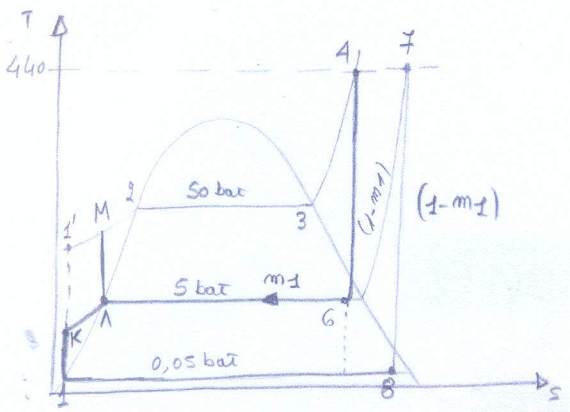
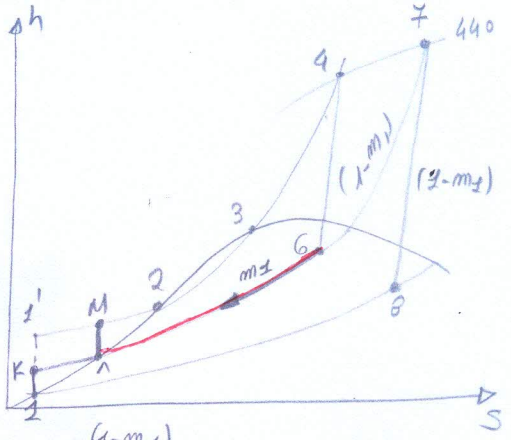
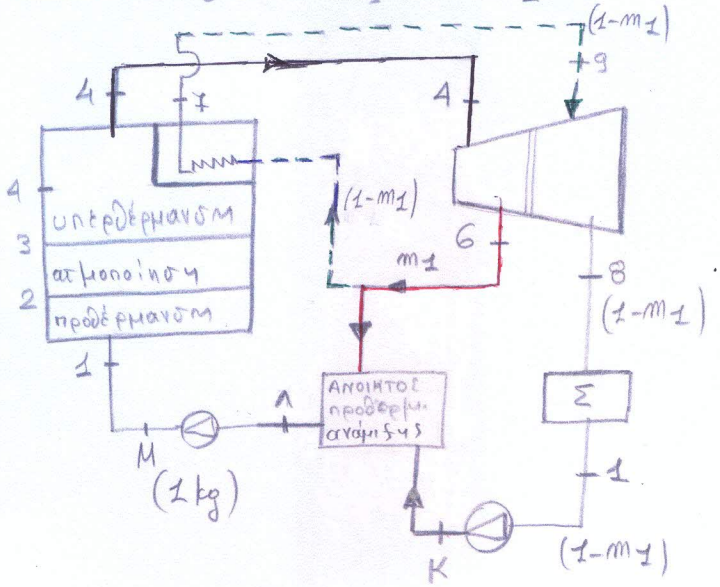
6η ΑΣΚΗΣΗ – 3η Σειρά ΧΕΙΜΕΡΙΝΟ 2019-2020







6η
2023

$$\eta_\theta = \frac{(\Delta h)_{\text{εκτονώσεων}} - (\Delta h)_{\text{αντλιών}}}{(q_1)_{\text{ολικό}}}$$

$(\Delta h)_{\text{εκτονώσεων}}$:

$(h_4 - h_6) \cdot 1$

$(h_7 - h_8) \cdot (1 - m_1)$

$(\Delta h)_{\text{αντλιών}}$:

$(h_2 - h_1) \cdot (1 - m_1)$

$(h_M - h_N) \cdot 1$

$(q_1)_{\text{ολικό}}$:

$(h_4 - h_M) \cdot 1$

$(h_7 - h_6) \cdot (1 - m_1)$

Υπολογισμός ΕΝΘΑΛΠΙΩΝ

ΣΗΜ. 4

$P_4 = 50$ bar
$t_4 = 440\,(^\circ C)$ → $h_4 = 3294\ (kJ/kg)$, $s_4 = 6,789\ (kJ/kg \cdot K)$

