

Summary:

Conduction can occur in three forms: solid, liquid or gas. The thermal conductivity of a medium depends on the shape, thickness, material, and temperature difference of the medium. Conductive heat transfer is the process of transferring internal energy from high-energy particles of a substance to adjacent low-energy particles due to interactions between molecules.

Question:

$$L = 0.4m, A = 20m^2, \Delta T = 25K, \text{ and } k = 0.78 \frac{W}{mK}$$

Solution:

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

By using the resistance concept

$$R_{Wal} = \frac{\Delta}{L} = \frac{0.4m}{0.78 \text{ m}^{-1}K^{-1} * 20m^2}$$

$$\approx 0.0256K/W$$

$$\dot{Q} = \frac{\Delta T}{R_{Wall}} = \frac{25K}{0.0256KW^{-1}}$$

$$\approx 976.6W;$$