Student Name: **Student Number:**

1- An air-conditioner with refrigerant-134a as the working fluid is used to keep a room at 26°C by rejecting the waste heat to the outdoor air at 34°C. The room gains heat through the walls and the windows at a rate of 250 kJ/min while the heat generated by the computer, TV, and lights amounts to 900 W. The refrigerant enters the compressor at 500 kPa as a saturated vapor at a rate of 100 L/min and leaves at 1200 kPa and 50°C. Determine:
(a) the actual COP,
(b) the maximum COP, and
(c) the minimum volume flow rate of the refrigerant at the compressor inlet for the same compressor inlet and exit conditions. (Score 50)

2- Steam enters an adiabatic turbine at 7 MPa, 600°C, and 80 m/s and leaves at 50 kPa, 150°C, and 140 m/s. If the power output of the turbine is 6 MW, determine:
   (a) the mass flow rate of the steam flowing through the turbine and,
   (b) the isentropic efficiency of the turbine. (Score 50)