

Mid Exam

Subject :: Quantity & Estimation

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ATTEMPT ALL Questions

Q1 Determine the Quantities of various material to prepare 100 CFT Concrete if the ratio is (1:4:8)? Also Calculate a brick work of 75 CFT and ratio for that is given (1:4).

Solution

- Quantity of Wet material = 100 CFT
- Dry Density of Concrete = 1.54
- Quantity of dry material = $100 \times 1.54 = 154 \text{ CFT}$
- Ratio of Concrete = 1:4:8
- Sum of ratio = $1+4+8 = 13$
- Quantity of Cement = $\frac{\text{Ratio of Cement} \times \text{Dry material}}{\text{Sum of ratio}}$

$$\text{Quantity of Cement} = \frac{1}{13} \times 154 = 11.78 \text{ CFT}$$
- No of bags = $\frac{11.78}{1.25} = 9.42 \text{ bags}$
 Let $9.42 \approx 10 \text{ bags}$
- Quantity of Sand = $\frac{\text{Ratio of Sand} \times \text{Dry material}}{\text{Sum of Ratio}}$

$$\text{Quantity of Sand} = \frac{4}{13} \times 154 = 47.12 \text{ CFT}$$

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$$\text{Quantity of course agg} = \frac{\text{Ratio of course Agg} \times \text{Dry material}}{\text{Sum of ratio}}$$

$$// = \frac{8}{13} \times 154 = 94.24 \text{ CFT}$$

$$\text{Cement} = 11.78 \text{ CFT}$$

$$\text{Sand} = 47.12 \text{ CFT}$$

$$\text{Course Agg} = 94.24 \text{ CFT}$$

" Brick Work "

$$\text{We have vol} = 75 \text{ ft}^3$$

$$\text{Ratio of Cement \& Sand} = 1:4$$

① Finding volume of Mortar :-

$$\text{We take 25\% of brickwork for mortar} = \frac{25}{100} \times 75 = 18.75 \text{ ft}^3$$

$$\text{Wet vol} = 18.75 \text{ ft}^3$$

Now Dry volume will be

$$\begin{aligned} \text{Dry vol} &= 18.75 \times 1.27 \\ &= 23.81 \text{ ft}^3 \end{aligned}$$

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② Quantities of Mortar:-

For Cement

We use formula

$$\text{Cement} = \frac{1}{5} \times 23.81$$

$$= 4.76 \text{ ft}^3$$

∴

$$\text{No of bags} = \frac{4.76}{1.25} = 3.8 \text{ bags}$$

$$\text{Let } 3.8 \approx 4 \text{ bags}$$

For Sand

$$\text{Sand} = \frac{4}{5} \times 23.81 = 19.04 \text{ ft}^3$$

No of bricks:-

$$\text{We have vol} = 75 \text{ ft}^3$$

Taking 25% of brickwork for mortar

$$\frac{25}{100} \times 75 = 18.75 \text{ ft}^3$$

$$\text{Net brick work} = \text{Total Brick work} - \text{vol of mortar}$$

$$= 75 - 18.75$$
$$56.25 \text{ ft}^3$$

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$$\text{No of bricks} = \frac{\text{Net Brick work}}{\text{vol of one Bricks}}$$

$$\text{Vol of 1 brick} = \frac{9}{12} \times \frac{4.5}{12} \times \frac{3}{12}$$

$$= 0.0703 \text{ m}^3$$

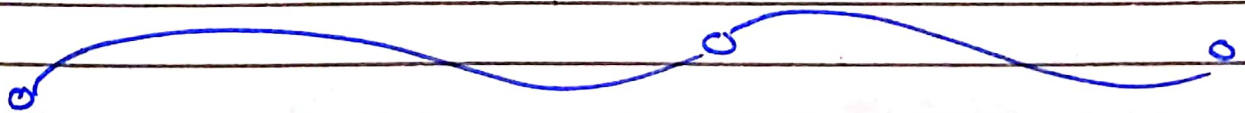
$$\text{No of bricks} = \frac{56.28}{0.0703} = 800 \text{ bricks}$$

Let Include 10% bricks wastage.

$$\frac{10}{100} \times 800 = 80$$

$$\text{Net no of bricks} = 800 + 80$$

$$\therefore = 880 \text{ bricks}$$



Q1b What is meant by Dry & Wet volume? Why 1.27 & 1.54 factor used in Calculation of Quantities? How Quantity Estimation is helpful in a Construction project.

