

QP CODE: 24046246



Reg No : .....

Name : .....

**B.Sc DEGREE (CBCS) REGULAR/IMPROVEMENT/REAPPEARANCE  
EXAMINATIONS, DECEMBER 2024**

**First Semester**

**Complementary Course - PH1CMT02 - PHYSICS - PROPERTIES OF MATTER AND  
THERMODYNAMICS**

(Common to B.Sc Chemistry Model I, B.Sc Geology Model I)

2017 Admission Onwards

CB38EA26

Time: 3 Hours

Max. Marks : 60

**Part A**

*Answer any **ten** questions.*

*Each question carries **1** mark.*


1. What is volume strain?
2. What do you mean by torsional couple?
3. What is a cantilever?
4. Distinguish between uniform and non uniform bending.
5. Small insects can walk on the surface of water. Why?
6. A needle floats on clear water but sinks when some detergents are added to it. Explain why.
7. Explain the term terminal velocity.
8. What do you mean by Brownian motion?
9. Explain thermodynamic variables.
10. Compare reversible and irreversible processes.
11. Write the equation for an adiabatic process in terms of volume and temperature.
12. Mention the mathematical expression for first law of thermodynamics and explain the terms.

(10×1=10)

**Part B**

*Answer any **six** questions.*

*Each question carries **5** marks.*

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13. Find the work done in stretching a wire of 1 sq. mm cross section and 1 meter long through 0.1 mm. Young's modulus for the material of the wire is  $2 \times 10^{10} \text{ N/m}^2$ .
  14. Two cylinders of same length, mass and density but one solid of radius  $r$  and the other hollow of inner and outer radii  $r_1$  and  $r_2$  respectively. Which one requires more couple to twist through same angle?
  15. Derive the expression for excess pressure inside a (a) liquid drop and a (b) liquid bubble.
  16. Distinguish between streamline flow and turbulent flow.
  17. Describe an experimental method to determine viscosity of a liquid using Poiseuille's equation.
  18. A Carnot's engine working between two temperatures 500K and 400K receives 1500 calories of heat from the source in each cycle. Calculate the amount of heat rejected to the Sink ? Calculate the efficiency of the engine and the work done by the engine in one cycle.
  19. A Carnot's refrigerator takes 80J heat from water at  $0^\circ\text{C}$  and discards it to room temperature at  $27^\circ\text{C}$ . How much heat is discarded to the room? What is the work done by the refrigerator in the process? What is the coefficient of performance of the machine?
  20. State and explain the two versions of Second law of thermodynamics.
  21. State and explain third law of thermodynamics and briefly explain the concept of entropy.

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **10** marks.

22. Explain the term rigidity modulus of the material. Derive an expression for the couple required to twist a cylindrical rod of circular cross section through an angle  $\theta$  at one end, the other end being kept fixed, and hence deduce an expression for the rigidity modulus of the rod.
23. What you do understand by Young's modulus of the material? Derive the expression for the depression at the free end of the cantilever heavily loaded at free end.
24. Derive Bernoulli's equation for the streamline flow of liquid. Discuss some applications of Bernoulli's equation.
25. Derive Maxwell's thermodynamical relations. Give its Physical Significance.

(2×10=20)