

1- a)

$$Re_x = \frac{\rho V_x}{\mu}$$

$$V_\infty = 5,0$$

$$L = 1,3$$

$$\dot{Q}'' = 286,93$$

$$Re_x = \frac{1,23 \cdot 5,0 \cdot (0,2 \cdot 1,3)}{1,78 \cdot 10^{-5}}$$

$$Re_x = 89831 = 8,98 E+04$$

↳ caso 4

$$Nux = 0,453 \cdot Re_x^{0,5} \cdot Pr^{1/3}$$

$$Nux = 1,22,35$$

$$Nux = \frac{h \cdot (0,2 L)}{k} \Rightarrow h = \frac{122,35 \cdot 0,02439}{0,2}$$

$$h = 11,47 \Rightarrow \boxed{h = 11,5}$$

1- b)

$$b-) Re_x = \frac{\rho V_x}{\mu}$$

$$= \frac{1,23 \cdot 5,0 \cdot (3 \cdot 0,2 \cdot 1,3)}{1,78 \cdot 10^{-5}} = 3,59 E+05$$

↳ caso 5

$$Nux = 0,038 \cdot Re_x^{0,8} \cdot Pr^{(1/3)}$$
$$= 952,73$$

$$h = \frac{Nux \cdot k}{0,2 L} = \frac{952,73 \cdot 0,02439}{1,04} = h = 22,34$$

$$\boxed{h = 22,3}$$

C-)

$$T_{S(0,26)} = 10 + \frac{286,93}{11,5} = 34,95^{\circ}\text{C}$$

$$T_{S(1,04)} = 10 + \frac{286,93}{22,3} = 22,87^{\circ}\text{C}$$

$$T_{S(1,04)} - T_{S(0,26)} = 22,87 - 34,95$$
$$= -12,08$$

$$\Delta t = -12^{\circ}\text{C}$$

2-

$$a) \dot{Q} = h \cdot A (T_s - T_\infty)$$

$$a = 0,35$$

$$b = 0,15$$

$$c = 0,229$$

$$h = 17,14$$

$$T_b = 50$$

$$= 17,14 \cdot (76 \cdot a) (T_s - T_\infty)$$

$$= 17,14 \cdot 0,3675 \cdot (50 - 10)$$

$$= 251,99$$

$$\dot{Q} = 252 \text{ W}$$

$$b) \dot{Q}_{al} = M \cdot \frac{\left[\sinh(mL) + \left(\frac{h}{mk}\right) \cosh(mL) \right]}{\cosh(mL) + \left(\frac{h}{mk}\right) \sinh(mL)}$$

$$\cosh(mL) + \left(\frac{h}{mk}\right) \sinh(mL)$$

$$= 160,07$$

$$m = \sqrt{\frac{h \cdot P}{k \cdot A_s}}$$

$$= \sqrt{\frac{17,14 \cdot 1}{40 \cdot 0,0525}}$$

$$m = 2,857$$

$$\Theta_b = T - T_\infty$$

$$= 40$$

$$M = \Theta_b \sqrt{h \cdot P \cdot k \cdot A_s}$$

$$M = 240$$

$$\dot{Q}_{AL} = 160 \text{ W}$$

$$c-) \quad \epsilon_a = \frac{\dot{Q}_{AL}}{h \cdot A_s \cdot \theta_b}$$

$$\epsilon_a = \frac{160}{17,14 \cdot 0,0525 \cdot 40}$$

$$= 4,4452$$

$$\boxed{\epsilon_a = 4,4}$$

$$d-) \quad \dot{Q}_t = \dot{Q}_p + \dot{Q}_r$$

$$A_{rem} = A_{total} - A_{aletas}$$

$$A_{rem} = (7 \cdot 0,15 \cdot 0,35) - 3(0,15 \cdot 0,35)$$

$$A_{rem} = 0,21$$

$$\dot{Q}_{rem} = h \cdot A_{rem} (T_s - T_\infty)$$

$$= 17,14 \cdot 0,21 \cdot 40$$

$$\dot{Q}_{rem} = 143,976$$

$$\dot{Q}_{AL} = 3 \cdot 160$$

$$\dot{Q}_{AL} = 480$$

$$\dot{Q}_t = \dot{Q}_{rem} + \dot{Q}_{AL}$$

$$= 143,976 + 480$$

$$= 623,97$$

$$\boxed{\dot{Q}_t = 624 \text{ W}}$$

3- a-)

$$\dot{Q} = \dot{Q}''' \cdot V$$

$$r = 110 \text{ mm}$$

$$L = 135 \text{ mm}$$

$$\dot{Q}''' = 22,77$$

$$h = 10,3$$

$$= 9,74 \cdot (\pi R^2 h)$$

$$= 9,74 \cdot (\pi \cdot 0,11^2 \cdot 0,135)$$

$$= 116,85$$

$$\boxed{\dot{Q} = 117 \text{ W}}$$

b-)

$$\dot{Q}_{\text{conv}} = h A (T_s - T_\infty)$$

$$= 10,3 \cdot (2\pi R L) \cdot (100 - 10)$$

$$= 10,3 \cdot (2 \cdot \pi \cdot 0,11 \cdot 0,135) \cdot (90)$$

$$= 86,49$$

$$\boxed{\dot{Q}_{\text{conv}} = 86}$$

$$c-) \dot{Q}_{\text{Ger}} = \dot{Q}_{\text{conv}} + \dot{Q}_{\text{cond}} + \dot{Q}_{\text{Rad}}$$

$$117 = 86 + \dot{Q}_{\text{conv}}$$

$$\dot{Q}_{\text{conv}} = 31$$

$$\epsilon \sigma A (T_1^4 - T_2^4) = 31$$

$$\epsilon = 31$$

$$5,669 \cdot 10^{-8} \cdot 0,093 \cdot 12960176650$$

$$\Rightarrow \boxed{\epsilon = 0,45}$$