

KAMARAJ COLLEGE (Autonomous)

Accredited with A+ Grade by NAAC

(Affiliated to Manonmaniam Sundaranar University, Tirunelveli)

THOOTHUKUDI – 628 003

(6 Pages)

Reg. No:

Question. Code No : 2400122 Sub Code : 24UEPH11

UG Degree - End Semester Examinations, November 2024

First Semester

PHYSICS

Elective - ALLIED PHYSICS I

(For those who joined in July 2024 onwards)

Time : 3 Hours

Maximum : 75 Marks

PART A – (10 × 1 = 10 Marks)

Answer ALL Questions

Choose the correct answer :

1. If the vibrating length of the string is doubled, its frequency

- (a) Doubles (b) Halves
(c) Remains the same (d) Becomes Zero
2. Audible range of frequency
(a) 20Hz to 20MHz (b) 20Hz to 20KHz
(c) 200Hz to 2000Hz (d) 100Hz to 1000Hz
3. The dimensional formula for viscosity
(a) ML^2T^{-2} (b) $ML^{-1}T^{-2}$
(c) $ML^{-1}T^1$ (d) $ML^{-1}T^{-1}$
4. Unit for couple per unit twist
(a) Nm (b) Nm^{-2}
(c) Jm (d) Nm^{-1}
5. The efficiency of carnot engine
(a) Less than 1 (b) greater than 1
(c) Equal to 1 (d) equal to 0
6. Adiabatic compression causes
(a) heating (b) cooling
(c) Both heating and cooling (d) Neither heating nor cooling
7. The frequency of the ac mains
(a) 25Hz (b) 50Hz
(c) 75Hz (d) 100Hz
8. The capacitive reactance (X_c)

(a) $L\omega$

(b) $\frac{1}{C\omega}$

(c) $R\omega$

(d) $\frac{1}{R\omega}$

9. Find 1's complement of $1000\ 110_2$

(a) $0111\ 001$

(b) $1111\ 001$

(c) $1000\ 001$

(d) $1000\ 001$

10. A digital word has odd parity if it has

(a) Odd number of zeros

(b) Even number of zeros

(c) Odd number of ones

(d) even number of ones

PART B - (5X5=25 Marks)

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

Answer should not Exceed 250 words.

11. (a) Describe the laws of transverse vibration of stretched strings.

(OR)

(b) Give the application of ultrasonic waves in the field of medicine.

12. (a) Derive the expression for work done per unit volume in deforming body.

(OR)

(b) What is meant surface tension? Give the unit and dimension at formula.

13. (a) Describe liquefaction of air by Linde's process.

(OR)

(b) Define entropy and give its unit. Find change in entropy in reversible process.

14. (a) Describe an experiment to determine thermo e.m.f. of a thermocouple using potentiometer.

(OR)

(b) Short notes on electrical fuse.

15. (a) Describe OR gate with truth table and symbol, explain the implementation of OR gate using discrete components. Name IC chip for quad 2 input OR gate.

(OR)

(b) State and explain De Morgan's theorem

PART C – (5 × 8 = 40 Marks)

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

Answer should not Exceed 500 words.

16. (a) Derive the expression for velocity, acceleration, period and phase of simple harmonic motion

(OR)

(b) What are Lissajou's figures? How are they produced?

What are their applications?

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

(OR)

- (b) Derive an expression for bending moment.

18. (a) Describe Joule-Kelvin effect. Obtain the expression for temperature of inversion

(OR)

- (b) What is a heat engine? Describe Carnot's engine and derive its efficiency.

19. (a) State and explain Biot-Savart's law. Deduce the magnetic induction at the point on the axis of a circular coil carrying current.

(OR)

- (b) Describe about circuit breakers.

20. (a) Justify the statement, 'NAND gate as universal gate'

(OR)

- (b)
- i. Draw the logic circuit $Y = A(B+C) + D$
 - ii. Give the expression, symbol and truth table for Ex- OR gate
 - iii. What is Digital India?
 - iv. Inputs of 3 input NAND gate is 101, Find its output
 - v. Show that OR-AND topology is equivalent to NOR-NOR system