Conductive heat transfer

Conductive heat transfer refers to the ability of a material to transfer or conduct heat. It is one of the three methods of heat transfer. Heat moves along a temperature gradient, from an area of high temperature and high molecular energy to an area with a lower temperature and lower molecular energy. This transfer will continue until thermal balance is reached. The rate ($\dot{Q}$) at which heat is transferred is depend on the difference (ΔT) between lower temperature (T_c) and higher temperature (T_h), the thermal resistivity of the material (K), thickness (L) and the area of the substance (A).

Question1

L= 0.4 m, A= 20 m^2, ΔT= 25 , k=0.78 W/m K

Answer:

Simple method:

$$\dot{Q} = k \times A \frac{\Delta T}{L} = 0.78 \times 20 \times \frac{25}{0.4} = 975 \text{ W}$$

Resistance concept method:

$$R_{wall} = \frac{L}{k \times A} = \frac{0.4}{0.78 \times 20} = 0.0256 \text{ K/W}$$

$$\dot{Q} = \frac{\Delta T}{R_{Wall}} = \frac{25}{0.0256} = 976 \text{ W}$$