Task 1: you should complete the modified example of simplified wall calculations that you 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(13mm*200mm)	0.14	0.14
Polywood(13mm)	0.11	0.11
Urethane Rigif Foam Ins.(90mm)	No	0.98*90/25=3.528
Wood Studs(90mm)	0.63	No
Gypsum Board(13mm)	0.079	0.079
Inside Surface	0.12	0.12

$$\mathrm{R_{withwood}} = (0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12)\frac{\mathrm{m^2 \times ℃}}{\mathrm{W}} = 1.109\frac{\mathrm{m^2 \times ℃}}{\mathrm{W}}$$

$$\mathrm{R_{withinsulation}} = (0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12)\frac{\mathrm{m^2 \times ℃}}{\mathrm{W}} = 4.007\frac{\mathrm{m^2 \times ℃}}{\mathrm{W}}$$

$$U_{wood} = \frac{1}{\mathrm{R_{withwood}}} = \frac{1}{1.109\frac{\mathrm{m^2 \times ℃}}{\mathrm{W}}} \approx 0.9017\frac{W}{\mathrm{m^2 \times ℃}}$$

$$U_{insulation} = \frac{1}{\mathrm{R_{withinsulation}}} = \frac{1}{4.007\frac{\mathrm{m^2 \times ℃}}{\mathrm{W}}} \approx 0.2496\frac{W}{\mathrm{m^2 \times ℃}}$$

$$\because \frac{1}{R_{Total}} = \frac{1}{R_{wood}} + \frac{1}{R_{insulation}}, R = \frac{R`}{A},$$

$$\therefore \frac{A_{total}}{R_{total}} = \frac{A_{wood}}{R_{wood}} + \frac{A_{insulation}}{R_{insulation}}$$

$$autem, U = \frac{1}{R`}$$

$$A_{total} * U_{total} = A_{wood} * U_{wood} + A_{insulation} * U_{insulation}$$

Both sides of the equation divided by U_{total}

$$U_{total} = U_{wood} * \frac{A_{wood}}{A_{total}} + U_{insulation} * \frac{A_{insulation}}{A_{total}} = (21\% + 4\%) * U_{wood} + 75\% * U_{insulation}$$

$$\approx 205\% * 0.9017\frac{W}{\mathrm{m^2 \times ℃}} + 75\% * 0.2496\frac{W}{\mathrm{m^2 \times ℃}} \approx 0.4126\frac{W}{\mathrm{m^2 \times ℃}}$$

The overall unit thermal resistance $R_{value} = \frac{1}{U_{total}} \approx \frac{1}{0.4126\frac{W}{\mathrm{m^2 \times ℃}}} \approx 2.4237\frac{\mathrm{m^2 \times ℃}}{W}$

The rate of heat loss through the walls $\dot{Q} = A_{total} * U_{total} * \Delta T \approx 0.4126\frac{W}{\mathrm{m^2 \times ℃}} * 50m *$

$2.5m * (1 - 20\%) * 22℃ - (-2)℃$=990.24W

Task 2 In 2 pages you shoudl write a summary (in your own word!, in your own words !!) of what you have learnt in this session about radiation and radiative heat transfer

Thermal radiation, the phenomenon in which an object radiates electromagnetic waves due to its temperature. One of the three ways of heat transfer. All objects with temperatures above absolute zero can generate heat radiation. The higher the temperature, the greater the total energy radiated and the more short-wave components. The spectrum of thermal radiation is a continuum, and the wavelength coverage can theoretically range from 0 to ∞. The general thermal radiation mainly depends on the longer wavelength visible light and infrared rays. Since the propagation of electromagnetic waves does not require any medium, thermal radiation is the only way to transfer heat in a vacuum.

Characteristics of heat radiation:

1. Any object, as long as the temperature is higher than 0K, will continuously emit heat radiation to the surrounding space;

2, can be transmitted in vacuum and air;

3.With the transformation of the energy form;

4, has a strong directionality;

5. Radiation energy is related to temperature and wavelength;

6. The emitted radiation depends on the the temperature.

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. The most important thermal radiation in industry is the mutual radiation between solids, and radiation can only be the main heat transfer method at high temperatures. Liquids and gases also transfer heat in a radiant manner, but only a small fraction of the total heat transfer.