

## Question number 1 :

$$R_{conv_1} = \frac{1}{h_1 \times A} = \frac{1}{10 * (0.015 + 0.22 + 0.015) * 1} = 0.4 \text{ } ^\circ\text{C}/\text{W}$$

$$R_{foam} = \frac{L_f}{K_f \times A} = \frac{1}{0.026 * (0.015 + 0.22 + 0.015) * 1} = 4.615 \text{ } ^\circ\text{C}/\text{W}$$

$$R_{pluster} = \frac{L_p}{(K_p \times A)} = \frac{0.32}{0.22 * 0.015 * 1} = 96.97 \text{ } ^\circ\text{C}/\text{W}$$

$$R_{brick} = \frac{L_b}{(K_b \times A)} = \frac{0.32}{0.22 * 0.72 * 1} = 2.02 \text{ } ^\circ\text{C}/\text{W}$$

$$\frac{1}{R_{total-parallel}} = 2 * \frac{1}{R_{pluster}} + \frac{1}{R_{brick}} = 2 * \frac{1}{96.97} + \frac{1}{2.02} = 0.516 \text{ } \text{W}/^\circ\text{C}$$

$$R_{total-parallel} = 1.94 \text{ } ^\circ\frac{\text{C}}{\text{W}}$$

$$R_{pluster} = \frac{L_p}{(K_p \times A)} = \frac{0.02}{0.022 * (0.015 + 0.22 + 0.015) * 1} = 0.363 \text{ } ^\circ\text{C}/\text{W}$$

$$R_{conv_2} = \frac{1}{h_2 \times A} = \frac{1}{40 * (0.015 + 0.22 + 0.015) * 1} = 0.1 \text{ } ^\circ\text{C}/\text{W}$$

$$R_{wall-total} = 0.4 + 4.615 + 0.363 + 1.94 + 0.363 + 0.1 = 7.781 \text{ } ^\circ\text{C}/\text{W}$$

$$\dot{Q} = \frac{30}{7.781} = 3.86 \text{ W}$$

We already calculate this question with 16 mm instead of 32 cm for the brick and the  $R_{total}$  was :  $6.81 \text{ }^{\circ}\frac{C}{W}$

And the heat transfer going to be :

$$\dot{Q} = \frac{30}{6.81} = 4.41 \text{ W}$$

Now with analyzing these two result we find out that increasing the brick thickness has no significant effect on the resistance wall and subsequently heat transfer.

## Question 2:

|                                   | Section A | Section B                       |
|-----------------------------------|-----------|---------------------------------|
| Outside air                       | 0.03      | 0.03                            |
| Wood bevel (13mm*<br>200mm)       | 0.14      | 0.14                            |
| Polywood (13mm)                   | 0.11      | 0.11                            |
| Urethane Rigif foam<br>Ins (90mm) | No        | $0.98 \cdot 90 / 25 =$<br>3.528 |
| Wood studs (90mm)                 | 0.63      | No                              |
| Gypsum board<br>(13mm)            | 0.079     | 0.079                           |
| Inside surface                    | 0.12      | 0.12                            |

$$R_A = 0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12 = 1.109 \text{ m}^2 \text{ }^{\circ}\frac{C}{W}$$

$$R_B = 0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12 = 4.007 \text{ m}^2 \circ \frac{C}{W}$$