WEEK 4 :

Task 1 :

| | Wood | Insulation |
|---|---|---|
| Outside air | 0,03 | 0,03 |
| Wood bevel 13mm-20mm | 0,14 | 0,14 |
| Plywood 13 mm | 0,11 | 0,11 |
| Urethane rigif foam insulation 90 mm | | 3,52 |
| Wood studs 90mm | 0,63 | |
| Gypsum 13 mm | 0,07 | 0,07 |
| Inside surface | 0,12 | 0,12 |

$R_{wood}$ = 0,03+0,14+0,11+0,63+0,07+0,12= 1,10 m²°C/W

$R_{ins}$=0,03+0,14+0,11+3,52+0,07+0,12 = 3,99 m²°C/W

$U_{wood} = 1/R_{wood} = 1/1,10$ =0,90 m²°C/W

$U_{ins} = 1/R_{ins} = 1/3,99$ = 0,25 m²°C/W

$U_{total}$ = 25% $U_{wood}$ + 75% $U_{ins}$ = 0,9*0,25 + 0,25*0,75 =0,225+0,1875= 0,4125 W/m²°C

Q = Utotal * As* deltaT = 0,4125*125*0,8*24 = 990,24 W

Task 2 :

RADIATION HEAT TRANSFER SUMMARY :
Radiation is a heat that is transmitted as light. It's light from elsewhere, but invisible because in the infrared.The radiation is of electromagnetic nature because of the agitation of the material under the effect of
temperature. Radiant heat can be reflected, scattered or concentrated exactly like light. The sun heats exclusively by radiation, and it is one of the most efficient heats ever. it intervenes in transparent (gas, glass, vacuum) or semi-opaque (gas + CO2 smokes, gas + water vapor) media

The radiation has an electromagnetic nature because of the agitation of the material under the effect of temperature.

The wave propagates in the direction of the wave vector with a velocity c which varies according to the medium through which it passes. This speed is worth c=c0/n
c0 is the speed of light in a vacuum and n is the index of the medium. The frequency of an electromagnetic wave does not vary with the medium through which it passes. It is related to c :

$\lambda = c\ v = cT$
Only wavelengths between 0.4µm and 0.8µm are visible to the eye.

$\nu = 1 / T$ is the frequency of the electromagnetic wave. We therefore see that the wavelength will be a function of the medium traversed.

A wave carries with it energy. When it is delivered by a radiant body, it thus loses some flow of energy Φ.

$E = h\nu = hc/\lambda \quad c=\lambda\nu$

$E(T) = \sigma T^4\ (W/m^2)$

$\sigma = 5{,}670*10^{-8}\ W/m^2.K^4$
n=1 for air and most gases , n=1,33 for water
$c_0 = 2{,}9979\ *10^8$
Plank constant $h = 6{,}626069*10^{-34}$ J/s

BLACK BODY RADIATION :

It is an ideal body which would absorb, if it existed, any radiation that it would receive, whatever its wavelength. For that a black body the temperature remains constant) it must also emit energy by radiation. Its absorptivity is equal to 1.
The interest of the black body resides in the fact that it serves as a reference for defining the radiative properties of a real body. It is important to note that a black body is not necessarily black. A body of black color is black in the visible but may not be visible for other wavelengths