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SEC : "B"

DEPT : BE Civil

SUBJECT : Quantity Surveying and Estimation.

SUBMITTED TO : SIR IMTIAZ.

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QUESTION NO # 01:

- i) Determine the Quantities of various materials to prepare 100 cuft concrete if the ratio is (1:4:8)? Also calculate a brick work of 75 cuft and ratio for that is given (1:4). Calculate No of bricks, Dry volume and quantities of mortar?

Ans:-

Solution:

Given that :-

Quantity of wet material = 100 cuft.

Dry density of Concrete = 1.54.

$$\Rightarrow \text{Quantity of Dry material} = 100 \times 1.54 \\ = 154 \text{ cuft.}$$

Ratio of concrete = 1 : 4 : 8 (Given)

$$\text{Sum of Ratio} = 1 + 4 + 8 = 13$$

Quantity of cement = $\frac{\text{Ratio of cement}}{\text{Sum of ratio}} \times \text{Dry materials.}$

putting values in above equation.

$$= \frac{1}{13} \times 154 = 11.78 \text{ cft.}$$

OR

$$= 11.78 / 1.25 = 9.42 \text{ bags of cement}$$

\Rightarrow Quantity of sand = $\frac{\text{Ratio of sand}}{\text{Sum of ratio}} \times \text{dry materials}$

$$= \frac{4}{13} \times 154 = 47.12 \text{ cft.}$$

\Rightarrow Quantity of coarse aggregate

$$= \frac{\text{Ratio of coarse aggregate}}{\text{Sum of ratio}} \times \text{dry materials}$$

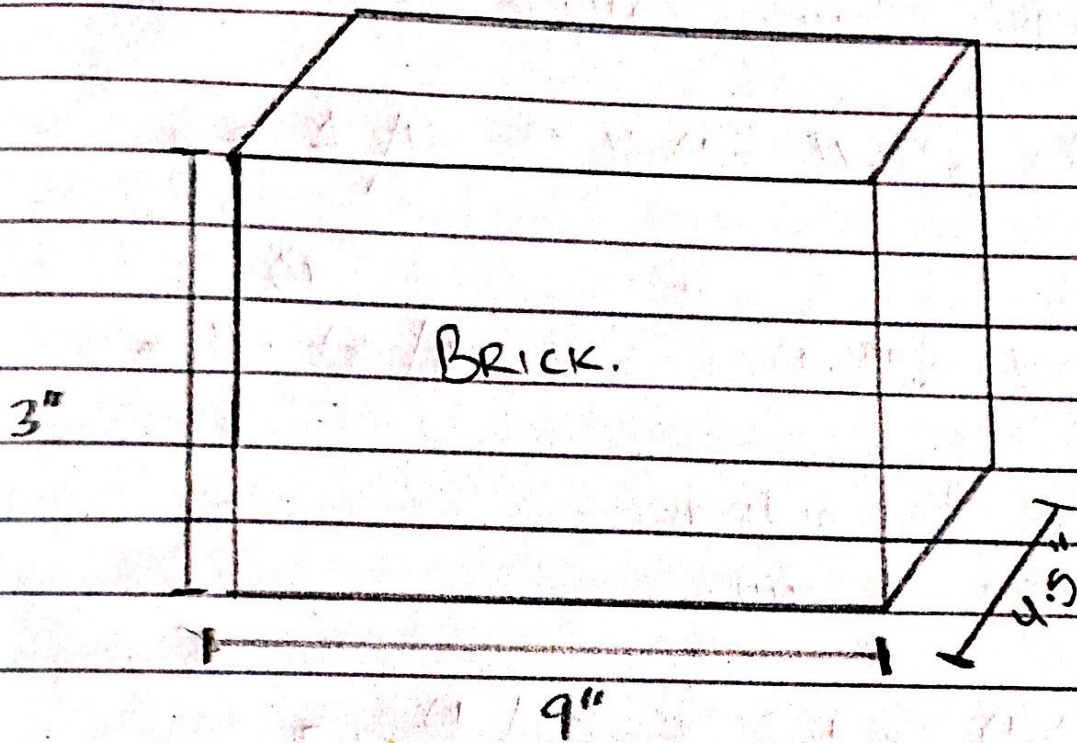
$$= \frac{8}{13} \times 154 = 94.24 \text{ cft.}$$

Now calculating No of bricks:

\Rightarrow Bricks in 75 cft:

$$\text{Size of brick} = 9'' \times 4.5'' \times 3''$$

$$\text{Volume of brick} = 121.5 \text{ inch}^3$$



And size of brick with mortar
 $= 9.08'' \times 4.58'' \times 3.08''$
 $= 128 \text{ inch}^3$

Volume of brick with mortar $= L \times B \times H$
 $= 128 \text{ inch}^3$

Volume of brick wall = 75 cft.