Ans Dry volume means volume of ingredient of Concrete like Sand, Cement, & aggregate in mix dry condition before adding water.

Wet volume means volume of ingredient of Concrete like Sand, Cement & aggregate in wet mix after adding water.

Why we use "1.27 & 1.54"

When we calculate the mortar quantity for any masonry work, we get the wet volume of mortar. If we want to calculate the required volume of Sand & Cement, we need to convert that wet volume into dry volume. For estimation purpose dry volume can be 1.27 or 1.30

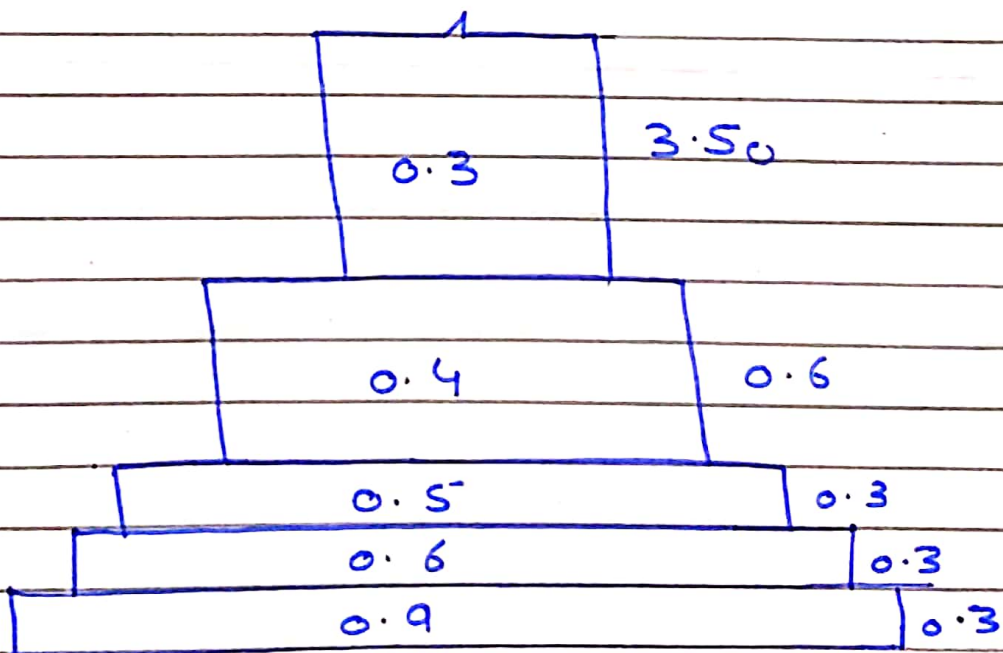
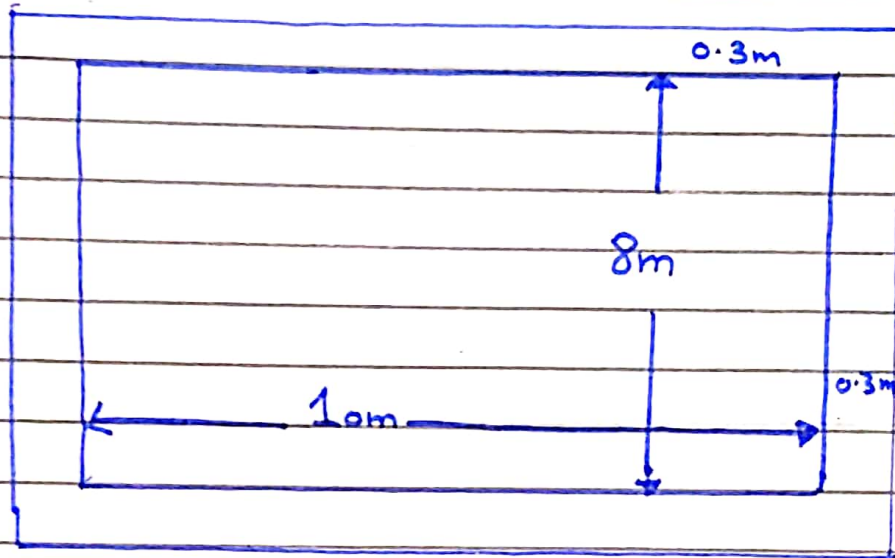
$$\text{Dry vol} = 1 + \left(\frac{27}{100} \times 1 \right) = 1.27$$

1.54 is a Factor help us to convert the wet volume of Concrete into Dry volume:

"Purpose of Quantity Estimation in Construction"

- To know the amount of money required in Construction.
- To know quantity of material used in Construction.
- To justify the Investment.
- Assess to the requirement tool, plants & equipment to complete the work accordingly.
- Ensure that project remain profitable to the Contractor or Not.

