Qu. 5 cont.

(a) Heat stored in the wall /m^3 is given by :-

$$Q = \rho C_p (T_{average} - T_{initial})$$

$$= 2630 \times 775 \ (7.665 - 4)$$

$$= \underline{7470 \ kJ}$$

(b) Heat transfer from the outside surface is given by :-

$$Q = h A (T_{surf\ av} - T_{air}) \times time$$

$$= 30 \times 1 \times (4.049 - 4) \times 12 \times 60 \times 60$$

$$= \underline{63.5 \ kJ}$$

At steady state the heat transfer rate is given by :-

$$\dot{Q} = \frac{\Delta T}{\Sigma \theta} = \frac{\Delta T}{\frac{1}{h_e} + \frac{x}{\lambda} + \frac{1}{h_i}}$$

$$= \frac{22 - 4}{\frac{1}{30} + \frac{0.75}{2.79} + \frac{1}{15}}$$

$$= 48.8 \ W/m^2$$

$\therefore$ over 12 hrs $\dot{Q} = 48.8 \times 12 \times 60 \times 60$

$$= \underline{2,108 \ kJ}$$