KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

(4 Pages) **Reg. No:……**

Question Code: 26E01211 **Course Code : 24UEPH11**

UG Degree - End Semester Examinations, April 2026

First Semester

B.Sc., PHYSICS

Allied Physics Paper - I

(For those who joined in July 2024 onwards)

Time : 3Hours **Maximum : 75 Marks**

PART – A (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

CO:1 K:2 1. A phase difference of π radian corresponds to a path difference of

(a) λ/4 (b) λ/2

(c) λ (d) 2λ

CO:1 K:2 2. For a stretched string, if the length of the vibrating segment is doubled, the frequency of vibration

(a) Remains the same (b) Will be doubled

(c) Will be reduced by half (d) Increases four times

CO:2 K:2 3. In streamlined flow, the velocity of the liquid in contact with the wall of tube is

(a) Zero (b) Minimum but not zero

(c) Large (d) Infinite

CO:2 K:2 4. The free surface of a liquid tends to acquire minimum area due to

(a) Gravity (b) Viscosity

(c) Fluidity (d) Surface tension

CO:3 K:1 5. According to Van der Waal's gas equation, critical coefficient RT_c/P_cV_c is equal to

(a) 8 (b) 8/3

(c) 8.3 (d) 1

CO:3 K:1 6. Transfer of heat from a body at low temperature to a body at high temperature:

(a) Is impossible
(b) Is possible by keeping both the bodies in contact
(c) Is possible by doing some external work
(d) None of these

CO:4 K:2 7. Which material is commonly used to make the potentiometer wires?

(a) Aluminium
(b) Copper
(c) Constantan
(d) Steel

CO:4 K:2 8. The Root Mean Square(RMS) value of a half-wave rectified sine wave is

(a) I_m
(b) $I_m/2$
(c) $I_m/4$
(d) $I_m/8$

CO:5 K:1 9. One of the following logic gate is also known as coincidence circuit

(a) OR logic
(b) NOT logic
(c) AND logic
(d) NAND logic

CO:5 K:1 10. Where is the Semiconductor laboratory (SCL) located?

(a) Bengaluru
(b) Ahmedabad
(c) Chandigarh
(d) Thiruvananthapuram

PART – B (5 X 5 = 25 Marks)

Answer ALL Questions choosing either (a) or (b).
Answer should not exceed 250 words.

CO:1 K:1 11. (a) State and explain the laws of transverse vibration of stretched strings.

(OR)

(b) What are Lissajou's figures? Give necessary theory to show how they are produced.

CO:2 K:1 12. (a) Define Young's modulus, Rigidity modulus and Bulk modulus of an elastic material.

(OR)

(b) Give the molecular theory explanation of surface tension.

CO:3 K:1 13. (a) What is temperature of inversion? Derive the expression for it.

(OR)

(b) Obtain an expression for the change in entropy in a reversible process.

CO:4 K:1 14. (a) State Biot-Savart's law and obtain its differential form.

(OR)

(b) What are the fuses and circuit breakers used for safety purpose in houses? Explain.

CO:5 K:1 15. (a) What is Exclusive-OR gate? Give its logic symbol, Boolean expression and truth table.

(OR)

(b) State and explain De Morgan's laws.

PART – C (5 X 8 = 40 Marks)

Answer ALL Questions choosing either (a) or (b).
Answer should not exceed 500 words.

CO:1 K:1 16. (a) Define simple harmonic motion. Obtain expression for displacement, velocity and acceleration of a particle executing S.H.M.

(OR)

(b) What are ultrasonic waves? Describe a method of production of ultrasonic waves.

CO:2 K:5 17. (a) Explain how you would determine the rigidity modulus of a wire using torsional pendulum. Derive the formula used.

(OR)

(b) Derive Poiseuille's formula for flow of liquid through a horizontal capillary tube.

CO:3 K:6 18. (a) Describe the Joule-Thomson porous plug experiment. What conclusions have been drawn from it?

(OR)

(b) Describe Carnot's cycle and obtain an expression for the efficiency of an ideal heat engine in terms of temperatures.

CO:4 K:4 19. (a) Explain, with diagram, the measurement of thermo emf using potentiometer.

(OR)

(b) Obtain an expression for power factor and current values in an AC circuit with neat circuit diagram.

CO:5 K:4 20. (a) Describe the basic logic gates. Give their logic symbol, Boolean expression and truth table.

(OR)

(b) The NAND and NOR gates are usually referred to as universal gates. Justify this statement with examples.