Attempt All the Following Questions

1- A thin-walled double-pipe counter-flow heat exchanger is used to cool oil \((c_p = 2.20 \text{ kJ/kg°C})\) from 150 to 40°C at a rate of 2 kg/s by water \((c_p = 4.18 \text{ kJ/kg°C})\) that enters at 22°C at a rate of 1.5 kg/s. Determine the rate of heat transfer in the heat exchanger and the exit temperature of water. (12 Marks)

2- An insulated rigid tank initially contains 1.4-kg saturated liquid water and water vapor at 200°C. At this state, 25 percent of the volume is occupied by liquid water and the rest by vapor. Now an electric resistor placed in the tank is turned on, and the tank is observed to contain saturated water vapor after 20 min. Determine

(a) Volume of the tank,
(b) Final temperature, and
(c) Electric power rating of the resistor. (8 Marks)

With Best Wishes

Dr. Eng. E. Elgendy