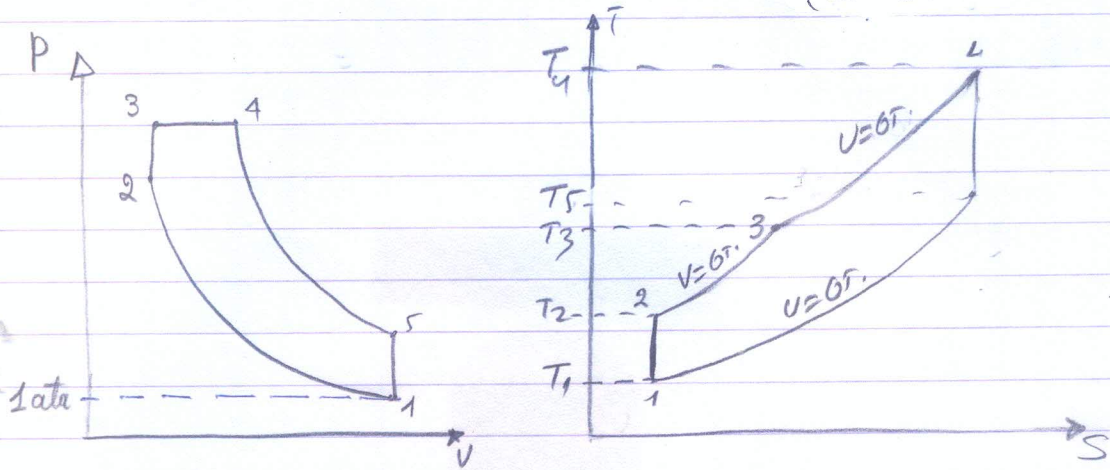


10³ αέριο (ΜΙΚΤΟΣ ΚΥΚΛΟΣ : ΔΙΔ. ΕΦΗΜΕΡΙΔΕΙΣ : ΣΕΠ-214-218)
(ΣΧ. 86)



λόγος συμπίεσης = $\frac{v_1}{v_2} = r = 10$

$P_1 = 1 \text{ bar}$

λόγος ισόχωρης μείωσης = $\frac{P_3}{P_2} = \pi = 2,1$

$T_1 = 27^\circ\text{C}$

λόγος νέσεων = $\frac{v_4}{v_3} = \beta = 1,8$

ΠΡΟΒΛΗΜΑ: ΑΕΡΑΙ

$R_1 = 287 \frac{\text{kJ}}{\text{kg}\cdot\text{K}}$: ΠΑΡΑΘΕΤΑ ΤΟΥ ΑΕΡΑ (ΠΙΝ. 2/ΣΕΠ. 341)

$k = 1,402$ (εμφέρειν αδιεξαρτησίς) (ΠΙΝ. 3/ΣΕΠ. 341)

1434

Καταβάτημα μεγέθων σε μέτρηση καταστάσεων J. Goupponias (2)6

ΣΗΜ.

$$\textcircled{1} P_1 = 1 \text{ bar} = 10^5 \text{ (N/m}^2\text{)} \quad T_1 = 27 + 273,15 = 300,15 \text{ (K)}$$

$$v_1 = \frac{P_1 \cdot T}{P_1} = \frac{287 \frac{\text{N}\cdot\text{m}}{\text{kg}\cdot\text{K}} \cdot 300,15 \text{ (K)}}{10^5 \text{ (N/m}^2\text{)}} = 0,861 \text{ (m}^3\text{/kg)}$$

ΣΗΜ.

$$\textcircled{2} r = \frac{v_1}{v_2} = 10 \rightarrow v_2 = 0,0861 \text{ (m}^3\text{/kg)}$$

$$\text{12: ΑΔΙΑΒΑΤΙΚΗ: } \frac{T_1}{T_2} = \left(\frac{v_2}{v_1}\right)^{\gamma-1} \Rightarrow T_2 = T_1 \cdot (r)^{\gamma-1} = 757,422 \text{ (K)}$$

$$P_2 = 2524740 \text{ N/m}^2 = 25,247 \text{ (bar)}$$

ΣΗΜ.

$$\textcircled{3} \eta_3 = 160\% \text{ η}$$

$$v_3 = v_2 = 0,0861 \text{ (m}^3\text{/kg)}$$

$$\eta = \frac{P_3}{P_2} = 2,1 \rightarrow P_3 = 53 \text{ (bar)} = 53 \times 10^5 \text{ (N/m}^2\text{)}$$

$$T_3 = T_2 \cdot \frac{P_3}{P_2} = 1590,58 \text{ (K)}$$

ΔΗΜ. (4) 34: Ισοβαρής

(3/6)

$$P_4 = P_3 = 53 \times 10^5 \text{ (N/m}^2\text{)}$$

$$\beta = 1.8 = \frac{v_4}{v_3} \rightarrow v_4 = 0,155 \text{ (m}^3\text{/kg)}$$

$$T_4 = \frac{P_4 \cdot v_4}{R_1} = 2862,37 \text{ (K)}$$

ΔΗΜ. (5) 45: ΑΔΙΑΒΑΤΙΚΗ

$$v_5 = v_1 = 0,861 \text{ (m}^3\text{/kg)}$$

$$\frac{T_5}{T_4} = \left(\frac{v_4}{v_5}\right)^{\gamma-1} \Rightarrow T_5 = 1437,7 \text{ (K)}$$

$$P_5 = \frac{R_1 \cdot T_5}{v_5} = 4,8 \text{ (bar)} = 4,8 \times 10^5 \text{ (N/m}^2\text{)}$$

