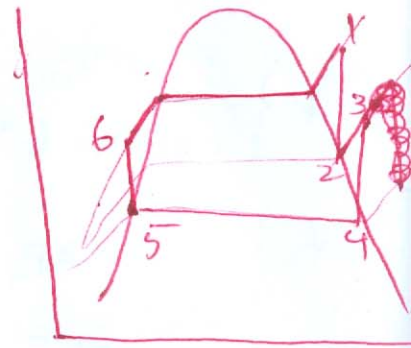


$$\left. \begin{array}{l} P_1 = 16 \text{ MPa} \\ T_1 = 550^\circ \text{C} \end{array} \right\} \rightarrow \left\{ \begin{array}{l} v = 0.021 \frac{\text{m}^3}{\text{kg}} \\ s = 6.48 \text{ kJ/kg}\cdot\text{K} \\ h_1 = 3439 \text{ kJ/kg} \end{array} \right.$$

$$\left\{ \begin{array}{l} P_4 = 10 \text{ kPa} \\ x = 0.95 \end{array} \right. \rightarrow \left\{ \begin{array}{l} T_4 = 45^\circ \text{C} \\ s = 7.77 \text{ kJ/kg}\cdot\text{K} \\ h = 2464.3 \text{ kJ/kg} \end{array} \right.$$



$$s_4 = s_3 \rightarrow \left\{ \begin{array}{l} s_4 = 7.77 \\ T_3 = 550^\circ \text{C} \end{array} \right. \rightarrow \left\{ \begin{array}{l} P_3 = 1.30 \text{ MPa} \\ h_3 = 3585.2 \end{array} \right.$$

$$\left. \begin{array}{l} s_1 = s_2 = 6.48 \frac{\text{kJ}}{\text{kg}\cdot\text{K}} \\ P_2 = P_3 = 1300 \text{ kPa} \end{array} \right\} \rightarrow h_2 = 2782.9$$

$$\left. \begin{array}{l} P_5 = 10 \text{ kPa} \\ x = 0 \end{array} \right\} \rightarrow \left\{ \begin{array}{l} h_5 = 191.8 \text{ kJ/kg} \\ s = 0.649 \text{ kJ/kg}\cdot\text{K} \\ v = 0.006 \frac{\text{m}^3}{\text{kg}} \end{array} \right.$$

$$P_6 = 16 \text{ MPa} \quad w_p = v \Delta P = 0.006 \times (16000 - 10) = 16.15 \frac{\text{kJ}}{\text{kg}}$$

$$h_6 = h_5 + w_p = 191.8 + 16.15 = 207.95 \frac{\text{kJ}}{\text{kg}}$$

$$w_{\text{net}} = (h_1 - h_2) + (h_3 - h_4) -$$

$$w_{\text{net}} = w_{\text{Tur}} - w_{\text{Pump}} = 1761.3 \text{ kJ/kg}$$

$$q_H = (h_6 - h_5) + (h_3 - h_2) = 4034.5$$

$$\eta = \frac{w}{q_H} = 43.7\%$$

داده های مسئله را با دقت کامل در نظر بگیرید.

$$1.5 \text{ bar} \left\{ \begin{array}{l} P = 10 \text{ MPa} \\ T = 500^\circ\text{C} \end{array} \right. \rightarrow \begin{array}{l} h = 3375 \text{ kJ/kg} \\ s = 6.59 \text{ kJ/kg}\cdot\text{K} \end{array}$$

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$$2 \left\{ \begin{array}{l} P = 1 \text{ MPa} \\ s_2 = s_1 = 6.59 \frac{\text{kJ}}{\text{kg}\cdot\text{K}} \end{array} \right. \rightarrow h_2 = 2783.6 \text{ kJ/kg}$$

$$3 \left\{ \begin{array}{l} P = 6 \text{ kPa} \\ s_3 = s_1 = 6.59 \frac{\text{kJ}}{\text{kg}\cdot\text{K}} \end{array} \right. \rightarrow h_3 = 2031.6 \frac{\text{kJ}}{\text{kg}}$$

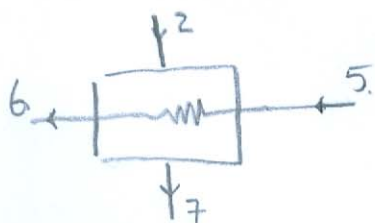
$$4 \left\{ \begin{array}{l} P = 6 \text{ kPa} \\ x = 0 \end{array} \right. \rightarrow \begin{array}{l} h_4 = 151.49 \frac{\text{kJ}}{\text{kg}} \\ v_4 = 0.0010 \end{array}$$

$$W_P = v \Delta P = 0.0010 \times (10000 - 6) = 10 \frac{\text{kJ}}{\text{kg}} \rightarrow h_5 = h_4 + W_P = 161.5 \frac{\text{kJ}}{\text{kg}}$$

$$6 \left\{ \begin{array}{l} P = 10 \text{ MPa} \\ T = 175^\circ\text{C} \end{array} \right. \rightarrow h_6 = 746.0 \frac{\text{kJ}}{\text{kg}}$$

$$7 \left\{ \begin{array}{l} P = 1 \text{ MPa} \\ x = 0 \end{array} \right. \rightarrow h_7 = 179.88 \frac{\text{kJ}}{\text{kg}}$$

7-8 مستوی  $\Rightarrow h_8 = h_7 = 179.88 \frac{\text{kJ}}{\text{kg}}$



بسیار نزدیک است به

$$\frac{\dot{m}_7}{\dot{m}_4} = x$$

$$x(h_7 - h_2) + h_6 - h_5 = 0 \rightarrow x = \frac{h_6 - h_5}{h_2 - h_7} = \frac{746 - 161.5}{2783.6 - 179.88} = 0.29$$

$$\dot{m}_7 = 0.29 \times 270 = 78.3 \frac{\text{kg}}{\text{s}}$$

$$\eta = \frac{W_{\text{turb}} - W_{\text{pump}}}{Q_H} = \frac{\dot{x}(h_1 - h_2) + (1 - \dot{x})(h_1 - h_3)}{h_5 - h_4}$$