Week (2)

Convection

When a fluid, such as air or a liquid, is heated and then travels away from the source, it carries the thermal energy along. This type of heat transfer is called convection
There are 2 different kind of convection
natural (it happens in terms of difference between warm and cold whether density)
Forced(wind can be a good example of this external force)

The amount of heat transferred through convection depends on 3 different item:
1-Kind of liquid or gas
2-Velocity of liquid or gas
3-Temperature variation

Decreasing the amount of convection has a reasonable way
Using double panel window, the air gap between two glass avoid heat transferring and also by increasing the air gap size we just wasting money this also is correct for increasing glass thickness because these item has no significant effect on heat transferring

Consider a 0.8-m-high and 1.5-m-wide double-pane window consisting of two 6-mm-thick layers of glass(k=0.78 W/m°CC) separated by a 13-mm-wide stagnant air space(k=0.026 W/m°CC).
Determine the steady rate of heat transfer through this double-pane window and the temperature of its inner surface.(Take the convection heat transfer coefficients on the inner and outer surfaces of the window to be h1=10$WWmm2°CC$ and h2= 40$WWmm2°CC$, which includes the effects of radiation.)

A = 0.8mm∗1.5mm=1.2mm^2

$$R_{conv_1} = \frac{1}{h_1 \times A} = (\frac{1}{10 * 1.2)} = 0.0833\ °C/W$$

$$R_{conv_2} = \frac{1}{h_1 \times A} = (\frac{1}{40 * 1.2)} = 0.0208\,°C/W$$

$$R_{glass} = \frac{L_g}{(K_g \times A)} = \frac{0.006}{0.78 * 1.2} = 0.0064\,° \frac{C}{W}$$

$$R_{air} = \frac{L_{air}}{(K_{air} \times A)} = \frac{0.013}{0.026 * 1.2} = 0.4167\,° \frac{C}{W}$$

$$R_{total=}\ 0.5333\,° \frac{C}{W}$$

$$\dot{Q}_{conv} = \frac{30}{0.5333} = 56.25\ W$$

$$\dot{Q} = \frac{T_{inff_1} - T_{s_1}}{R_{conv_1}} = \rightarrow 56.25 = \frac{20 - T_{s_1}}{0.0833} \rightarrow T_{S_{1=}}\ 15.3\ °C$$