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B.Sc. (Hons.) Physics (Semester – 2nd)

THERMAL PHYSICS

Subject Code: BPHYS1-201

Paper ID: [19131510]

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) Define Specific heat capacity and determine the term specific heat ratio of a gas.
- b) Explain the concept of internal energy and formulate the first law of thermodynamics.
- c) Explain Helmholtz energy and Gibbs free energy for system.
- d) What is a perfectly Black body & how it can be realized experimentally.
- e) State Carnot's theorem & justify with examples.
- f) State & write Clausius Clapeyron equation.
- g) Explain the law of equipartition of energy. Does this law is valid for diatomic gases too, if yes explain how?
- h) Define the term entropy and its principle for entropy increment.
- i) Which type of collision is there if the wall of system are in thermal equilibrium with the gas molecules?
- j) Explain the concept of "Temperature" & "Thermal equilibrium".

Section – B

(5 marks each)

- Q2. Define degree of freedom & calculate the value of C_v for SO_2 gas at NTP.
- Q3. Show that the entropy remains constant in reversible process while increasing in irreversible process.
- Q4. Show how bulk modulus of elasticity, coefficient of volume and pressure expansion are correlated?
- Q5. Calculate the change in entropy of liquid when heated from a temperature T_1 to T_2 .
- Q6. Define C_p , C_v , latent heat & derive the equation of Mayer law.

Section – C

(10 marks each)

- Q7. Explain thermodynamic parameters and drive the Maxwell's relation.
- Q8. Differentiate between Isothermal & Adiabatic process also derive the relation $pV\gamma = \text{constant}$.
- Q9. Explain Carnot's engine and calculate its efficiency. Also discuss its working principle.