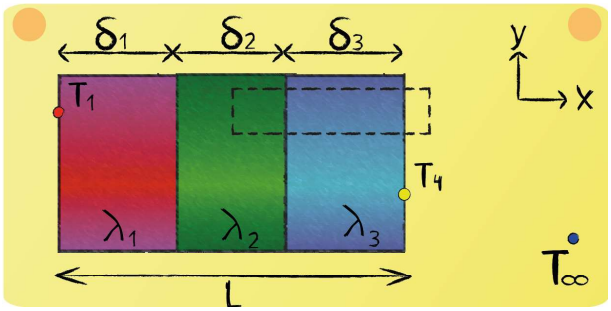
Lecture 7 - Question 8



Determine the heat transfer passing the multi-layer wall. Take $\delta_1 = 0.8\ cm$, $\delta_2 = 1.6\ cm$, $\delta_3 = 1.2\ cm$, $\lambda_1 = 2\ W/mK$, $\lambda_2 = 4\ W/mK$, $\lambda_3 = 3\ W/mK$, $A = 1\ m^2$, $T_1 = 293\ K$, $\alpha = 30\ W/m^2K$ and $T_\infty = 273\ K$.

Using the following equation:

$$\dot{Q} = \frac{1}{R_{c,tot}}(T_1 - T_{n+1})$$

Results in:

$$\dot{Q} = \frac{T_1 - T_\infty}{\frac{\delta_1}{\lambda_1 A} + \frac{\delta_2}{\lambda_2 A} + \frac{\delta_3}{\lambda_3 A} + \frac{1}{\alpha A}} = \frac{20}{0.004 + 0.004 + 0.004 + 0.0333} = 441\ W$$