No of bricks without mortar

$$= \frac{75}{\left(\frac{121.5}{(12)^3}\right)}$$

$$\therefore \frac{121.5}{(12)^3}$$

converting inch
to feet.

$$= \frac{75}{0.0703}$$

No of bricks = 1066.8 or 1067

Dry volume = ?

For dry volume we have to multiply factor 1.27 with wet volume of mortar.

$$\begin{aligned} \text{Dry volume} &= \text{wet volume} \times 1.27 \\ &= 18.75 \times 1.27 = 23.81 \text{ cft.} \end{aligned}$$

Now : Sand = ? Cement = ?

Quantity of cement = $\frac{\text{Ratio of cement}}{\text{sum of ratio}} \times \text{Dry material}$

$$= 1/5 \times 23.81 = 4.76 \text{ cft}$$

$$\therefore 1:4 = 1+4 = 5.$$

Note 1 bag = 1.25 cft.

$$4.76 / 1.25 = 3.8 \text{ bags or } 4 \text{ bags.}$$

Quantity of sand = $\frac{\text{Ratio of sand}}{\text{Sum of ratio}} \times \text{dry material}$

$$= 4/5 \times 23.81$$

$$= 19 \text{ cft.}$$

To find volume of mortar:

Note (we consider 20% to 30% mortar in brick work)

Taking 25% of brick work for mortar

$$25/100 \times 75 = 18.75 \text{ cft (wet volume)}$$

ii) what is meant by Dry and wet volume? why 1.27 and 1.54 factor is used in calculation of quantities? How Quantity Survey and Estimation is helpful in a construction project?

Ans:

Dry & wet volume of concrete:

=> Dry volume of concrete is the combined volume cement, fine aggregates and coarse aggregates in dry condition.

=> After mixing the resultant wet volume turns out to be approximately 60-70% of the dry volume.

=> For estimation purposes, dry volume of concrete can be taken as 1.54 of its wet volume.

For concrete $1 \text{ cu m} = 54\%$

$$\text{Dry volume} = \text{wet volume} + 54\%$$

$$= 1 + \left(\frac{54}{100} \times 1 \right)$$

$$= 1 + 0.54$$

$$\text{Dry volume} = 1.54.$$

Dry & wet volume of Mortar:-

=> when water is added to the dry mix of cement-sand the volume of dry mix is reduced. It happens due to the presence of air voids in sand particles.

=> 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 and cement, we need ~~to~~ to convert the wet volume into the dry volume.

=> For estimation purposes dry volume of mortar can be taken 1.27 & 1.54 times of its wet volume.

For cement mortar 1 cum.
= 27% or 57%

Dry volume = wet volume + 27% of wet volume.

