

Esercizio TD 1

$$S_{\text{irr}} = 1075.0 \text{ J}$$

Esercizio TD 2

1. $W^{\rightarrow} = m c \left[T_1^A + T_1^B - 2\sqrt{T_1^A T_1^B} \exp\left(\frac{S_{\text{irr}}}{m c}\right) \right]$
 2. $T_{\text{min}} = 460.43 \text{ K}; T_{\text{max}} = 508.15 \text{ K}$
 3. $W_{\text{min}}^{\rightarrow} = 0; W_{\text{max}}^{\rightarrow} = 520.1 \text{ kJ}$
 4. $\Psi_1^A = 0; \Psi_1^B = 0$
 5. $\Psi_{11}^{AB} = 520.1 \text{ kJ}$
 6. $\Omega_{11}^{AB} = 968.1 \text{ kJ}$
-

Esercizio TD 3

1. $T_{2\text{rev}} = 350 \text{ K}$
 2. $T_{2\text{irr}} = 380 \text{ K}$
 3. $\varepsilon_{\text{PC}} = 1 - \frac{T_B}{T_A} (1 - \varepsilon_{\text{F}})$
-

Esercizio TD 4

1. $\dot{W}_{\text{min}} = 13.7 \text{ kW}$
 2. $\dot{Q}_0 = 21.3 \text{ kW}$
 3. $\dot{W} = 35.0 \text{ kW}$
 4. $\dot{S}_{\text{irr}} = 76.4 \text{ W/K}$
-

Esercizio TD 5

$$m = 2.969 \text{ kg}; x = 0.12; V_f = 0.003 \text{ m}^3; V_g = 0.047 \text{ m}^3 \\ \Psi = 0; \Omega^R = 663.12 \text{ kJ}$$

Esercizio TD 6

$$Q_{12}^+ = 9970 \text{ kJ}$$

Esercizio TD 7

$$p_2 = p_{amb}; T_2 = 99.99 \text{ }^\circ\text{C}; x_2 = 0.168; (v_2 = 0.2818 \text{ m}^3/\text{kg}; V_2 = 39.4 \text{ dm}^3)$$

Esercizio TD 8

1. $T_2 = 160 \text{ }^\circ\text{C}; p_2 = 1.473 \text{ bar}$
 2. $S_{irr} = 6346 \text{ kJ/K}$
-

Esercizio TD 9

$$\Delta H = 188 \text{ kJ}; T_2 = 89.6 \text{ }^\circ\text{C}; \Delta U = 134.4 \text{ kJ}; W^+ = -53.6 \text{ kJ}; \Delta S = 0.553 \text{ kJ/K}$$

Esercizio TD 10

$$\text{flusso da 2 a 1}; \dot{S}_{irr} = 77.6 \text{ W/K}$$

Esercizio TD 11

$$\dot{W}_{\max}^{\rightarrow} = 940.6 \text{ kW}$$

Esercizio TD 12

$$W_{\min}^{\leftarrow} = 28.5 \text{ MJ}$$

Esercizio TD 13

$$\dot{S}_{irr} = 9.47 \text{ kW/K}; (\dot{S}_{irr,V} = 3.97 \text{ kW/K}; \dot{S}_{irr,SC} = 5.50 \text{ kW/K})$$

Esercizio TD 14

$$p_3 = 1.63 \text{ bar}$$

Esercizio TD 15

1. $\dot{W}_{\min}^{\leftarrow} = 4.1335 \text{ MW}$
 2. $\dot{m}_g = 41.68 \text{ kg/s}$
 3. $\Delta T_{\min} = 14^{\circ}\text{C}$
-

Esercizio TD 16

1. $w_t^{\rightarrow} = 769.3 \text{ kJ/kg}$
 2. $q_{eb}^{\leftarrow} = 3013.3 \text{ kJ/kg}$
 3. $\eta_I = 25.5\%$
-

