SIXTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2025
(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. State Carnot's Theorem.
2. What is meant by quasi-static process?
3. State the Principle of increase of entropy.
4. What is the significance of PV diagram?
5. Write a note on ideal gas.
6. Give the Kelvin-Planck statement of the Second Law.
7. What are the conditions for thermodynamic equilibrium of a system?
8. Write a note on volume expansivity.
9. Give one example each for reversible and irreversible process.
10. Define a heat reservoir. What will be its heat capacity?
11. Distinguish between intensive and extensive coordinates.
12. Draw the Phase diagram for H_2O.

SECTION B: Answer the following questions. Each carries *five* marks.
(Ceiling 30 marks)

13. Show that the heat capacity of an ideal gas at constant pressure is always larger than the heat capacity at constant volume, the difference is nR.
14. Calculate the change in entropy of the ideal gas as a function of T and P.
15. Show that adiabatic slope is steeper than isothermal slope.
16. Derive an expression for work of a quasi-static isothermal compression of an ideal gas. Calculate the work in compressing 2 mol of an ideal gas kept at a constant temperature of 20°C from a volume of 4 litres to 1 litre.
17. State and explain Clausius' theorem.
18. Show that $T\, dS = C_V dT + T \left(\frac{\partial P}{\partial T}\right)_V dV$.
19. Discuss the terms (a) Heat capacity (b) Average heat capacity (c) Molar heat capacity.

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

20. With the help of schematic diagrams, explain the working of Carnot heat engine and Carnot refrigerator.
21. Describe the characteristic functions and Maxwell's relations in thermodynamics.

(1 × 10 = 10 Marks)