or

- (b) Simplify $F = A(B + C)(A + B + C)$ ABC using Boolean algebra.

PART C — ($5 \times 8 = 40$ marks)

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

16. (a) State and explain laws of transverse vibrations of a string.

Or

- (b) Explain the determination of a.c. frequency using sonometer.

17. (a) Describe the method to determine the rigidity modulus by torsion pendulum.

Or

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

18. (a) Explain Joule – Kelvin effect.

Or

- (b) Explain the theory of porous plug experiment.

19. (a) Describe the method of measuring thermoe.m.f. of a thermocouple using potentiometer.

Or

- (b) Explain about the RMS and peak values.

20. (a) Explain universal building blocks.

Or

- (b) Verify De Morgan's theorem.