Brayan sandoval.

P1.
datos:

$\nearrow$ superficie opaca

$T = 500K$ $\qquad \alpha + \rho = 1$

$\varepsilon = 0.3$

$H_{bi} = 30.000\ W/m^2$ $\qquad \sigma = 5.67 \times 10^{-8} \left(\frac{W}{m^2 K^{-4}}\right)$

por ley de Kirchoff $\alpha = \varepsilon = 0.3$

$\Rightarrow \quad \rho = 1 - \alpha = 1 - 0.3 = 0.7$

a) flujo absorbido por unidad de area

$$\alpha H_{bi} = 0.3 \times 30.000 \frac{W}{m^2} = 9000 \frac{W}{m^2}$$

b) flujo reflejado por unidad de area

$$\frac{W}{A} = \rho \cdot H_{bi} = 0.7 \times 30.000 \frac{W}{m^2}$$
$$= 21000 \frac{W}{m^2}$$

c) flujo emitido.

$$W = \sigma \cdot A \cdot \varepsilon \cdot T^4 \Rightarrow \frac{W}{A} = \sigma \cdot \varepsilon \cdot T^4$$

$$\Rightarrow \frac{W}{A} = 5.67 \times 10^{-8} \times 0.3 \times (500)^4 \frac{W}{m^2}$$
$$= 1063.1 \frac{W}{m^2}$$

d) Radiosidad.

B_i = energía emitida + energía reflejada

$= 1063.1 \frac{W}{m^2} + 21000 \frac{W}{m^2}$

$= 220631 \frac{W}{m^2}$

P2.

datos:

$\alpha H_{bi} = 800 \frac{W}{m^2}$ $T_\infty = 20°C = 293.15 K$

$h = 12 \frac{W}{m^2 K}$ $\sigma = 5.67 \times 10^{-8} \left[\frac{W}{m^2 K^4}\right]$

a)

$$Q_{abs} = Q_h + Q_r \Leftrightarrow \alpha H_{bi} = h \cdot (T_t - T_\infty) + \varepsilon \sigma (T_t^4 - T_\infty^4)$$

si $Q_r = 0$

$$\Rightarrow \alpha H_{bi} = h (T_t - T_\infty)$$

$$\Rightarrow 800 \frac{W}{m^2} = 12 \left[\frac{W}{m^2 K}\right] (T_t - 293.15 K)$$

$$\Rightarrow T_t \approx 359.82 K$$

b) $\varepsilon = 0.8$

$$\Rightarrow Q_{abs} = Q_h + Q_r \Leftrightarrow \alpha H_{bi} = h \cdot (T_t - T_\infty) + \varepsilon \sigma (T_t^4 - T_\infty^4)$$

$$\Rightarrow 800 \frac{W}{m^2} = 12 \frac{W}{m^2 K} (T_t - 293.15K) + 0.8 \times 5.67 \times 10^{-8} \frac{W}{m^2 K^4} (T_t^4 - (293.15 K)^4)$$

$$\Rightarrow T_t \approx 338.25 K$$