D 140214 **(Pages : 2)** **Name.....**

Reg. No.....

SIXTH SEMESTER (CBCSS—U.G.) DEGREE EXAMINATION
APRIL 2026

Physics/Applied Physics

PHY6B10/APH6B10—THERMODYNAMICS

(2020 Admission onwards)

Time : Two Hours Maximum : 60 Marks

The symbols used in this question paper have their usual meanings.

Section A (Short Answer Type)

Answer **all** *questions in two* **or** *three sentences, each correct answer carries a maximum of* 2 *marks.*

1. Define the Zeroth Law of Thermodynamics.
2. Differentiate between macroscopic and microscopic points of view in thermodynamics.
3. What is an ideal-gas temperature scale ?
4. Define intensive and extensive properties with examples.
5. What is a quasi-static process?
6. State the First Law of Thermodynamics in its mathematical form.
7. What is meant by heat capacity ? How is it related to specific heat ?
8. Write the equation of state for an ideal gas.
9. Define a heat engine and give an example.
10. State the Kelvin-Planck statement of the Second Law of Thermodynamics.
11. Write down the Clausius-Clayperon equation and its applications ?
12. Define enthalpy and give its mathematical expression.

(Ceiling - 20)

Turn over

Section B (Paragraph/Problem Type)

Answer **all** *questions in a paragraph of about* **half a page** *to* **one page**, *each correct answer carries a maximum of* 5 *marks.*

13. Show that the hydrostatic work depends on the path taken in a PV diagram.

14. A gas expands from an initial state of 2 atm and 3 liters to a final state of 1 atm and 6 liters quasi-statically. Calculate the work done by the gas.

15. Derive an expression for the internal energy of an ideal gas using the kinetic theory of gases.

16. Calculate the depression of melting point of ice by 1 atm increase of pressure, given latent heat of ice = 3.35×10^{5} J/Kg and the specific volumes of 1 Kg. of ice and water at 0°C are $1.090 \times 10^{-3} m^3$ and 10^{-3} m^3 respectively.

17. Explain the concept of reversibility and irreversibility in thermodynamic processes.

18. A Carnot's engine whose lower temperature reservoir is at 7 °C has an efficiency of 50 %. It is desired to increase the efficiency to 70 %. By how many degrees should the temperature of the high temperature reservoir be increased ?

19. What is the principle of increase of entropy ? Illustrate with an example.

(Ceiling - 30)

Section C (Essay Type)

Essays - Answer in about **two pages**, *any* **one** *question.*
The question carries 10 *marks.*

20. Derive the mathematical formulation of the First Law of Thermodynamics and explain its significance.

21. Derive Maxwell's relations and discuss their applications in thermodynamics.

(1 × 10 = 10 marks)