ASSIGNMENT

UNIT –II

**Q1.** A) Explain First law of thermodynamics.

B) Explain and derive Steady Flow Energy Equation.

**Q2.** What do you mean by the term ‘Property’? Prove that Heat and Work is not a point function.

**Q3.** Derive the work done for following process:

1. Isochoric process
2. Isobaric process
3. Isothermal process
4. Adiabatic process
5. Polytrophic process

**Q4.** Derive amount of heat transfer for the above processes in previous question.

**Q5.** a) Explain Second Law of Thermodynamics. Prove that violation of Kelvin Plank statement leads to violation of

Clausius statement.

b) Prove that the violation of Clausius statement leads to violation of Kelvin Plank statement.

Q.6 A reversible engine is supplied with heat from two constant temperature sources at 900 K and 600 K and rejects heat to a constant temperature sink at 300 K. The engine develops work equivalent to 90 kJ/s and rejects heat at the rate of 56 kJ/s. Estimate I. Heat supplied by each source, and 2. Thermal efficiency of the engine.

Q.7 A cold storage is to be maintained at - 5°C while the surroundings are at 35°C. The heat leakage from the surroundings into the cold storage is estimated to be 29 kW. The actual C.O.P of the refrigeration plant is one -third of an ideal plans working between the same temperatures. Find the power required to drive the plant.

Q.8 0.05 m3 of air at a pressure of 8 bar and temperature 2800 C expands to eight times its original volume and the final temperature after expansion is 250 C. Calculate change of entropy of air during the process. Assume Cp = 1.005 kfikg K and Cv, = 0.712 kJ/kg K.

Q.9 A 5 kg of a perfect gas is heated from 1000 C to 3000C at a constant pressure 012.8 bar. It is then cooled to 1000 C at constant volume. Find the overall change in entropy. Take Cp=1 KJ/kgK and Cv= 0.72 KJ/KgK.

Q.10 A certain quantity of a perfect gas is heated in a reversible isothermal process from 1 bar and 40° C to 10 bar. Find the work done per kg of gas and the change of entropy per kg of gas. Take R=287 J/kg K

Q.11 A certain volume of gas at 320 Kand 6.5 bar is expanded to four times its original volume, according to PV1.25= constant. Determine the final temperature of the gas and change of entropy per kg of gas. assuming Cp= 0.996 KJ/kg K and Cv = 0.707 KJ//kg K.

Q.12 A mass of 9 kg of air at 1.75 bar and 130 Cis compressed to 24.5 bar according to the law PV1.32 =Constant , and then cooled at constant volume to 15° C. DetermIne: 1. Volume and temperature at the end of compression, and 2. Change of entropy during compression

and during constant volume cooling.