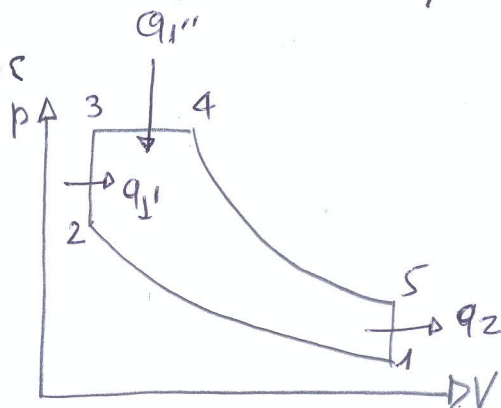
ΑΝΤΑΛΛΑΓΕΣ ΕΝΕΡΓΕΙΑΣ

(4/6)

ΣΥΣΤΗΜΑΤΟΣ ΠΕΡΙΒΑΛΛΟΝΤΟΣ

A) ποσά θερμότητας

$$q_1 = (q_{1'} + q_{1''}) = \text{προβιδιδόμενο}$$



23: Ισόχωρη: $q_{1'} = (\Delta U)_{23} = U_3 - U_2$

$$T_2 = 757,422 \text{ (K)}$$

$$u_2 = 52,83 + \frac{90,81 - 52,83}{800 - 600} \times (757,422 - 600) = 82,724 \left(\frac{\text{kcal}}{\text{kg}} \right)$$

$$u_3 = \dots = 258,278 \left(\frac{\text{kcal}}{\text{kg}} \right)$$

$$\Delta U_{23} = 175,554 \left(\frac{\text{kcal}}{\text{kg}} \right)$$

$$\rightarrow \Delta U_{23} = 175,554 \times 4,1868 = 735,0 \left(\frac{\text{kJ}}{\text{kg}} \right) = q_{1'}$$

34: Ισοβαρής: $q_{1''} = (h_4 - h_3)$

Ομοίως με γραμμική παρεμβολή:

$$h_3 = 347,04 \left(\frac{\text{kcal}}{\text{kg}} \right), \quad h_4 = 731,52 \left(\frac{\text{kcal}}{\text{kg}} \right)$$

$$(h_4 - h_3) = 384,48 \times 4,1868 = 1609,74 \left(\frac{\text{kJ}}{\text{kg}} \right) = q_{1''}$$

51: 160xωρη:

5/6

$$q_2 = q_{51} = (u_1 - u_5) : \underline{\text{ΑΠΟΒΑΛΛΟΜΕΝΟ}}$$

$$u_1 = 0,025 \frac{\text{Kcal}}{\text{kg}} \times 4,1868 = 0,108 \text{ KJ/kg}$$
$$u_5 = 224,5 \frac{\text{Kcal}}{\text{kg}} \times 4,1868 \approx 940 \text{ KJ/kg.} \quad \Rightarrow q_2 = 938,9 \text{ (KJ/kg)}$$

Ποσα Εργου

72: ΑΔΙΑΒΑΤΙΚΗ:

$$l_{1,2} = \frac{R_1 \cdot (T_1 - T_2)}{\gamma - 1} \dot{m} \quad l_{1,2} = -(u_2 - u_1)$$

↓
(δq = 0 = du + δl)

$$\dot{m} l_{1,2} = \frac{P_1 V_1 - P_2 V_2}{\gamma - 1}$$

$$l_{1,2} = -326\,460,36 \text{ (J/kg)}$$

23: Ισόχωρη: $l_{23} = 0$

6/6

34: Ισοβαρής

$$\begin{aligned} l_{34} &= P_{34} \cdot (v_4 - v_3) = \\ &= 53 \times 10^5 \left(\frac{\text{N}}{\text{m}^2} \right) \cdot (0,155 - 0,0861) \left(\frac{\text{m}^3}{\text{kg}} \right) = \\ &= 365170 \text{ (J/kg)} \end{aligned}$$

45: ΑΔΙΑΒΑΤΙΚΗ

$$l_{45} = 1017115,15 \text{ (J/kg)}$$

51: Ισόχωρη $l_{51} = 0$

ΒΑΘΜΟΣ ΑΠΟΔΟΣΗΣ

$$\eta = \frac{L}{Q_1} = \frac{Q_1 - Q_2}{Q_1} = 0,599$$

$$Q_1 = (q_{12} + q_{11}) \cdot 1 \text{ kg}$$

$$Q_2 = q_{21} \cdot 1 \text{ kg}$$

m

Από την σχέση 21B: $\eta = 0,60$