D6BPH2101   *10*   Reg.No.............................

Name: ....

SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2024

(Regular/Improvement/Supplementary)

PHYSICS

GPHY6B10T: THERMODYNAMICS

Time: 2 Hours   Maximum Marks: 60

SECTION A: Answer the following questions. Each carries *two* marks.

(Ceiling 20 Marks)

1. Discuss zeroth law of thermodynamics.
2. Define entropy.
3. What are the conditions for reversibility of a thermodynamic process?
4. Discuss the conditions for thermodynamic equilibrium of a system.
5. Write a note on volume expansivity.
6. What is heat capacity? Write expressions for average heat capacity and molar heat capacity.
7. Show that an adiabatic curve has a steeper negative slope than does an isothermal curve at the same point in a PV diagram.
8. Helium is the most useful gas for thermometric purposes. Why?
9. Draw a schematic diagram for Carnot's refrigerator.
10. State Carnot's Theorem.
11. Discuss first order phase transition.
12. Write the Clausius statement of second law in thermodynamics.

SECTION B: Answer the following questions. Each carries *five* marks.

(Ceiling 30 Marks)

13. The pressure on 10g of solid copper is increased quasi-statically and isothermally at 20°C from 0 to 1000 atm. Calculate the work. Given $\kappa = 7.16 \times 10^{-12} \text{Pa}^{-1}$.
14. Calculate the change in entropy of the ideal gas as a function of T and V.
15. Show that $PV^{\gamma} = Constant$ for a quasi-static adiabatic process.
16. State and explain Clausius' theorem.
17. Distinguish between path function and state function. Show that hydrostatic work depends on the path.
18. What are the characteristic functions in thermodynamics? Discuss.
19. Discuss the kinetic theory of ideal gas.

SECTION C: Answer any *one* question. Each carries *ten* marks.

20. Describe the working and efficiency of a heat engine.
21. Derive TdS equations using Maxwell's relations

(1 x 10 = 10 Marks)