Task4 – Ali Ahmadi

Task1.

$$\frac{1}{R_{total}} = \frac{1}{R_{wood}} + \frac{1}{R_{ins}}$$

$$U_{wood} = \frac{1}{R'_{wood}} = \frac{1}{1.109} = \mathbf{0.9017}\,\frac{\boldsymbol{W}}{\boldsymbol{m^{2\circ}C}}$$

$$U_{ins} = \frac{1}{R'_{ins}} = \frac{1}{4.009} = \mathbf{0.2494}\,\frac{\boldsymbol{W}}{\boldsymbol{m^{2\circ}C}}$$

$$U_{tot} = U_{wood} \times \frac{A_{wood}}{A_{tot}} + U_{ins} \times \frac{A_{ins}}{A_{tot}} = 0.25 \times U_{wood} + 0.75 \times U_{ins}$$

$$U_{tot} = 0.25 \times 0.9017 + 0.75 \times 0.2494 = \mathbf{0.4123}\,\frac{\boldsymbol{W}}{\boldsymbol{m^{2\circ}C}}$$

$A_{tot} = 50 * 2.5 = 125m^2$
20% of the wall is glazing ---- 0.8
$\Delta T = 22 - (-2) = 24°C$

$$Q_{tot} = U_{tot} \times A_{tot} \times \Delta T = 0.4123 * (125 * 0.8) * 24 = \mathbf{989.52}\ \boldsymbol{W}$$

Task2.

In physics, the term radiation is generally used to indicate the set of phenomena characterized by the transport of energy in space, where there are different surroundings conditions (in which there isn't thermal equilibrium). Typical examples of radiation are light and heat.
So, radiation differs from conduction and convection because it doesn't require the presence of a material medium to take place.
A particular type of radiation is constituted by electromagnetic waves: they represent the energy emitted by matter as a result of the changes in the electronic configurations of the molecules.
Electromagnetic waves transport energy, and this energy, once in contact with another medium, produces a change in heat. An increase in temperature is caused by an increase in energy in the movement of the particles that compose it.
Electromagnetic waves that transport energy is characterized by a constant, finite vacuum speed of approximately 299792 km/s (rounded to 3.0 x 108 m/s), indicated by *c*, from a particular frequency *v* and its wavelength, indicated with the symbol λ.
The frequency ν is defined as the number of wavelengths that pass in a second for a given point in space:
$\nu = c\lambda$
Higher is the wave frequency value, smaller its wavelength is, so the speed of light is constant for every electromagnetic radiation in a vacuum.
Visible light (or better, visible light for the human eye) is the electromagnetic radiation with a wavelength ranging from about 380 nm of violet to about 760 nm for red.