

Week2 YUYUE

1. Complete the modified example of simplified wall calculations that went through in the assignment of week 3 and find the total heat transfer through wall

	Wood	Insulation
Outside air	0.03	0.03
Wood bevel	0.14	0.14
plywood	0.11	0.11
Urethane rigid foam insulation		3.528
Wood studs	0.63	
Gypsum board	0.079	0.079
Inside surface	0.12	0.12

$$R'_{with.wood} = 0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12 = 1.109 \text{ }^{\circ}\text{C/W}$$

$$R'_{with.insulation} = 0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12 = 4.007 \text{ }^{\circ}\text{C/W}$$

$$U_{wood} = \frac{1}{R'_{with.wood}} = \frac{1}{1.109} = 0.9017 \text{ }^{\circ}\text{C/W}$$

$$U_{insulation} = \frac{1}{R'_{with.insulation}} = \frac{1}{4.007} = 0.2496 \text{ }^{\circ}\text{C/W}$$

$$U_{total} = U_{wood} * \frac{A_{wood}}{A_{total}} + U_{insulation} * \frac{A_{insulation}}{A_{total}} = 0.9017 * 0.25 + 0.2496 * 0.75$$

$$= 0.4126 \text{ }^{\circ}\text{C/W}$$

$$R_{total} = \frac{1}{U_{total}} = \frac{1}{0.4126} = 2.4237 \text{ }^{\circ}\text{C/W}$$

$$Q_{total} = U_{total} * A_{total} * \Delta T = 0.4126 * 50 * 2.5 * (1 - 20\%) * 24 = 990.24 \text{ W}$$

2. A summary of what you have learnt in this session about radiation and radiative heat transfer

While the object emits radiant energy outward, it also continuously absorbs the radiant energy emitted by other surrounding objects and converts it into thermal energy. The heat transfer between the objects that emits radiant energy and absorbs radiant energy is called radiation. Heat transfer. If the radiation heat transfer is between two objects with different temperatures, the result of the heat transfer is that the high temperature object transfers the heat to the low temperature object. If the temperature of the two objects is the same, the radiation heat transfer between the objects is equal to zero, but the object The process of radiation and absorption is still ongoing.

Also known as thermal radiation. A basic way of heat transfer.

Radiation is a phenomenon in which energy is transmitted by electromagnetic waves. Objects emit radiant energy for a variety of reasons. The process in which radiant energy is emitted due to heat is called thermal radiation. It is emitted in the form of electromagnetic waves and propagates in space. When it encounters another object, it is partially or completely absorbed, and it is converted into heat again. Thermal radiation is different from heat conduction and convective heat transfer. Radiation is not only the transfer of energy but also the conversion of energy. In addition, radiant energy can be transmitted in a vacuum without any material being used as a medium. Liquids and gases also transfer heat in a radiant manner, but only a small fraction of the total heat transfer.