Esercizio TD 17

1. $\dot{m} = 6.46 \text{ kg/s}$
 2. $\eta_I = 41.2\%$
-

Esercizio TD 18

1. $w_p^{\leftarrow} = 6.3 \text{ kJ/kg}$
 2. $w_t^{\rightarrow} = 1424.1 \text{ kJ/kg}$
 3. $q_{eb}^{\leftarrow} = 3878.5 \text{ kJ/kg}$
 4. $\eta_I = 36.6\%$
-

Esercizio TD 19

1. $w_{rev}^{\rightarrow} = 194.7 \text{ kJ/kg}; \eta_I = 37.0\%$
 2. $w^{\rightarrow} = 95.3 \text{ kJ/kg}; \eta_I = 19.7\%$
 3. $w^{\rightarrow} = 95.3 \text{ kJ/kg}; \eta_I = 30.3\%$
-

Esercizio TD 21

1. $\dot{m} = 1.01 \text{ kg/s}$
 2. $\dot{W}_C^{\leftarrow} = 24.3 \text{ kW}$
 3. C.O.P. = 4.94
-

Esercizio TD 22

1. stato 2 monofase vapore, $p_2 = 200$ kPa, $h_2 = 2748.9$ kJ/kg, $T_2 = 140.7$ °C, ($s_2 = 7.2309$ kJ/kg K); $\dot{W}_A = 3422.0$ kW
 2. $\dot{W}_{B,\max} = 2989.0$ kW
 3. $\dot{W}_{C,\max} = 3803.6$ kW
-

Esercizio TD 23

1. $\omega = 8.7319 \times 10^{-3}$ kg/kg_{as}; $T_r = 11.8$ °C
 2. $\phi = 34.6\%$; $T_r = 3.8$ °C
 3. $\omega = 9.8791 \times 10^{-3}$ kg/kg_{as}; $T_r = 13.7$ °C
 4. $\phi = 55.1\%$; $\omega = 1.4691 \times 10^{-2}$ kg/kg_{as}
-

Esercizio TD 24

1. $T_{bu} = 27.7$ °C; $T_{si} = 27.6$ °C
 2. $\omega_1 = 8.5851 \times 10^{-3}$ kg/kg_{as}; $\omega_{\text{appr}} = 8.6361 \times 10^{-3}$ kg/kg_{as}
-

Esercizio TD 25

1. $\omega_1 = 5.6227 \times 10^{-3}$ kg/kg_{as}; $\phi_1 = 53.2\%$
 2. $\dot{Q} = 2.0$ kW
-

Esercizio TD 26

stato eterogeneo; $T_2 = 17.6$ °C

Esercizio TD 27

1. $\dot{m}_w = 0.884 \text{ kg/h}$
 2. $\dot{Q} \rightarrow = 0.909 \text{ kW}$
-

Esercizio TD 28

1. $\omega_1 = 1.048 \times 10^{-2} \text{ kg/kg}_{\text{gas}}$
 2. $\phi_1 = 39.5\%$
 3. $T_{r1} = 14.7^\circ\text{C}$
-

Esercizio ST 1

1. $L_{2\text{min}} = 23.8 \text{ cm}$
 2. $T_3 = 1272^\circ\text{C}$
-

Esercizio ST 2

$$q = 937.5 \text{ W}$$

Esercizio ST 3

1. $q' = 111.3 \text{ W/m}$
 2. $s = 26.8 \text{ cm}$
-

Esercizio ST 4

1. $q_o = \frac{T_c - T_{\infty,o}}{R_{h,o}} = \frac{T_c - 18^\circ\text{C}}{1.1111 \text{ K/W}}$
 2. $q_i = \frac{T_c - T_{\infty,i}}{R_{tot,i}} = \frac{T_c - 20^\circ\text{C}}{33.4445 \text{ K/W}}$
 3. $T_{c,acc} = 47.10^\circ\text{C}; T_{c,sp} = 18.06^\circ\text{C}$
 4. $T_c(2s) = 33.01^\circ\text{C}$
-

