

Q no 1

Check whether the building is safe or not if load of building is 10 kips & and bearing capacity is 1ton /ft square

$$L = 10 \text{ Kips}$$

B.C = Bearing capacity

$$B.P = L/A \text{ ----- } 1$$

B.P = Bearing pressure

$$\text{Tons/ ft. Square} \times 2.204 \text{ ----- } 2$$

B.P = B.P

$$1 \times 2.204 = 2.204 \text{ kips/ ft. square}$$

$$B.C = 2.204 \text{ kips/ ft. square}$$

$$\text{Now, } B.P = L/A$$

$$A = L/B.P$$

$$= 10/2.204$$

$$A = 4.5$$

$$B.P = L/A = 10/4.5$$

$$B.P = 2.22$$

If B.C is > and equal to B.P building is safe

If B.P is > B.C building is unsafe

So, the building is unsafe.

Q no 2

Check whether the foundation is safe or not if load of foundation is 20kips and size is 1.5x1.5 ft and bearing capacity is 0.75 tons/ft square

Firstly, convert ton/ft square into kips/ ft square

$$= 0.75 \times 2.204$$

$$B.C = 1.653$$

$$B.P = L/A$$

$$= 20/2.25 \quad 1.5 \times 1.5 = 2.25$$

$$B.P = 8.88$$

AS, B.P > B.C

SO, Foundation is safe.

Q no 3

Calculate the size of foundation for a column, if load of foundation is 20ft and bearing capacity is 0.75 tons/ft square. Also mention is structure safe or not

$$L = 20\text{FT}$$

$$0.75 \text{ tons/ft square} \times 2.204$$

$$B.C = 1.653$$

$$B.P = L/A$$

$$A = L/B.P$$

$$A = 20/1.653$$

$$= 12.099$$

$$B.P = L/A = 20/12.099 = 1.653$$

$$B.C = B.P$$

SO, THE structure is safe

Q no 4

Calculate total no of bricks required to calculate a wall of length 20ft, height 15ft, and thickness 12.5ft. Find out no of cement bags required to construct a wall also fix the quantity of cement and sand if ratio is 1:4

$$L = 20\text{FT}$$

$$H = 15 \text{ FT}$$

$$W = 13.5 \text{ Inch} = 13.5/12 = 1.125 \text{ FT}$$

NO OF BRICKS?

$$V = L \times W \times H$$

$$= 20 \times 1.125 \times 15$$

$$V = 337.5 \text{ Cuft}$$

RULE 1: 100 cuft of brick masonry = 1420 bricks

$$1 \text{ cuft of } \dots\dots\dots = 1420/100$$

$$337.5 \text{ cuft of } \dots\dots\dots = 1420/100 \times 337.5 = 4800$$

For quantity of cement and sand

Rule 2: 100 cuft of brick masonry = 30ft of dry mortar

$$1 \text{ cuft of } \dots\dots\dots = 30/100$$

$$337.5 \text{ cuft of } \dots\dots\dots = 30/100 \times 337.5 = 101.25 \text{ cuft}$$

$$\text{Quantity of cement} = 1/5 \times 101.25 = 20.25 \text{ cuft}$$

$$\text{Quantity of sand} = 1/5 \times 101.25 = 81 \text{ cuft}$$

$$\text{No of cement bags} = 20.25/1.25 = 16.2 = 17 \text{ bags}$$

$$\text{Volume of cement bag (fixed value)} = 1.25$$

Q no 5

Calculate the amount of dry material required for a column having 1.5x1.5 ft. The height of column is 15 ft and ratio is 1:2:4

For estimation of concrete:

$$\text{Dry concrete} = 1.54 \times \text{wet volume of concrete}$$

Concrete = cement, sand, aggregate

$$\text{Wet volume of concrete} = 1.5 \times 1.5 \times 15$$

$$= 33.7 \text{ cuft}$$

$$\text{Dry concrete} = \text{wet v} \times 1.54$$

$$= 33.7 \times 1.54$$

$$= 51.98 \text{ cuft}$$

$$\text{Quantity of cement} = 1/7 \times 51.98 = 7.42$$

$$\text{Cement bags} = 7.42/1.25 = 5.9 = 6 \text{ bags}$$

$$\text{Quantity of sand} = 2/7 \times 51.98 = 14.85 \text{ cuft}$$

$$\text{Aggregate} = 4/7 \times 51.98 = 29.65 \text{ cuft}$$

Q no 6

Calculate the amount of brick work if ratio is 1:4, Length is 20 ft, height is 20ft and thickness is 9 inches. For estimation of concrete ratio is 1:3:4 and the thickness of plaster is 8ft.