Q2



Sol:-

$$C/c \text{ length of long wall} = \left(\frac{0.30}{2}\right) + 10 + \left(\frac{0.30}{2}\right) = 10.3m$$

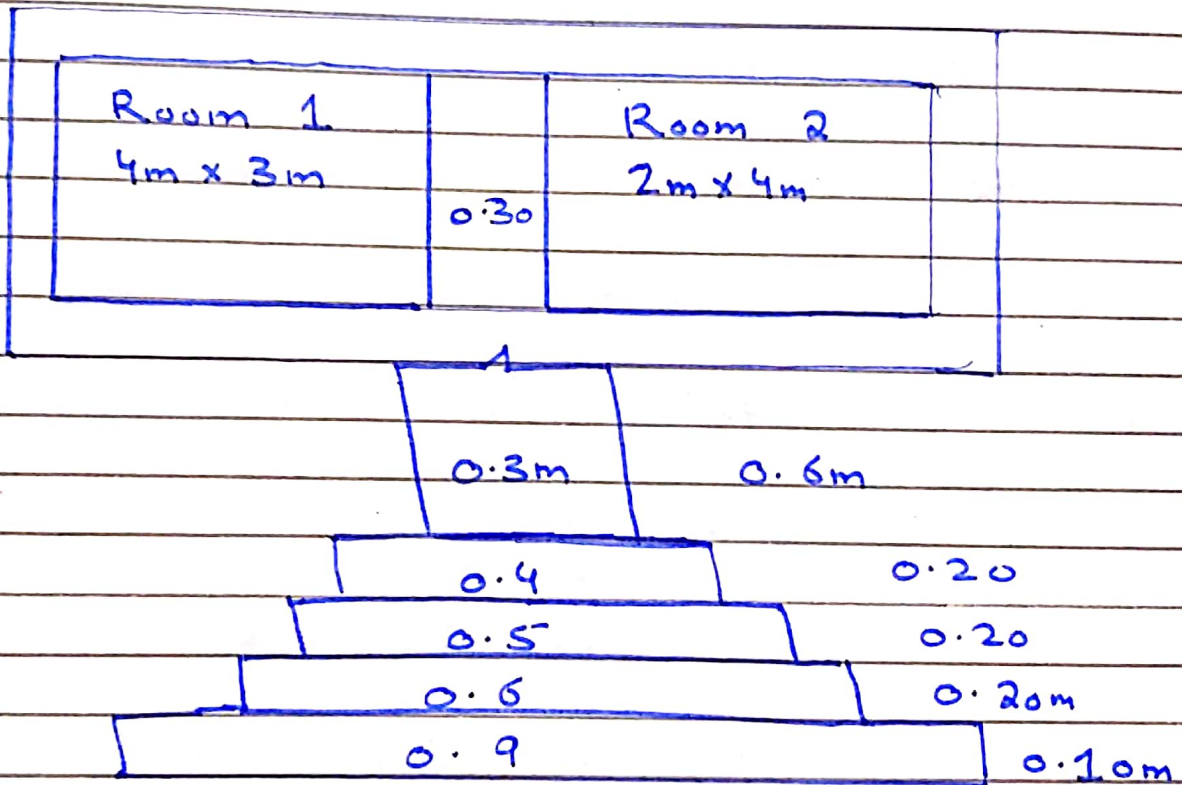
$$C/c \text{ length of short wall} = \left(\frac{0.30}{2}\right) + 8 + \left(\frac{0.30}{2}\right) = 8.3m$$

Sr No	Item Description	No	Length	Breadth	Height/Depth	Quantity	Note
1	Excavation in Foundation						
	Longwall	2	11.2m	0.90	0.90	18.14	Length = $10.3 + 0.90 = 11.2m$
	Shortwall	2	7.40m	0.90	0.90	11.98	Breadth = $8.3 - 0.90 = 7.40m$
					Total	30.12 cumt	
2	Concrete in Foundation						
	Longwall	2	11.2m	0.90	0.30	6.04	Length = $10.3 + 0.9 = 11.2m$
	Shortwall	2	7.40m	0.90	0.30	3.99	Breadth = $8.3 - 0.9 = 7.40m$
					Total	10.03 cumt	
3	Brick work in Foundation & Plinth						
	Long wall:- 1st Footing	2	10.9m	0.60m	0.30m	3.92	Length = $10.3 + 0.6 = 10.9m$
	2nd Footing	2	10.8m	0.50m	0.30m	3.42	Length = $10.3 + 0.5 = 10.8m$
	Plinth 2nd Footing	2	10.7m	0.40m	0.30m	5.13	Length = $10.3 + 0.4 = 10.7m$

