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 cal = 4.2 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^γ = 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.