

(3 Hours)

[Total Marks - 80]

- Note: i) Q.No 1 is compulsory.
 ii) Answer any three of the remaining five questions.
 iii) Assume suitable data where ever necessary.

- Q.1 a) Define (i) Process (ii) System (iii) Specific Heat (iv) Equilibrium State (v) Closed System (vi) Enthalpy (vii) Internal Energy. 14
 b) State the various laws of thermodynamics and explain briefly the importance of each law. 06
- Q.2 a) What is heat pump and COP of pump? 06
 b) Reversible heat engine A absorbs energy from a reservoir at T_1 and rejects energy at reservoir T_2 . A second reversible engine B absorbs the same amount of energy as rejected by engine A from the reservoir at T_2 and rejects the energy to reservoir at T_3 . What is the relation between T_1 , T_2 and T_3 if:
 i) the efficiency of engine A and B are same. 14
 ii) the work delivered by engines are same.
- Q.3 Derive maxwell thermodynamics relations. 20
- Q.4 a) Discuss about thermodynamic diagrams. 12
 b) For an ideal gas undergoing adiabatic process, show that $(T_2/T_1) = (V_1/V_2)^{\gamma-1}$. 08
- Q.5 a) Explain Kelvin - Planck Statement. 10
 b) Explain Clausius Inequality.
- Q.6 a) State various equations of state for real gases. Discuss virial equation in brief. 10
 b) Derive a mathematical expression of the first law of thermodynamics for a steady state flow process between a single entrance and a single exit. 10