C 20658 (Pages : 2) 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 kgm^{-3}, its isothermal compressibility $7.16 \times 10^{-12} Pa^{-1}$.

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.

$(5 \times 5 = 25 \text{ marks})$

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.

$(1 \times 11 = 11 \text{ marks})$