

(7 pages)

Reg. No. :

Code No. : 20922 E Sub. Code : EEPH 31

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

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. Which of the following effects can be used to produce ultrasonic waves?
 - (a) Magnetostriction effect
 - (b) Doppler Effect
 - (c) Magnetic effect
 - (d) Sound effect

2. The fundamental frequency of a sonometer wire is n . If the tension is made 3 times and length and diameter are also increased 3 times, the new frequency will be _____.

- (a) $3n$ (b) $n/3\sqrt{3}$
- (c) $n/3$ (d) $\sqrt{3} n$

3. Which of the following represents viscosity?

- (a) Potential energy stored in fluid
- (b) Resistance to fluid motion
- (c) Roughness of the surface
- (d) The pressure difference between the two fluids

4. Which type of fluids will have zero surface tension?

- (a) Real fluids
- (b) Ideal fluids
- (c) Both ideal and real fluids
- (d) No fluids have zero surface tension

5. The region inside the inversion curve has Joule-Kelvin coefficient and the region outside the inversion curve has _____ Joule-Kelvin coefficient.
 - (a) positive, positive
 - (b) negative, negative
 - (c) negative, positive
 - (d) positive, negative
6. Heat does not spontaneously flow from a colder body to a hotter one. Which of the following thermodynamics law states this?
 - (a) Zeroth law of thermodynamics
 - (b) First law of thermodynamics
 - (c) Second law of thermodynamics
 - (d) Third law of thermodynamics
7. Basically a potentiometer is a device for
 - (a) Comparing two voltages
 - (b) Measuring a current
 - (c) Comparing two currents
 - (d) Measuring a voltage
8. Which equation represents Biot-Savarts Law in vector form?
 - (a) $Idl / \sin \theta$
 - (b) $(\mu_0/4\pi)(Idl \sin \theta / r^2)$
 - (c) $(\mu_0/4\pi) i((dl * r)/r^3)$
 - (d) $(\mu_0/4\pi)(Idl \sin \theta)$
9. The universal gate is _____.
 - (a) NAND gate
 - (b) OR gate
 - (c) AND gate
 - (d) None of the above
10. De-morgans theorem solves _____ expressions?
 - (a) Boolean algebra
 - (b) Logic gates
 - (c) Arithmetic
 - (d) Both (a) and (b)

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) Analyze the composition of two simple harmonic motions at right angles to each other.

Or

- (b) State the laws of transverse vibrations of strings.

12. (a) Annotate the bending of beams.

Or

- (b) Summarize the process of droplets formation.

13. (a) What is inversion temperature? Derive the formula for temperature of inversion.

Or

- (b) Elaborate the theory of thermodynamic equilibrium.

14. (a) Derive an expression for field along the axis of the coil carrying current.

Or

- (b) Compare Fuse and circuit breaker in houses.

15. (a) Draw the symbol and explain the truth table of OR gate.

Or

- (b) List out the important rules for 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) Determine the frequency of alternating current using a sonometer.

Or

- (b) Explain the applications of ultrasonic waves in medical field.

17. (a) Obtain an expression for young's modulus by non-uniform bending.

Or

- (b) Define viscosity and deduce the formula for a coefficient of viscosity using Poiseuille's method.

18. (a) Explain Joule-Kelvin effect.

Or

- (b) Discuss about the working action of Carnot's cycle.

19. (a) How does a potentiometer measure thermo electromagnetic force?

Or

- (b) State and explain the Biot-Savart law.

20. (a) Draw and explain the symbol of NAND and NOR gates with their truth tables.

Or

- (b) Verify the Demorgan's theorem.