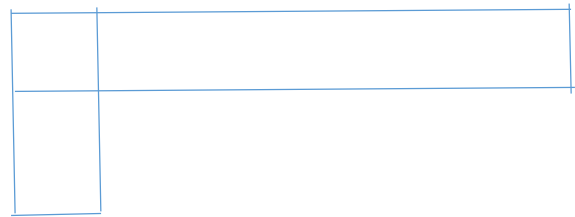
For brick work

Wall 1

$$\begin{aligned}\text{Volume} &= L \times W \times H \\ &= 20 \times 0.75 \times 20 \\ &= 300 \text{ Cu ft}\end{aligned}$$

Wall 2

$$\begin{aligned}\text{Volume} &= L \times W \times H \\ &= 19.25 \times 0.75 \times 20 \\ &= 288.75 \text{ cu ft}\end{aligned}$$



$$20-9'' = 19.25$$

$$\text{Total volume} = 300 + 288.75 = 588.75 \text{ cu ft}$$

$$100 \text{ cu ft of brick masonry} = 1420 \text{ bricks}$$

$$1 \text{ cuft of } \dots\dots\dots = 1420/100$$

$$588.75 \text{ of } \dots\dots\dots = 1420/100 \times 588.75 = 8360 = 8400 \text{ bricks}$$

$$\text{For cost estimation } 8400 \times 8.5 =$$

For quantity of cement and sand,

$$100 \text{ cuft of brick masonry} = 30 \text{ft of dry mortar}$$

$$1 \text{ cuft of } \dots\dots\dots = 30/100$$

$$\begin{aligned}588.75 \text{ cuft of } \dots\dots\dots &= 30/100 \times 588.75 \\ &= 176.6\end{aligned}$$

$$\begin{aligned}\text{Quantity of cement} &= 1/5 \times 176.6 \\ &= 35.32 \text{ cuft}\end{aligned}$$

$$\text{Cement bags} = 35.32/ 1.25 = 28.25 = 29 \text{ bags}$$

$$\text{Quantity of sand} = 4/5 \times 176.6 = 141.28$$

Estimation 141.28

For plastering

$$\text{External volume} = L \times W \times H$$

$$20 \times 8 \times 20$$

$$266.8 \text{ cuft}$$

$$\text{For internal volume} = L \times W \times H$$

$$19.25 \times 19.25 \times 8/12 = 247$$

$$\text{Wet volume} = 266.8 + 247$$

$$513 \text{ cuft}$$

$$\text{For plastering dry volume} = \text{wet volume} \times 1.27$$

$$= 513 \times 1.27$$

$$= 651.5 \text{ cu ft}$$

$$\text{Quantity of cement} = 1/5 \times 651.5 = 130$$

$$\text{Cement bags} = 130 / 1.25 = 105$$

$$\text{Quantity of sand} = 4/5 \times 651.5 = 522$$

For concert:

$$\text{Dry volume} = 588.7 \times 1.54 = 906.675$$

$$\text{Quantity of cement} = 1/8 \times 906.675$$

$$= 113.33$$

$$\text{Cement bags} = 113.33 / 1.25 = 90.66 = 91 \text{ bags}$$

$$\text{Quantity of sand} = 3/8 \times 906.675$$

$$= 340 \text{ cuft}$$

$$\text{Aggregate} = 4/8 \times 906.675$$

$$453.33$$

$$\text{Estimation} = 454$$

Q no 7

Calculate the amount of brick required to make a wall having height 20 ft length 30 ft and thickness 13 inches. The wall is having a door of size 4 x 7 ft and window of size 6 x 6ft.

$$\text{Volume} = L \times H \times W$$

$$= 30 \times 20 \times 18 \text{ inch}$$

$$= 900 \text{ cuft}$$

$$\text{Volume of door} = L \times W \times H$$

$$= 7 \times 4 \times 1.5$$

$$= 42 \text{ CUFT}$$

$$\text{Volume of window} = L \times W \times H$$

$$= 6 \times 6 \times 1.5$$

$$= 54 \text{ cuft}$$

$$\text{Total volume} = 900 - 42 - 54$$

$$= 804 \text{ cu ft}$$

$$100 \text{ cuft of brick masonry} = 1420 \text{ bricks}$$

$$= 1420/100$$

$$= 1420/100 \times 804$$

$$\text{No of bricks required} = 11,500$$

Q no 8

Calculate the amount of brick work required for wall having length 40ft height 30ft and thickness 22.5 inches. The wall is laid in cement, sand, mortar of 1:6. Wall has two doors of 4x7 ft and 3.5 x 7 ft and two windows of 7x5 and 6x5 ft.