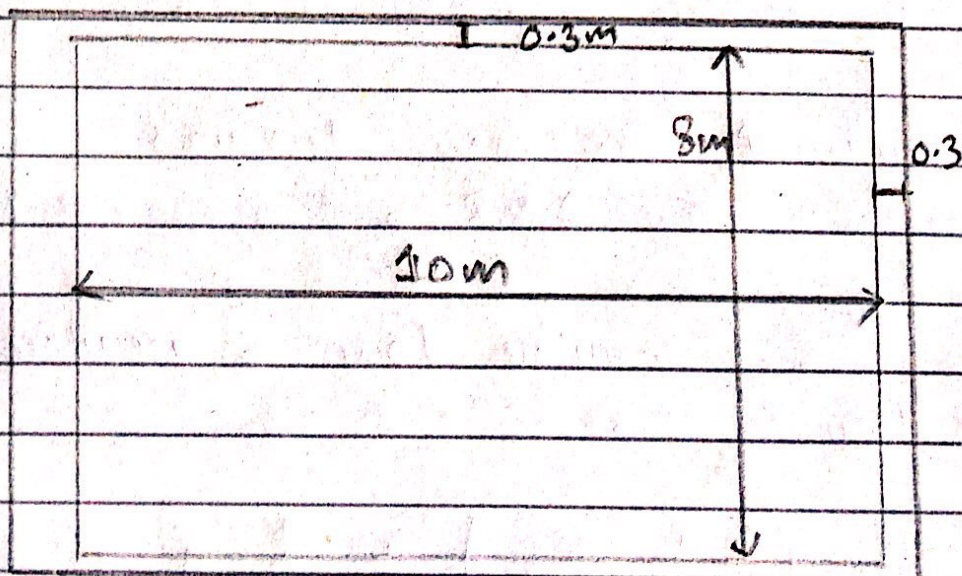
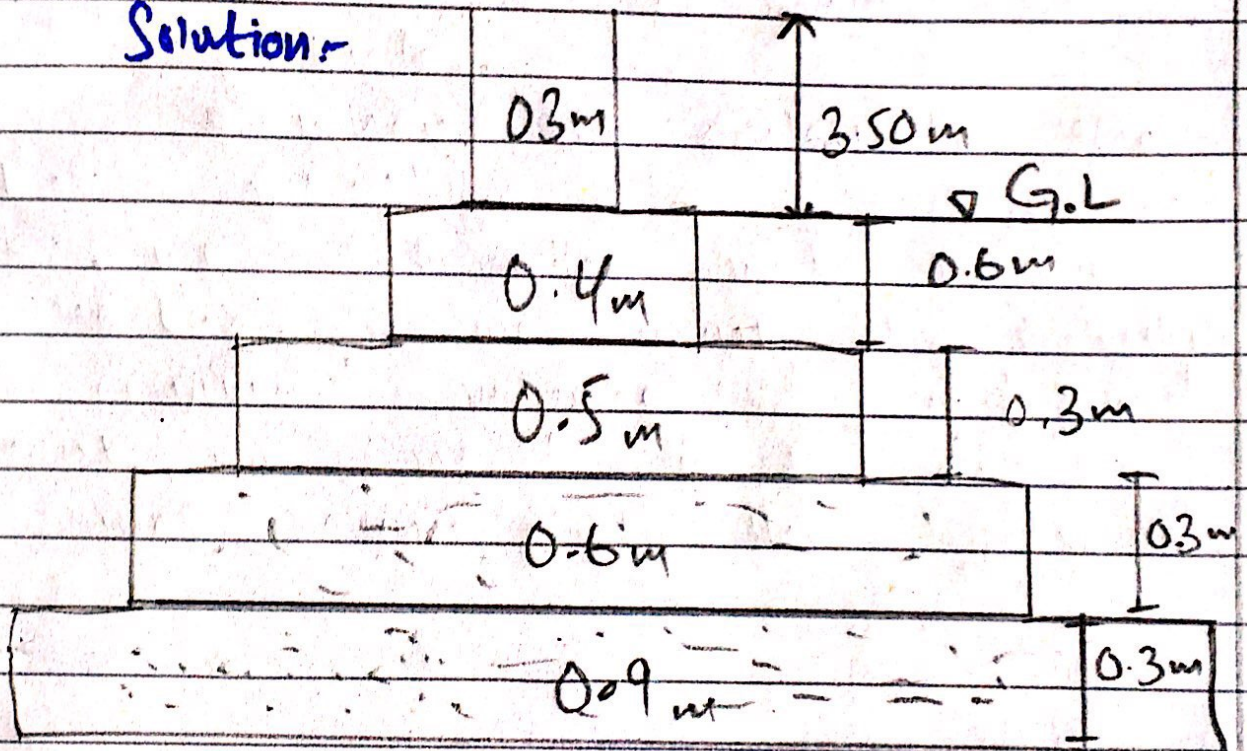
$$= 1 + \left(\frac{27}{100} + 1 \right)$$

$$= 1 + 0.27$$

\Rightarrow Dry Volume = 1.27.

QUESTION: NO # 02:

Solution:-



$$L/W = 10 + 0.3 + 0.3 = 10.6 \text{ m.}$$

$$S/W = 8 \text{ m.}$$

⇒ Excavation:-

$$L/W = 2 \times 10.6 \times 0.9 \times 1.5 = 28.62 \text{ cum.}$$

$$S/W = 2 \times 8 \times 0.9 \times 1.5 = 21.6 \text{ cum.}$$

Total excavation:

$$= 28.62 + 21.6$$

$$= 50.22 \text{ cu m.}$$

⇒ Concrete work:-

$$L/W = 2 \times 10.6 \times 0.9 \times 0.3 = 5.724 \text{ cum}$$

$$S/W = 2 \times 8 \times 0.9 \times 0.3 = 4.32 \text{ cum}$$

Total concrete work = 10.044 cu m.

