

# ASSIGNMENT 1

## Question:

A short summary about the conductive heat transfer and solving the same exercise with:  $L = 0.4 \text{ m}$ ,  $A = 20 \text{ m}^2$ ,  $\Delta T = 25$ , and  $k = 0.78 \text{ W/m K}$  using both simple method and using the resistance concept.

## Summary:

Conductive heat transfer occurs in solids because of the differences in the temperature in different parts of the solid. Thermal energy is transferred due to molecular movement throughout the material.

## Solution:

*Simple method:*

$$\dot{Q} = kA \frac{\Delta T}{L} = 0.78 \frac{\text{W}}{\text{mK}} * 20 \text{m}^2 * \frac{25 \text{K}}{0.4 \text{m}} = 975 \text{W}$$

*Using the resistance concept:*

$$R_{\text{wall}} = \frac{L}{kA} = \frac{0.4 \text{m}}{0.78 \frac{\text{W}}{\text{mK}}} * 20 \text{m}^2 \approx 0.02564 \frac{\text{K}}{\text{W}}$$

$$\dot{Q} = \frac{\Delta T}{R_{\text{wall}}} = \frac{25 \text{K}}{0.02564 \frac{\text{K}}{\text{W}}} \approx 976.6 \text{W}$$