	No	Length	Breadth	Height	Quantity	Note
Shoot wall						
1st Footing	2	7.70m	0.60m	0.30m	2.77	Length = $8.3 - 0.6 = 7.70m$
2nd Footing	2	7.80m	0.50m	0.30m	2.34	Length = $8.3 - 0.5 = 7.80m$
Plinth walls	2	7.90m	0.40m	0.60m	3.79	Length = $8.3 - 0.4 = 7.90m$
				Total	8.90 Cumt	
4 Brick work in Super- structure						
Long wall	2	10.6m	0.30m	3.50m	22.26	Length = $10.3 + 0.3 = 10.6m$
Shoot wall	2	8.0m	0.30m	3.50	16.8	Length = $8.3 - 0.3 = 8.0m$
				Total	39.06 Cumt	

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Q3 Calculate the quantities of earthwork, concrete work, brick work, for the given wall by Center line wall method.



Sol:-

$$C.L = S(H) + S(V)$$

$$S(H) = 0.15 + 3 + 0.3 + 2 + 0.15 = 5.6m$$

No of walls = 2

So we have

$$2 \times 5.6 = 11.2m$$

$$S(w) = 0.15 + 4 + 0.15 = 4.3m$$

No of Short wall = 3

So we have

$$3 \times 4.3 = 12.9m$$

$$\Rightarrow C.L = 11.2 + 12.9 = 24.1m$$

① Excavation or Earthwork:-

$$B = 0.9m, \quad H = 1.3m$$

$$L = C.L - \left(\frac{1}{2} \times B\right) \times \text{no of T Junctions}$$

$$= 24.1 - \left(\frac{0.9}{2}\right) \times 2$$

$$L = 23.2m$$

$$\Rightarrow Q = L \times B \times H$$

$$= 23.2 \times 0.9 \times 1.3$$

$$Q = 27.144 \text{ Cum or } m^3$$

② Concrete work in Foundation:-

$$B = 0.9m, \quad H = 0.1m$$

$$L = C.L - \frac{B}{2} \times \text{No of T Junctions}$$

$$= 24.1 - \frac{0.9}{2} \times 2$$

$$L = 23.2 \text{ m}$$

$$\Rightarrow \text{Quantity} = 23.2 \times 0.9 \times 0.1$$

$$\text{Quantity} = 2.088 \text{ m}^3$$

③ Brickwork in foundation:-

a) Step 1:

$$B = 0.6 \text{ m}, \quad H = 0.2 \text{ m}$$

$$L = C.L - \frac{B}{2} \times \text{No of T Junctions}$$

$$= 24.1 - \frac{0.6}{2} \times 2$$

$$L = 23.5 \text{ m}$$

$$Q = 23.5 \times 0.6 \times 0.2 = 2.82 \text{ m}^3$$

b) Step 2:

$$B = 0.5 \text{ m}, \quad H = 0.2 \text{ m}$$

$$L = 24.1 - \frac{0.5}{2} \times 2 = 23.6 \text{ m}$$

$$Q = 23.6 \times 0.5 \times 0.2 = 2.36 \text{ m}^3$$

c Step 3 :-

$$B = 0.4\text{m}, H = 0.2\text{m}$$

$$L = 24.1 - \frac{0.4}{2} \times 2$$

$$L = 23.7\text{m}$$

$$Q = 23.7 \times 0.4 \times 0.2$$

$$Q = 1.896\text{m}^3$$

d Step 4 :-

$$B = 0.3\text{m}, H = 0.6\text{m}$$

$$L = 24.1 - \frac{0.3}{2} \times 2$$

$$L = 23.8\text{m}$$

$$Q = 23.8 \times 0.3 \times 0.6$$

$$Q = 4.284\text{m}^3$$

Total Quantity of Brick work

$$Q = 2.82 + 2.36 + 1.89 + 4.28$$

$$Q = 11.36\text{m}^3$$