Esercizio ST 5

$$T_{\max} = 37.73^\circ\text{C}$$

Esercizio ST 6

1. $T_0 = 93.073^\circ\text{C}$
 2. (a) $T_R = 87.4^\circ\text{C}; T_{(R+\delta)} = 71.8^\circ\text{C};$ (b) $\delta_C = 4.57 \text{ mm}$
-

Esercizio ST 7

$$q' = 422.1 \text{ W/m}$$

Esercizio ST 8

$$\dot{Q} = 84.7 \text{ W}$$

Esercizio ST 9

1. $q_{\text{senza}} = 235.6 \text{ W}$
 2. $q_{\text{con}} = 689.6 \text{ W}$
-

Esercizio ST 10

$$T_t = -727.60K e^{-21.747t} + 747.60 \text{ }^\circ\text{C}; T_t(0.1\text{s}) = 664.91 \text{ }^\circ\text{C}; T_t(10\text{s}) = 747.60 \text{ }^\circ\text{C}$$

Esercizio ST 11

1. $t_1 = 93.8 \text{ s}$
 2. $t_2 = 3.2 \text{ s}$
-

Esercizio ST 12

1. $T(2 \text{ cm}, 1 \text{ min}) = 176 \text{ }^\circ\text{C}$
 2. $Q(1 \text{ min})/L = 2780 \text{ kJ/m}$
 3. $T(1 \text{ min}) = 170 \text{ }^\circ\text{C} (-3\%); Q(1 \text{ min})/L = 2290 \text{ kJ/m} (-17.6\%)$
-

Esercizio ST 13

1. $x_1 = 0.223 \text{ m}; x_2 = 0.316 \text{ m}$
 2. $Q_{\text{suolo} \rightarrow \text{aria}} = 1614 \text{ kJ}$
-

Esercizio ST 14

$$q'_1 = 80.7 \text{ W/m}; q'_2 = 114.2 \text{ W/m}$$

Esercizio ST 15

$$q = 2349 \text{ W}$$

Esercizio ST 16

1. $T_m = 268.8 \text{ }^\circ\text{C}$

2. $T_L = 389.7 \text{ }^\circ\text{C}$

Esercizio ST 17

(a) $q_{\max, \text{cpt}} = 3476.8 \text{ W}$; (b) $q_{\max, \text{spt}} = 2167.0 \text{ W}$;

Esercizio ST 18

$$1.26 \text{ A} < I < 1.89 \text{ A}$$

Esercizio ST 19

1. $q'' = 1260 \text{ W/m}^2$

2. $\Delta T_m = 38.8 \text{ }^\circ\text{C}$

Esercizio ST 20

1. $T_m(x) = 300 \text{ K} + 8.074 \text{ K} \left[1 - \cos\left(\frac{\pi}{1.5} x\right) \right]$; $T_m(1.5 \text{ m}) = 43.1 \text{ }^\circ\text{C}$

2. $T_p(x) = 300 \text{ K} + 8.074 \text{ K} \left[1 - \cos\left(\frac{\pi}{1.5} x\right) \right] + 21.13 \text{ K} \text{ sen}\left(\frac{\pi}{1.5} x\right)$

3. $T_{p, \max} = 57.69 \text{ }^\circ\text{C}$

Esercizio ST 21

$$T_m(L) = 73.1 \text{ }^\circ\text{C}$$

Esercizio ST 22

1. $\dot{E}_{cil} = 794.9 \text{ W}$
 2. $q_{cil-stanza} = 790.9 \text{ W}$
-

Esercizio ST 23

$$(q'' - q_r'')/q'' = 93\%; T_i = 255 \text{ }^\circ\text{C}$$

Esercizio ST 24

$h = 13.2 \text{ W/m}^2 \text{ K}$; il vento scalda la foglia, è meglio se c'è

Esercizio ST 25

1. $F_{12} = 5.236 \times 10^{-3}$; $F_{R2} = 5.236 \times 10^{-3}$; $F_{1R} = 0.9948$
 3. $q = 3.44 \text{ W}$
-