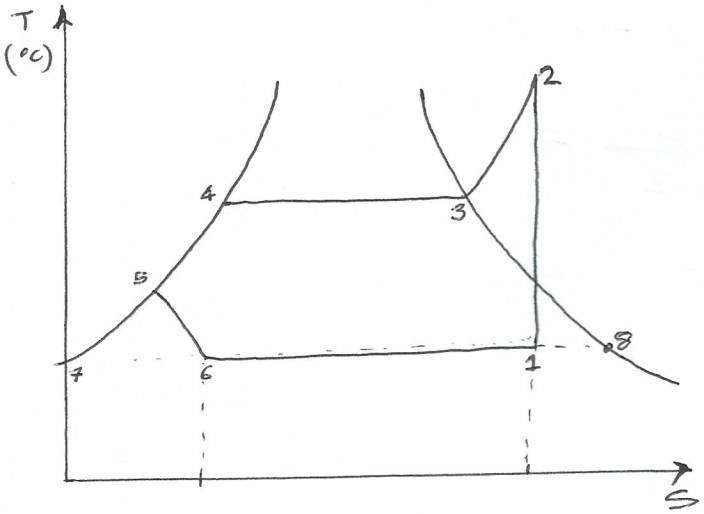
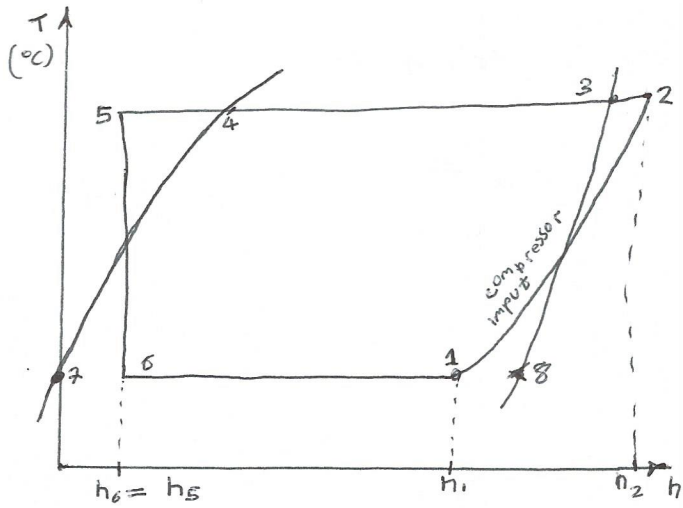
Question 5

T-S diagram



T-h chart



From Steam Tables

Pressure = 0.423 MN/m²

Saturation temperature = 10°C

Specific enthalpy: h_f = 45.4 KJ/Kg, h_g = 191.7 KJ/Kg

Specific entropy: S_f = 0.1752 KJ/KgK, S_g = 0.6921

Pressure = 1.219 MN/m²

saturation temperature = 50°C

Specific enthalpy: h_f = 84.9 KJ/Kg, h_g = 206.6 KJ/Kg

Specific entropy: S_f = 0.3037 KJ/KgK, S_g = 0.6797 KJ/KgK

(i) $S_1 = 0.6921$ KJ/KgK $=$ $S_2 = S_3 + C_{pv} \ln\left(\frac{T_2}{T_1}\right)$.

$\Rightarrow 0.6797 + C_{pv} \ln\left(\frac{331}{323}\right) = 0.6921$

$\Rightarrow 0.02446052 C_{pv} = 0.0124 \Rightarrow C_{pv} = 0.50682$ KJ/KgK

$h_2 = h_3 + C_{pv}(T_2 - T_3) = 206.5 + 0.50682(331 - 323)$

$h_2 = 210.5544$ KJ/Kg

$h_4 = 84.9$ KJ/Kg

$Q_{(condenser)} = 210.5544 - 84.9 = 125.6544$ KJ per hr

mass flow rate $=$ Q in condenser $= \frac{120 \times 10^6}{} = 955.034$ Kg/h