ΣΗΜ. 7

$P_7 = 5$ bar
$t_4 = 440\,(^\circ C)$ → $h_7 = 3356,1$, $s_7 = 7,916$

ΣΗΜ. 1

$p_1 = 0{,}05$ bar

$t_1 = 32{,}898\,(^oC)$

$v_1 = 0{,}0010052\ (m^3/kg)$

$h_1 = 137{,}77 \qquad r = 2423{,}8$

$s_1 = 0{,}4763$

ΣΗΜ. Κ : $h_K = h_1 + v_1 \cdot (P_K - P_1) = 137{,}77 + 0{,}0010052 \cdot (5 - 0{,}05) \times 10^2$

$p = 5$ bar $\qquad = 138{,}267\ (kJ/kg)$

ΣΗΜ. Λ $\Rightarrow$ **ΣΗΜ. Μ**

$p = 5$ bar $\qquad p = 50$ (bar)

$t = 151{,}84\,(^oC) \qquad h_\Lambda = 640{,}12 \qquad s_\Lambda = 1{,}8604\ (kJ/kg \cdot K)$

$v = 0{,}0010928 \qquad r = 2107{,}4$

$h_M = h_\Lambda + v_\Lambda \cdot (P_M - P_\Lambda) = 640{,}12 + 0{,}0010928 \cdot (50 - 5) \times 10^2 =$

$= 645{,}037\ (kJ/kg)$

ΣΗΜ. 6 $(p = 5$ bar$)$

$h_6 = h_\Lambda + r \cdot x_6$

$s_4 = s_6 = s_\Lambda + \frac{r}{T} \cdot x_6 \Rightarrow$

$\Rightarrow x_6 = \frac{s_4 - s_\Lambda}{r} \cdot T = \frac{6{,}789 - 1{,}8604}{2107{,}4} \cdot (151{,}84 + 273{,}15)$

$= 0{,}994$

$h_6 = 640{,}12 + 2107{,}4 \cdot 0{,}994 = 2734{,}875\ (kJ/kg)$

ΣΗΜΕΙΟ 8

$h_8 = h_1 + r \cdot x_8$

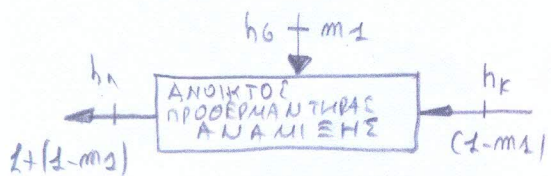
$s_7 = s_8 = s_1 + \frac{r}{T} \cdot x_8$

$x_8 = \frac{s_7 - s_1}{r} \cdot T = \frac{7,916 - 0,4763}{2423,8} \cdot (32,898 + 273,15) =$

$= 0,939$

$h_8 = 137,77 + 2423,8 \cdot 0,939 = 2413,718 \ (kJ/kg)$

Υπολογισμός ποσότητας (m_1):



$1 \cdot h_A = h_6 \cdot m_1 + h_K \cdot (1 - m_1)$

$1 \cdot h_A = h_6 \cdot m_1 + h_K \cdot 1 - h_K \cdot m_1$

$1 \cdot h_A - h_K \cdot 1 = (h_6 - h_K) \cdot m_1$

$\rightarrow m_1 = \frac{h_A - h_K}{h_6 - h_K} = \frac{640,12 - 138,267}{2734,875 - 138,267} = 0,193$

Sh) Εκτονώσεων:

$(h_4 - h_6) \cdot 1 \frac{kg}{} + (h_7 - h_8) \cdot (1 - m_1) =$

$(3294 - 2734,875) \cdot 1 + (3356,1 - 2413,718) \cdot (1 - 0,193) =$

$559,125 + 760,502 = 1319,627 \ (kJ)$

ΑΝΤΛΙΕΣ

$$(h_K - h_1)\cdot(1-m_1) + (h_M - h_A)\cdot 1 =$$

$$(138,967 - 137,77)\cdot(1-0,193) + (645,037 - 640,12)\cdot 1 =$$

$$= 5,718\ (kJ)$$

$$(q_1)_{\text{ολικό}} :$$

$$(h_A - h_1)\cdot 1 + (h_7 - h_6)\cdot(1-m_1) =$$

$$(3294,0 - 137,77)\cdot 1 + (3356,1 - 2734,875)\cdot(1-0,193) =$$

$$3156,23 + 501,328 =$$

$$= 3657,558\ (kJ)$$

$$\eta_\theta = \frac{1319,627 - 5,718}{3657,558} = 0,359$$