P1) $\forall(T) = 5 \cdot 10^6 \cdot e^{0{,}0558(T-20)}$; $T_e = 60$

$$Q_a = 156 + \frac{(406-156)}{86.400} t = 156 + 0{,}0029\, t \; ; \; (0 \leq t \leq 1\,\text{día} = 86.400\,[s])$$

$$Q_a = 406 - \frac{(406-156)}{2 \cdot 86.400} t = 406 - 0{,}00145\, t \; ; \; (86.400 \leq t \leq 259.200\,[s])$$

Continuidad: $\frac{d\forall}{dt} = Q_a - \cancel{Q_e}^{\,0} \Leftrightarrow \frac{d\forall}{dt} = Q_a \Leftrightarrow \int_{\forall_0}^{\forall_f} d\forall = \int_0^t Q_a\, dt$

a) $$\int_{\forall(T=56)}^{\forall(T=60)} d\forall = \int_0^t (156 + 0{,}0029t)\,dt \Leftrightarrow 5 \cdot 10^6 \cdot e^{0{,}0558 \cdot 40} - 5 \cdot 10^6 \cdot e^{0{,}0558 \cdot 36} = 156t + \frac{0{,}0029}{2} t^2$$

$$9.320.588 = 156t + 0{,}0029\, t^2 \Rightarrow t = 42.756\,[s]$$

b) $$5 \cdot 10^6 \cdot e^{0{,}0558 \cdot 40} - 5 \cdot 10^6 \cdot e^{0{,}0558 \cdot 25} = 26.417.549 = 156t + \frac{0{,}0029}{2} t^2 \Rightarrow t = 91.508\,[s] > 86.400$$

$\Rightarrow$ Hay que usar ambas expresiones de caudal efluente

$$26.417.549 = \int_0^{86.400} (156 + 0{,}0024t)\,dt + \int_{86.400}^{t} (406 - 0{,}00145t)\,dt = 156t + \frac{0{,}0029}{2} t^2 \Big|_0^{86.400} + 406t - \frac{0{,}00145}{2} t^2 \Big|_{86.400}^{t}$$

$$\Leftrightarrow 26.417.549 = 156 \cdot 86.400 + \frac{0{,}0029}{2} \cdot 86.400^2 + 406t - \frac{0{,}00145}{2} t^2 \Rightarrow t = 177.575\,[s]$$