A short summary about the conductive heat transfer and solving the same exercise with L= 0.4 m, A= 20 m2, DeltaT= 25, and k=0.78 W/m K using both simple method and using the resistance concept

Answer

Heat transfer occurs when there is an imbalance in temperature between the outer and inner layers of a material. Naturally the heat will flow from the higher temperature to the lowest by radiation(gas)then conduction (solid and liquid) until it reaches equilibrium. Depending on the type and property of that material- in respect to the space between material molecules a material can be considered conductive, convection or radiation. Subsequently, heat conduction occurs in stationary materials as a result of the vibrations of atoms or molecules in the materials. The molecules collide with surrounding molecules, making them vibrate too, resulting in the transportation of thermal energy to neighbouring part of the object. Hence, the smaller the spaces between the molecules are the higher the material to be conductive. As a result, Conduction is a process in which transfer of heat takes place between objects by direct contact. due to the difference in temperature, between adjacent parts of the object. It happens when the temperature of the molecules presents in a substance increase, resulting in vigorous vibration. In simple terms, whenever two objects are in direct contact with one another, there will be a transfer of heat from the hotter object to the colder one, which is due to conduction. Further, the objects which permit heat to travel easily through them are called conductors.

Answer

$$Q=KA\frac{\Delta T}{L}$$

Q=0.7x20(25/0.4)

Q=14x62.5

Q=875W

Answer

$$Q=\frac{\Delta T}{R}$$

$$Q=\frac{25}{0.4/(0.7x20)}$$

$$Q=\frac{25}{0.4/14}$$

Q=25/0.02857

Q=875.04W