Assignment

1) One kg of saturated steam at 100 KPa is held in a piston cylinder assembly. Energy in the form of heat is added to the steam at constant pressure till the volume is doubled. Determine the amount of heat interaction and the final temperature of the steam.

2) An adiabatic cylinder piston assembly contains one kg of saturated steam at 100 KPa with a quality of 0.8. 300 KJ of paddle wheel work is performed on the steam, while the pressure is held constant. Determine the final state of the steam.

3) One kg of superheated steam at 30 bar and 350°C contained in a cylinder piston assembly is allowed to expand reversibly and adiabatically (isentropic) to a pressure of 10 K·Pa. Determine the final conditions of the steam and the work done.

4) A cylinder of 0.5 m in diameter with a frictionless piston contains saturated steam at 500 KPa. The piston is 0.5 m above the base of the cylinder. The piston is held in the position by means of latches and energy is added as heat until the pressure of the steam is 1 MPa. Determine the Final temperature of the steam and the energy transferred as heat. Now, the piston is released and the energy is added as heat at constant pressure until the steam temperature is 700°C. Determine the amount of energy added as heat and the final position of the piston.

Answer Key

1) 732.52 kJ, 461.8° C

2) $X = 0.933$ at 100 KPa

3) $X = 0.811$ at 10 KPa, 832.24 KJ

4) 544°C, 167.64 KJ, 91.18 KJ, 0.597 m above the base