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Reg. No. :

Code No. : 10436 E Sub. Code : CAPH 11

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

First/Third Semester

Physics — Allied

ALLIED PHYSICS — I

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. A rod is placed between two fixed supports and it is heated. What type of stress is developed on a rod?
 - (a) compressive stress
 - (b) tensile stress
 - (c) shear stress
 - (d) relative stress

2. The steel is used to make the spring compared to aluminium because _____
 - (a) Steel is cheaper than aluminium
 - (b) Aluminium is more elastic than steel
 - (c) Steel is more elastic than aluminium
 - (d) None of these
3. Which type of fluids have zero surface tension?
 - (a) real fluids
 - (b) ideal fluids
 - (c) both ideal and real fluids
 - (d) no fluids
4. The viscosity of a fluid in motion is 1 poise. What will be its viscosity (in poise) when the fluid is at rest
 - (a) 0
 - (b) 0.5
 - (c) 1
 - (d) 2
5. Periodic vibrations of decreasing amplitude are called _____
 - (a) free vibrations
 - (b) damped vibrations
 - (c) forced vibration
 - (d) none of these

6. For a body moving in simple harmonic motion, the number of cycles per second is known as its _____

- (a) oscillation (b) amplitude
(c) period (d) frequency

7. Heat transfer in liquids and gases are due to _____

- (a) conduction
(b) convection
(c) radiation
(d) conduction as well as convection

8. Most metals are good conductors of heat because of _____

- (a) transport of energy
(b) free electrons and frequent collision
(c) lattice defects
(d) capacity to absorb energy

9. How shall a diffraction pattern change when white light is used instead of a monochromatic light?

- (a) the pattern disappears
(b) the shape of the pattern will change
(c) coloured pattern will be observed
(d) the fringes change position

10. What happens if ordinary unpolarised light is passed through a uniaxial crystal?

- (a) light split into two rays
(b) light remain unaffected
(c) light splits into more than two rays
(d) none of these

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Derive the relation between the three modulus of elasticity.

Or

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

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[P.T.O.]

13. (a) Define surface tension. Explain the molecular interpretation of surface tension.

Or

(b) Derive Stoke's formula by dimension method.

14. (a) Define simple harmonic motion. Derive the expression for time period of the particle in simple harmonic motion.

Or

(b) Describe Melde's string experiment to determine the frequency of an electrically maintained tuning fork in transverse mode.

15. (a) Define mean free path and obtain an expression for it.

Or

(b) Plot the energy distribution of a black body radiation for different temperatures. Also outline the important features of black body spectrum.

16. (a) Compare Fresnel and Fraunhofer diffraction.

Or

(b) Give the theory of Half wave plate.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Obtain an expression for the couple per unit twist. Also estimate the work done in twisting.

Or

(b) Explain a torsion pendulum and using it determine the rigidity modulus of a wire.

17. (a) Determine the expression for the rate of flow of liquid through a capillary tube.

Or

(b) Derive an expression for excess of pressure inside a synclastic and anticlastic surface.

18. (a) Is free vibration exist in practise. Give reasons Derive the expression for damped vibration.

Or

(b) Calculate the resultant of two simple harmonic motions acting in perpendicular direction.

19. (a) Describe Lee's disc experiment to determine the thermal conductivity of a poor conductor.

Or

- (b) State and prove Wiedmann Franz law.

20. (a) Determine the thickness of a thin wire by air wedge method.

Or

- (b) (i) Define interference and double refraction.

- (ii) An wedge shaped film of $\mu = 1.4$ is formed between two glass plates separated at one edge by a very fine wire. when the wedge is illuminated from above by 600 nm light and if the fringe width is 2 mm, calculate the angle of the wedge.