**Assignment 1: Applied Thermodynamics**

**CLO1**

1. Differentiate between reversible and irreversible processes with an example.
2. Differentiate between **intensive** and **extensive** properties. Give two examples of each.
3. Explain the difference between **point function** and **path function** with examples (e.g., pressure vs. work).
4. 1 kg of a fluid is compressed reversibly according to a law pv = 0.25, where p is in bar and v is in m3/kg. The final volume is of the initial volume. Calculate the work done on the fluid and sketch the process on a p-v diagram.
5. 0.05 m3 of a gas at 6.9 bar expands reversibly in a cylinder behind a piston according to the law pu1.2 constant, until the volume is 0.08 m3. Calculate the work done by the gas and sketch the process on a p-v diagram.
6. 1 kg of a fluid expands reversibly according to a linear law from 4.2 bar to 1.4 bar; the initial and final volumes are 0.004 m3 and 0.02 m3. The fluid is then cooled reversibly at constant pressure, and finally compressed reversibly according to a law pv= constant back to the initial conditions of 4.2 bar and 0.004 m3. Calculate the work done in each process and the net-work of the cycle. Sketch the cycle on a p-v diagram.
7. A steady flow of steam enters a condenser with a specific enthalpy of 2300 kJ/kg and a velocity of 350 m/s. The condensate leaves the condenser with a specific enthalpy of 160 kJ/kg and a velocity of 70 m/s. Calculate the heat transfer to the cooling fluid per kilogram of steam condensed.
8. A turbine operating under steady-flow conditions receives steam at the following state: pressure, 13.8 bar; specific volume 0.143 m3/kg, specific internal energy 2590 kJ/kg, velocity 30 m/s. The state of the steam leaving the turbine is as follows: pressure 0.35 bar, specific volume 4.37 m3/kg, specific internal energy 2360 kJ/kg. Velocity 90 m/s. Heat is rejected to the surroundings at the rate of 0.25 kW and the rate of steam flow through the turbine is 0.38 kg/s. Calculate the power developed by the turbine.