Brick work:

Long wall:

$$1^{\text{st}} \text{ footing} = 2 \times 10.6 \times 0.6 \times 0.3 = 3.816 \text{ m}^3$$

$$2^{\text{nd}} \text{ footing} = 2 \times 10.6 \times 0.5 \times 0.3 = 3.18 \text{ cu m}$$

$$3^{\text{rd}} \text{ footing} = 2 \times 10.6 \times 0.4 \times 0.6 = 5.088 \text{ cu m}$$

Brick wall above G.L.

$$= 2 \times 10.6 \times 0.3 \times 3.5 = 22.26 \text{ cu m.}$$

$$\text{Total L/w brick work} = 34.344 \text{ m}^3$$

Short wall:

$$1^{\text{st}} \text{ footing} = 2 \times 8 \times 0.6 \times 0.3 = 2.88 \text{ m}^3$$

$$2^{\text{nd}} \text{ footing} = 2 \times 8 \times 0.5 \times 0.3 = 2.4 \text{ cu m.}$$

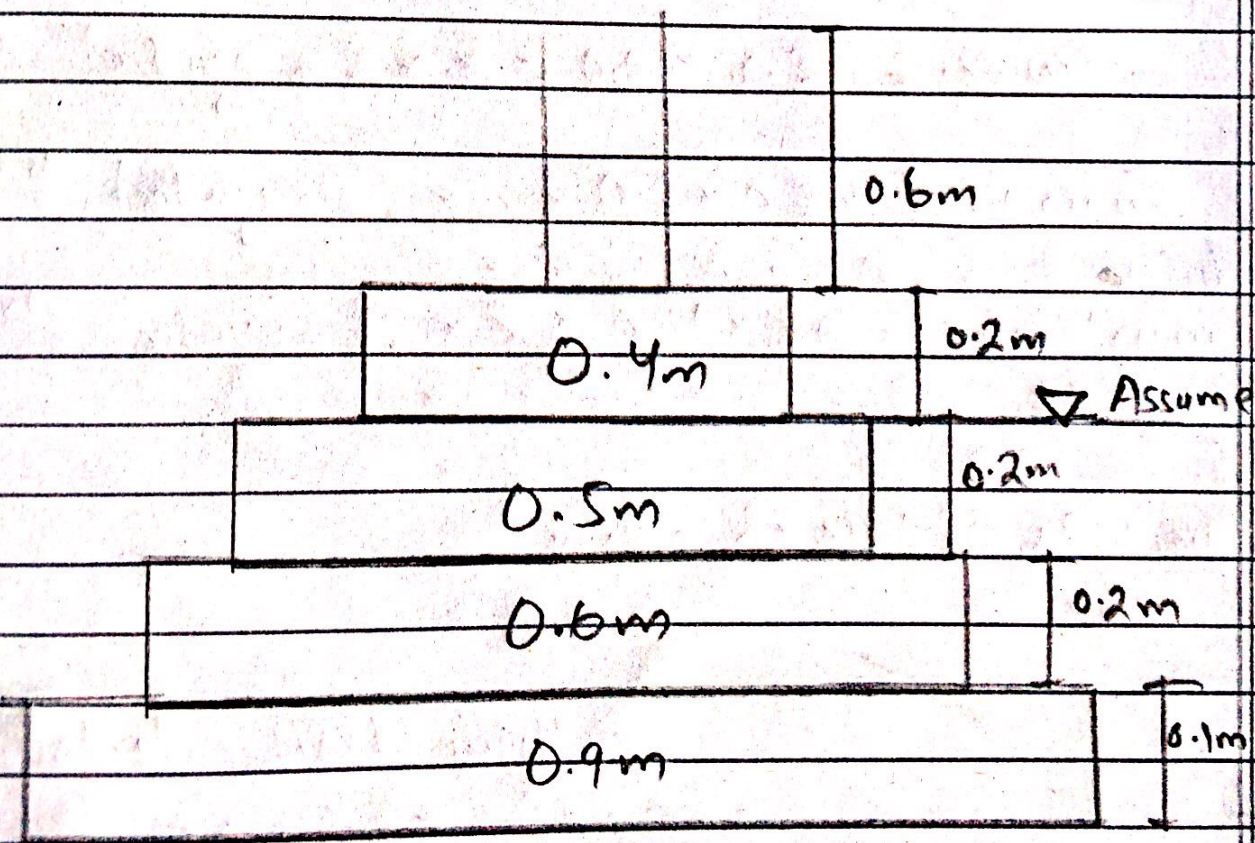
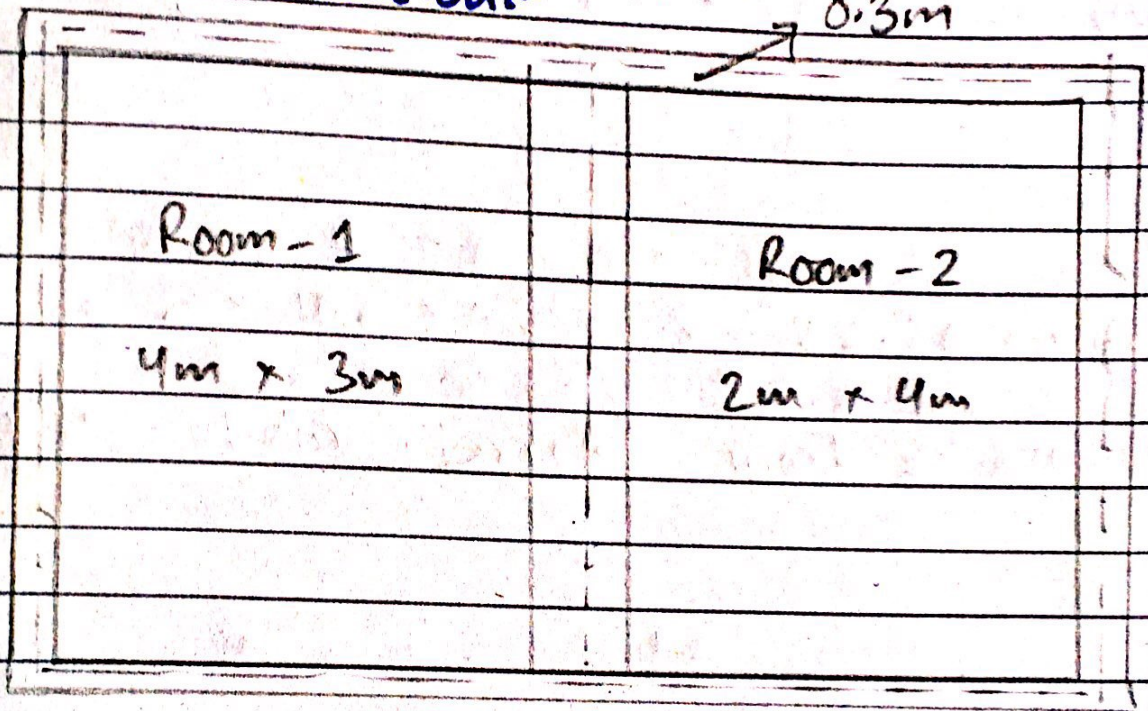
$$3^{\text{rd}} \text{ footing} = 2 \times 8 \times 0.4 \times 0.6 = 3.84 \text{ cu m}$$

