

C 20658

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Name.....

Reg. No.....

**SIXTH SEMESTER U.G. DEGREE EXAMINATION, MARCH 2022**

(CBCSS—UG)

Physics/Applied Physics

PHY 6B 10/APH 6B 10—THERMODYNAMICS

(2019 Admissions)

Time : Two Hours

Maximum : 60 Marks

*The symbols used in question paper have their usual meanings***Section A (Short Answer Type)***Answer at least **eight** questions.**Each question carries 3 marks.**All questions can be attended.**Overall Ceiling 24.*

1. Distinguish between reversible and irreversible processes.
2. Is it possible to get a Carnot's engine with 100 % efficiency ? Explain.
3. Plot the TS diagram for various reversible processes of a hydrostatic system.
4. State the mathematical form of entropy principle and explain it.
5. What is Joule- Thomson expansion ? What is its use ?
6. Distinguish between first and second order phase transitions.
7. Which are the macroscopic quantities, required to describe the materials in a cylinder of an automobile engine ?
8. State and explain the zeroth law of thermodynamics.
9. Explain thermal equilibrium.
10. What are the features of quasi-static process ?
11. Give the mathematical formulation of the first law of thermodynamics and its related ideas.
12. Comment on the molar heat capacities of ideal gases.

(8 × 3 = 24 marks)

**Turn over**

**Section B (Paragraph/Problem Type)**

Answer at least **five** questions.

Each question carries 5 marks.

All questions can be attended.

Overall Ceiling 25.

13. Explain the isotherms of  $H_2O$ .
14. Write down the equations representing the hydrostatic properties of a pure substance and then express Maxwell's thermodynamic relations.
15. Find the change in entropy when a perfect gas expands isothermally and adiabatically.
16. The pressure of 10 g of copper is increased at ice point from 0 to 1000 times the atmospheric pressure. Calculate the work done. Given the density of copper  $8930 \text{ kgm}^{-3}$ , its isothermal compressibility  $7.16 \times 10^{-12} \text{ Pa}^{-1}$ .
17. What are virial coefficients? Give their significance.
18. Show that the adiabatic curve has a steeper negative slope than does an isothermal curve at the same point.
19. Explain the microscopic theories which help to give information about thermal properties of systems.

(5 × 5 = 25 marks)

**Section C (Essay Type)**

Answer any **one** question.

The question carries 11 marks.

20. Analyse the working of a Carnot's engine, calculating expression for its efficiency.
21. Discuss first order phase transition and derive the Clausius-Clapeyron equation.

(1 × 11 = 11 marks)