R16

Reg. No:

Time: 3 hours   Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1 **a** What do mean by property"? Distinguish between intensive and extensive Properties.   **6M**

   b What do you understand by path function and point function? What are the exact and inexact differentials?   **6M**

OR

2 **a** State the following   **6M**
      i) Pressure ii) Temperature iii) volume

   b Define and explain Zeroth Law of Thermodynamics"   **6M**

UNIT-II

3 The system contains piston and cylinder is subjected to a process, such that its volume increases from 0.004 m3 to 0.034 m3 at constant pressure of 750KN/m2. The heat supplied through the walls of cylinder the process is 8 KJ. Calculate the change in internal energy of the system.   **12M**

OR

4 **a** During a cycle consisting of four processes, the heat transfer are a s following. Q1 = +60KJ, Q2 = -40KJ, Q3= 15KJ, and Q4=-20KJ, Determine the net work done by the system.   **7M**

   b Define Mass Balance? Derive equation for it.   **5M**

UNIT-III

5 **a** An inventor claims to have developed an engine that takes in 105 MJ at a temperature of 400 K, rejects 42 MJ at a temperature of 200 K, and delivers 15 kWh of mechanical work. Would you advise investing money to put this engine in the market?   **8M**

   b What are the limitations of the First law of Thermodynamics?   **4M**

OR

6 Calculate the decrease in exergy when 25 kg of water at 95 0C mix with 35 kg of water at 35 0C, the pressure being taken as constant and temperature of the surrounding being 15 0C (cp of water = 4.2 kJ/kg K).   **12M**

UNIT-IV

7 A cylinder Tank containing 4 kg of carbon monoxide gas at -500C has internal diameter of 0.2m and length of 1m.Determine the pressure exerted by the gas using (a) The generalize compressibility chart (b) The ideal gas of equation of state (c) Vander Walls equation of state   **12M**

OR

8 One kg of air in a closed system, initially at 5°C and occupying 0.3$m3$ volume, undergoes a constant pressure heating process to 100°C. There is no work other than *pdv* work. Find (a) the work done during the process, (b) the heat transferred, and (c) the entropy change of the gas. **12M**

UNIT-V

9 **a** What is Joule- Thomson coefficient? Why he is zero for ideal gas **6M**

b Derive the Clapeyron equation. **6M**

OR

10 An engine working on the otto cycle is supplied with air at 0.1 MPa ,350C .the compression ratio is 8.the heat supplied is 2100 kJ/kg .calculate the Maximum pressure and temperature of the cycle ,the cycle efficiency and the mean effective pressure.(for air Cp=1.005kj/kg. k , Cv = 0.717 kJ/kgk, and R=0.287 kJ/kgk). **6M**

*** END ***