$$\text{Above G.L. wall} = 2 \times 8 \times 0.3 \times 3.5 = 16.8 \text{ m}^3$$

$$\text{Total short wall} = 16.8 \text{ cu m.}$$

QUESTION NO # 03.

Solution:-



$$\text{Vertical} = 0.15 + 4 + 0.15 = 4.3$$

$$EV = 3 \times 4.3 = 12.9.$$

$$\begin{aligned} \text{Horizontal} &= 0.15 + 3 + 0.3 + 2 + 0.15 \\ &= 5.6. \end{aligned}$$

$$EH = 2 \times 5.6 = 11.2.$$

Centre line length.

$$\begin{aligned} &= 11.2 + 12.9 \\ &= 24.8. \end{aligned}$$

Excavation:- (Total length - one breadth)

$$L = 24.8 - 0.9 = 23.9.$$

So,

$$1 \times 23.9 \times 0.9 \times 0.5 = 10.755 \text{ cu m.}$$

Concrete:

$$1 \times 23.9 \times 0.9 \times 0.1 = 2.151 \text{ cu m.}$$

Brick work:

$$\begin{aligned} 1^{\text{st}} \text{ footing} &= 1 \times 24.2 \times 0.6 \times 0.2 \\ &= 2.904 \text{ cu m.} \end{aligned}$$

$$\begin{aligned} 2^{\text{nd}} \text{ footing} &= 1 \times 24.3 \times 0.5 \times 0.2 \\ &= 2.43 \text{ cu m.} \end{aligned}$$

$$\begin{aligned} 3^{\text{rd}} \text{ footing} &= 1 \times 24.4 \times 0.4 \times 0.2 \\ &= 1.952 \text{ cu m.} \end{aligned}$$

$$\begin{aligned} \text{Brick wall} &= 1 \times 24.5 \times 0.3 \times 0.6 \\ &= 4.41 \text{ cu m.} \end{aligned}$$