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Reg. No. :

Code No. : 20304 E Sub. Code : CAPH 11

B.Sc. (CBCS) DEGREE EXAMINATION,
APRIL 2025.

First/Third Semester

Physics — Allied

ALLIED PHYSICS — I

(For those who joined in July 2021 and 2022 only)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer :

1. A liquid has only _____
- (a) Shear modulus
 - (b) Young's modulus
 - (c) Bulk modulus
 - (d) All the above

2. Which of the following substances has the highest elasticity?

- (a) rubber
- (b) copper
- (c) sponge
- (d) steel

3. The rise of liquid in a capillary tube is due to

- (a) viscosity
- (b) osmosis
- (c) diffusion
- (d) surface tension

4. What happens to the viscosity of liquid with increase in temperature?

- (a) it increases
- (b) it decreases
- (c) it may increase or decrease
- (d) no change

5. Sound waves do not travel through _____

- (a) solids
- (b) liquids
- (c) gases
- (d) vacuum

6. For simple harmonic motion, the magnitude of the acceleration is greatest when the _____
- (a) velocity is maximum
 - (b) displacement is maximum
 - (c) displacement is zero
 - (d) force is zero
7. The mean free path of a gas molecule depends on _____
- (a) the number of molecules per unit volume
 - (b) the collision cross section
 - (c) the number of molecules per unit volume and the collision cross section
 - (d) molecular mass
8. Heat conduction in gases is due to _____
- (a) elastic impact of molecules
 - (b) movement of electrons
 - (c) electromagnetic waves
 - (d) mixing of gas

9. Which nature of light is exposed by its diffraction and interference?
- (a) electromagnetic nature
 - (b) wave nature
 - (c) quantum nature
 - (d) longitudinal nature
10. Polarisation is not possible in _____ waves.
- (a) radio waves
 - (b) ultraviolet rays
 - (c) ultrasonic waves
 - (d) light waves

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) State Hooke's law and explain the different elastic moduli.
- Or
- (b) Obtain an expression for work done in stretching a wire. Also estimate the work done in twisting.

12. (a) Explain surface tension with examples.
Or
(b) Give the analogy between liquid flow and current flow.
13. (a) Give the theory of free vibration.
Or
(b) Describe Melde's string experiment to determine the frequency of an electrically maintained tuning fork in longitudinal mode.
14. (a) Write the difference between conduction, convection and radiation.
Or
(b) Define mean free path. Obtain an expression for it.
15. (a) State the conditions of interference.
Or
(b) With the theory, explain the action of quarter wave plate.

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) Derive an expression for the bending moment.
Or
(b) Describe twisting couple of a wire and obtain an expression for couple per unit twist.
17. (a) Explain the Stoke's experiment to determine the viscosity of a highly viscous liquid.
Or
(b) Derive Poiseuille's formula for the rate of flow of the liquid in a capillary tube.
18. (a) Explain the theory of forced vibration and discuss the sharpness of resonance.
Or
(b) Arrive at the resultant of two SHM's acting along the same direction.

19. (a) Derive an expression for coefficient of viscosity of a gas based on kinetic theory of gases.

Or

- (b) State and prove Newton's law of cooling.
20. (a) Discuss the theory of diffraction grating. Describe the experiment to determine the wavelength of mercury spectrum using it.

Or

- (b) Describe the production and detection of a plane, elliptically and circularly polarised light.
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