(i) **Printed Pages: 3** **Roll No. .....**

(ii) **Questions : 7** **Sub. Code : 0347**

Exam. Code : 0004

B.A./B.Sc. (General) 4th Semester

1048

PHYSICS

Paper : A (Statistical Physics and Thermodynamic—II)

Time Allowed : Three Hours] **[Maximum Marks : 44**

Note :— Attempt **five** questions in all, selecting **two** from each of Unit-I and Unit-II. Unit-III is compulsory. Ask for Logarithmic Tables if required. From Q. No. **7** attempt any **eight** parts.

UNIT—I

1. (a) Derive the relation for the entropy of one mole of an ideal gas. Also explain the expansion of gases on the basis of the law of increase of entropy. 6

   (b) Find the pressure required to compress adiabatically a gas at atmospheric pressure to one fifth of its volume (given $\gamma = 1.4$). 3

2. (a) Define reversible and irreversible processes. Show that the entropy of a thermodynamical system remains constant in any reversible process. 6

(b) A Carnot heat engine absorbs heat from a source at 500°K and rejects a part of the heat to a sink at 300°K. If heat absorbed from the source be 1000 cal, calculate the heat rejected to the sink. 3

3. (a) How does Heat Pump differ from Refrigerator ? Prove that the amount of mechanical energy required to extract a given amount of heat from cold body increases with decrease in temperature of the body, for a given temperature of sink. 6

(b) What is a thermocouple ? How does a thermocouple act like a heat engine ? 3

UNIT—II

4. Discuss four thermodynamical potential V, F, H and G and hence derive Maxwell's thermodynamic relations. 9

5. (a) What is Joule Thomson effect ? Discuss Joule Thomson effect for the perfect gas. 6

(b) Making use of Maxwell relation show that the adiabatic expansion produces cooling. 3

6. (a) Derive the Clausius Clapeyron's latent heat equation and give its significance. 6

(b) Write a note on Adiabatic demagnetization. 3

UNIT—III

7. (a) What is significance of $\Delta S \geq 0$ relation to entropy ?

(b) Why does entropy increase during free expansion of gas ?

(c) Why $C_p > C_v$?

(d) What are the extensive and intensive parameters ?

(e) Give importance of S-T diagram.

(f) Seebeck effect is not an independent effect. Explain it.

(g) Write Maxwell thermodynamic relations.

(h) A Carnot heat engine absorbs 5000 J of heat from a reservoir at 327°C and rejects 2000 J to heat during each cycle. Calculate efficiency of Heat engine.

(i) What is a perfect differential ? Give examples of perfect and imperfect differentials. 8×1=8