Week 4

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

Task 2 In 2 pages you should 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

Task 1:

$$R' = R \times A \rightarrow R = \frac{R'}{A}$$

$$\frac{1}{\frac{R'total}{Rtotal}} = \frac{1}{\frac{R'wood}{A\ wood}} + \frac{1}{\frac{R'ins}{Ains}}$$

$$\frac{Atot}{R'tot} = \frac{Awood}{R'wood} + \frac{Ains}{R'ins}$$

We know that $\frac{1}{R'} = U$

$$Utot = Uwood \times \frac{Awood}{Atot} + Uins \times \frac{Ains}{Atot} =$$

$$= 0.25Uwood + 0.75Uins$$

$$Uwood = \frac{1}{R'wood} = \frac{1}{1.82} = 0.5494$$

$$Uins = \frac{1}{4.718} = 0.21195$$

$$Utot = 0.25 \times 0.5494 + 0.75 \times 0.21195$$

$$Utot = 0.2963\ \frac{W}{°C.m^2}$$

$$Qtot = Utot \times Atot \times \Delta T$$

$$= 0.2963 \times 100 \times 24$$
=711.12 W

Task 2:

Everything in our environment emits energy and radiation. Nicolas Tesla once said “If you want to find the secrets of the universe, think in terms of energy, frequency, and vibration”. Therefore we can understand that radiation is the emission of energy in the form of waves through space or a medium.

A real world example of radiation includes the sun as the main example, which emits heat through radiation that eventually reaches us to Earth with a lower intensity due to the protective shield around the Earth, known as the ozone layer. Other examples would be the heat radiators we use during winter to keep ourselves warm. Other forms of radiation which come in waves include radio waves, visible light which we see through colors in our world, microwaves (how we heat our food in a quick manner) ultraviolet (commonly used in beauty salons for long lasting nail polish), x-rays (used in hospitals to see our bone structure through our skin.. etc

A black body (or “black hole”) is the perfect example of a body that totally absorbs all types od electromagnetic radiation no matter the wavelength. It can also emit radiation as well as absorb. Black holes are a very crucial focal point in our understanding of the cosmos as scientists are still trying to fully understand them. Very recently, a female scientist managed to capture the very first picture of a black hole.

$$E_b(T) = \sigma T^4 \left(\frac{W}{m^2}\right)$$

$$where\ \sigma = 5.67 \times 10^{-8} \frac{W}{m^2} . K^4$$

According to the Stephan Boltzmann Constant

As for the equation we use to calculate a wavelength:

$$\lambda = \frac{c}{\nu}$$

Where frequency is ν
And wavelength is λ