

Roll No.....

Total No. of Printed Pages: [01]

Total No. of Questions: [09]

B.Sc. (Hons.) Chemistry (Semester: 2nd)

THERMAL PHYSICS

Subject Code: BPHYS1-201

Paper ID: [19131612]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) State Zeroth law of thermodynamics.
- b) Illustrate extensive and intensive parameters.
- c) How first law lead to the concept of internal energy?
- d) What are the reversible and irreversible processes?
- e) What is entropy?
- f) What do you mean by mean free path?
- g) Define first and second order phase transition.
- h) A system absorbs 10^5 cal of heat. If the work done by the system against the surrounding is 10^5 J. Calculate the change in internal energy of the system. Given $1 \text{ cal} = 4.2 \text{ J}$.
- i) Define Helmholtz free energy.
- j) What is adiabatic demagnetization?

Section – B

(5 marks each)

- Q2. Derive the relation for difference of C_p and C_v in the case of a perfect gas. How does C_p and C_v vary with pressure and volume?
- Q3. Distinguish between isothermal and adiabatic processes. Show $PV^\gamma = \text{constant}$ for an adiabatic change in a perfect gas.
- Q4. Describe the working principle of refrigerator.
- Q5. State and prove Clausius theorem.
- Q6. Write a short note on principle of increase of entropy.

Section – C

(10 marks each)

- Q7.a) What is a Carnot's cycle? On what factor does efficiency of a reversible Carnot's engine depend?
 - b) A carnot heat engine absorbs heat from a source at 500 K and rejects a part of the heat to sink at a 300 K. If the heat absorbed from the source be 1000 cal, calculate the heat rejected to the sink. (7, 3)
- Q8. Define second law of thermodynamics. What are its applications? Write a short note on thermodynamic scale of temperature and its equivalence to Perfect gas scale.
 - Q9. Write four Maxwell's relation and show that an adiabatic expansion always results a fall in temperature.