

$$\text{Embodied Carbon} = \text{Material Quantity} \times \text{Carbon Factor}$$

### Question 1

$$\text{Height} = 3\text{m}$$

$$\text{Length} = 6\text{m}$$

$$\text{Thickness} = 0.15\text{m}$$

$$\text{Concrete Mix per m}^3$$

$$\text{Cement} = 320\text{kg}$$

$$\text{Aggregates} = 1900\text{kg}$$

$$\text{Water} = 175\text{kg}$$

$$\begin{aligned}\text{Volume of Wall} &= \text{Length} \times \text{Height} \times \text{Thickness} \\ &= 6.0 \times 3.0 \times 0.15 = 2.7\text{m}^3\end{aligned}$$

$$\text{Total Cement} = 320 \times 2.7 = 864\text{kg}$$

$$\text{Total Agg} = 1900 \times 2.7 = 5130\text{kg}$$

$$\text{Total Water} = 175 \times 2.7 = 472.5\text{kg}$$

Embodied Carbon

$$\text{Cement} = 864 \times 0.85 = 734.4\text{kg CO}_2$$

$$\text{Agg} = 5130 \times 0.004 = 20.52\text{kg CO}_2$$

$$\text{Water} = 472.5 \times 0.0003 = 0.14\text{kg CO}_2$$

$$\text{Total EC} = 734.4 + 20.52 + 0.14 = \underline{\underline{755.06\text{kg CO}_2}}$$

### Question 2

$$\text{Length} = 4.0\text{m}$$

$$\text{Width} = 0.3\text{m}$$

$$\text{Depth} = 0.5\text{m}$$

$$\text{Concrete mix per m}^3$$

$$\text{Cement} = 350\text{kg}$$

$$\text{Aggregates} = 1900\text{kg}$$

$$\text{Water} = 160\text{kg}$$

$$\begin{aligned}\text{Volume of Beam} &= \text{Length} \times \text{Width} \times \text{Depth} \\ &= 4.0 \times 0.3 \times 0.5 \\ &= 0.60 \text{ m}^3\end{aligned}$$

$$\text{Total Cement} = 350 \times 0.60 = 210 \text{ kg}$$

$$\text{Total Agg} = 1900 \times 0.60 = 1140 \text{ kg}$$

$$\text{Total Water} = 160 \times 0.60 = 96 \text{ kg}$$

Embodied Carbon

$$\text{Cement} = 210 \times 0.85 = 178.5 \text{ kg CO}_2$$

$$\text{Agg} = 1140 \times 0.004 = 0.56 \text{ kg CO}_2$$

$$\text{Water} = 96 \times 0.0003 = 0.03 \text{ kg CO}_2$$

$$\text{Total} = 178.5 + 0.56 + 0.03 = 179.09 \text{ kg CO}_2$$