B.Sc. Physical Science
SEMESTER –III
SPH 203: Thermal Physics and Statistical Mechanics
MODEL PAPER

1. Answer all questions Max. Marks: 60
2. All questions carry equal marks

Q1. a). Give a neat sketch for Maxwell's distribution of molecular speeds with temperature and find the average number of molecules having momenta *p and p+dp*. [8+4]

b). An ideal gas expands isothermally from V_i to V_f, Calculate the workdone?

OR

c). On the basis of kinetic theory of gases, write the relation between thermal conductivity and diffusion? [4+4+4]

d). Apply kinetic theory of gases to obtain an expression for thermal conductivity of gas.

e). when you let air out of a tire, the air seems cool. Why? What kind of process occurring?

Q2. a). Derive Maxwell's thermodynamic relations for internal energy, Gibbs free energy, Helmohltz free energy and Enthalpy. [12]

OR

c). What is Joule-Kelvin effect for perfect gas and Van der waal's gas? Give its coefficient?

d). What happens if Joule-Kelvin coefficient is zero? [9+3]

Q3. a). Describe the carnot's cycle and deduce the expression for its efficiency for ideal gas as working substance. [10+2]

b). What is temperature - entropy diagram?

OR

c) . What happens to entropy in (a) reversible process and (b) irreversible process? [8+4]

d). Milk is poured in to a cup of tea and mixed with a spoon. Is this an example of reversible process. Give reason for your answer.

Q4. a). What is ultraviolet catastrophe. [2+10]

b). Discuss the Wein's law in detail.

OR

c). How the classical concepts failed in explaining black body radiation. [6+6]

d). Discuss how Planck's radiation law explain black body radiation.

Q5. a). Define phase space, macrostates, and microstates with examples. [4+8]

b). Give measurement of radiation using any one method?

OR

c). Write the principle of equal aprorie probability and Thermodynamic probability? [8+4]

d). Discuss in brief entropy and thermodynamic probability.