$$\text{Volume} = L \times W \times H$$

$$= 40 \times 1.87 \times 30 = 2244 \text{ cuft}$$

$$\text{Door 1} = L \times W \times H$$

$$= 4 \times 7 \times 1.87$$

$$= 52.36 \text{ cuft}$$

$$\begin{aligned}\text{Door 2} &= L \times W \times H \\ &= 3.5 \times 7 \times 1.87 \\ &= 81 \text{ cuft}\end{aligned}$$

$$\begin{aligned}\text{Window 1} &= L \times W \times H \\ &= 7 \times 5 \times 1.87 \\ &= 45 \text{ cuft}\end{aligned}$$

$$\begin{aligned}\text{Window 2} &= L \times W \times H \\ &= 6 \times 5 \times 1.87 = 56.1 \text{ Cuft}\end{aligned}$$

$$\text{Total volume} = 2024.28 \text{ cuft}$$

$$100 \text{ cuft of brick masonry} = 1420 \text{ bricks}$$

$$\begin{aligned}1 \text{ cuft} &\dots\dots\dots = 1420 / 100 \\ &= 1420 / 100 \times 2024.28 \\ &= 28744.776\end{aligned}$$

For quantity of cement and sand,

$$100 \text{ cuft of brick masonry} = 30 \text{ft of dry mortar}$$

$$1 \text{ cuft of } \dots\dots\dots = 30 / 100$$

$$2024.28 \text{ cuft of } \dots\dots\dots = 30 / 100 \times 2024.28 = 607.28$$

$$\text{Quantity of cement} = 1/7 \times 607.28 = 86.75$$

$$\text{No of cement bags} = 86.75 / 1.25 = 70 \text{ bags}$$

$$\text{Quantity of sand} = 6/7 \times 607.28 = 521 \text{ cuft}$$

Q no 9

Calculate the amount of material required to plaster a wall having area A= 100 sqft and thickness of plaster =1 inch. Ratio of cement and sand is 1:3.

$$V = AXW$$

$$= 100 \times \frac{1}{12} = 8.33 \text{ cuft}$$

$$\text{Dry mortar} = \text{wet volume} \times 1.27$$

$$= 8.33 \times 1.27 = 10.5 \text{ cuft}$$

$$\text{Quantity of cement} = \frac{1}{4} \times 10.5 = 2.62 \text{ cuft}$$

$$\text{Cement bag} = \frac{2.62}{1.25} = 2 \text{ bags}$$

$$\text{Quantity of sand} = \frac{3}{4} \times 10.5 = 7.8 \text{ cuft}$$

Cost of building a new house of size 10 Marla

Wall 1

L=42 ft

H=11 ft

W=9 ft =9/12=0.75 ft

Window=8'×7'

Door=3'×7'

Ventilator=1.5'×1.5'

Volume=L×W×H

$$=42 \times 0.75 \times 11$$

$$=346.5 \text{ cu ft}$$

Volume of window= L×W×H

$$= 8 \times 0.75 \times 7$$

$$= 42 \text{ cu ft}$$

Volume of door=L×W×H

$$=3 \times 0.75 \times 7$$

$$=15.75 \text{ cu ft}$$

Volume of ventilator=L×W×H

$$=1.5 \times 0.75 \times 1.5$$

$$=1.68 \text{ cu ft}$$

Total volume of window, door and ventilator=42+15.75+1.68

$$=59.43$$

Total volume =346.5-59.43

$$=287.07$$

BRICKS

100 cu ft of brick masonry=1420

1 cu ft of brick masonry=1420/100

$$287.07 \text{ cu ft of brick masonry} = 1420 \times 287.07 / 100$$
$$= 4076.39$$

Estimation = 5000 bricks

CEMENT

Volume of 1 cement bag = 1.25

100 cu ft of masonry = 30 ft of dry mortar

287.07 cu ft masonry = $30/100 \times 287.07$

$$= 86.12 \text{ cu ft}$$

The cement and sand ratio is 1:4

Quantity of cement = $1/5 \times 86.12$

$$= 17.22$$

Cement bags = $17.22 / 1.25$

$$= 13.78$$

Estimation = 14 bags

Quantity of sand = $4/5 \times 86.12$

$$= 68.89$$

Estimation = 70

PLASTERING

Thickness of plastering is 3" = 0.25 ft

External = $L \times H \times \text{Thickness}$

$$= 42 \times 11 \times 0.25$$

$$= 115.5$$

Internal = $40.5 \times 11 \times 0.25$

$$= 111.37$$

Wet Volume = $115.5 + 111.37$

$$= 226.87$$

Dry Volume = 226.87×1.27

$$= 288.12$$

The cement and sand ratio in plastering is 1:4

Cement $=1/5 \times 288.12$
 $=57.62$

Cement bags $=57.62/1.25$
 $=46.09$

Estimation =47 bags

Sand $=4/5 \times 288.12$
 $=231$

CONCRETE

The cement , sand and aggregate ratio in concrete is 1:3:4

Dry concrete $=\text{Wet concrete} \times 1.54$
 $=287.07 \times 1.54$
 $=442.08$

Cement $=1/8 \times 442.08$
 $=55.26$

Cement bags $=55.26/1.25$
 $=44.20$

Estimation =45 bags

Sand $=3/8 \times 442.08$
 $=165.78$

Estimation =166

Aggregate $=4/8 \times 442.08$
 $=222$