Salman Sadeghi – 10649160 – Week3

1.

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{30}{6.81} = 4.40\ w$$

2.

$$R_i = \frac{1}{h_i \times A} = \frac{1}{10*0.25} = 0.4 \circ \frac{C}{W}$$

$$R_f = \frac{L_f}{(K_f \times A)} = \frac{0.03}{0.026*0.25} = 4.615 \circ \frac{C}{W}$$

$$R_{P_1} = R_{P_2} = \frac{L_{p_1}}{k_p \times A_{p_1}} = \frac{0.02}{(0.22*0.25)} = 0.363 \circ \frac{C}{W}$$

$$R_{p_{c_1}} = R_{p_{c_2}} = \frac{L_{p_{c_1}}}{k_p \times A_{p_{c_1}}} = \frac{0.32}{0.22*0.015} = 96.9696 \circ \frac{C}{W}$$

$$R_b = \frac{L_b}{k_b \times A_b} = \frac{0.32}{0.72*0.22} = 2.0202 \circ \frac{C}{W}$$

$$\frac{1}{R_{tot_{parallel}}} = \frac{1}{R_b} + \frac{1}{R_{p_{c_1}}} + \frac{1}{R_{p_{c_2}}} = \frac{1}{2.02} + 2 * \left(\frac{1}{96.96}\right) = 0.51 \circ \frac{C}{W}$$

$$\rightarrow \frac{1}{R_{tot_{parallel}}} = 0.51 \frac{W}{^\circ C} \longrightarrow R_{tot_{parallel}} = \frac{1}{0.51} = 1.96 \circ \frac{C}{W}$$

$$R_o = \frac{1}{h_0 \times A} = \frac{1}{40*0.25} = 0.1 \circ \frac{C}{W}$$

$$R_{total} = R_i + R_o + 2 * R_{P_1} + R_{tot_{parallel}} + R_{foam} = 0.4 + 4.615 + 0.363 + 0.363 + 1.96 + 0.1 = 7.801$$

$$\dot{Q} = \frac{\Delta T}{R_{Tot}} = \frac{30}{7.801} = 3.84\ w$$

By Comparing the two result , we concluded that :
The Changing of thickness does not effect significantly since we change the thickness double but we have not same effect on Q.

3.

	Wood	Insulation
Outside Air	0.03	0.03
Wood bevel l.	0.14	0.14
Plywood(13mm)	0.11	0.11
Urethane rigif foam	No	0.98*90/25=3.528
Wood studs	0.63	No
Gypsum board	0.079	0.079
Inside surface	0.12	0.12

$$R'_{withWood} = 0.03 + 0.14 + 0.11 + 0.63 + 0.079 + 0.12$$
$$= 1.109\ m^2.^\circ\frac{C}{W}$$
$$R'_{withIns} = 0.03 + 0.14 + 0.11 + 3.528 + 0.079 + 0.12$$
$$= 4.007\ m^2.^\circ C/W$$