

Lectures Note
on
Estimating & Cost Evaluation - I
For
3rd Semester Civil Engg. Diploma Students
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Method of Estimate:

Estimate :-

An estimate is a computation or calculation of the quantities required & expenditure likely to be incurred in the construction of a work. The estimate is the probable cost of a work & is determined theoretically by mathematical calculations based on the plan(s) & drawing & current rates. Approximate estimate may be prepared by various method but accurate estimate is prepared by detailed Estimate method.

Actual Cost :-

The actual cost of a work is known as at the completion of the work. Account of all expenditure is maintained day to day during the execution of work in the account section & at the end of the completion of the work when the account is completed, the actual cost is known. The actual cost should not differ much from the estimated cost worked at the beginning.

Detailed Estimate:-

Preparation of detailed estimate consist of working out of the quantities of different items of work & then working out of the cost i.e the estimate is prepared in two stages:-

- ① Detailed of measurements & calculation of quantities.
- ② Abstract cost of estimate.

① Detailed of Measurement & Calculation of Quantities :-

The whole work is divided into different items of work as earthwork, concrete, brickwork etc. & the Hems are classified & grouped under different sub-heads & details of measurement of each item of work are taken out & quantities under each item are computed in prescribed form. Detail of measurement form.

Detail of Measurement form :-

| Item no. | Description | No. | Length | Breadth | Height | Quantity |
|----------|-------------|-----|--------|---------|--------|----------|
|----------|-------------|-----|--------|---------|--------|----------|

② Abstract of Estimate cost :-

The cost under item of work is calculated from the quantities already computed at workable rate & the total cost is worked in a out in a prescribed form, Abstract of estimate form. A percentage of 3 to 5 % is added for contingencies to allow for pretty contingent expenditures unforeseen expenditures changes in design, changes in rates etc. which may occur during the execution of the work. A percentage of 1½ to 2 percent is also added to meet the expenditure of work charged establishment. The grand total thus obtained is the estimated cost of the work.

Abstract of Estimate form :-

| Item no. | Description | No. | Length | Breadth | Height | Quantity |
|----------|-------------|-----|--------|---------|--------|----------|
|----------|-------------|-----|--------|---------|--------|----------|

Different types of Estimate :

1. Preliminary / Approximate / Abstract / Rough cost Estimate.
2. Plinth area Estimate.
3. Cube rate Estimate or Cubical concrete Estimate.
4. Approximate quantity method Estimate.
5. Detailed Estimate or Item Rate Estimate.
6. Revised Estimate.
7. Supplementary Estimate
8. Supplementary & revised Estimate
9. Annual Repair or Maintenance Estimate.

① Preliminary / Approximate / Abstract / Rough cost Estimate :

It is the studies of various aspects of a work or project to decided the financial position & policy for administrative sanction by the competent administrative authority. This estimate is prepared showing ~~separate~~ separately the approximate is prepared showing cost of all important items of works as cost of lands, cost of each building, cost of roads, water supply, sanitary works, electrification etc. The estimate is accompanied by a brief report explaining the need necessity & utility of the project & showing how the cost of separate items have been arrived at. This is also accompanied with a site plan or lay out plan. A percentage about 5% to 10%.

2. Plinth Area Estimate for Building :-

This is prepared on the basis of plinth area of building the rate being deducted from the cost of similar building having similar specification height & construction, in the locality, Plinth area estimate is calculated by finding the plinth area of the building multiplying by the plinth area rate.

The plinth area should be calculated for the covered area by taking taking external dimension of the building at the floor level courtyard & other open area should not be included in the plinth area.

Plinth area estimated is only approximate and is a preliminary estimate to known the approximate cost before hand, for building the plinth area estimate is prepared for each story separately.

3. Cube Rate Estimate for Building :-

Cube rate estimate is a preliminary estimate or an approximate estimate & is prepared on the basis of the cubical content of the building the cube rate being deducted from the cost of the similar building having specifications & construction in the locality.

This calculated by finding the cubical content of the following building content of the building

$(L \times B \times H)$ & multiplied by it by the cubic rate.
The L & B should be taken as the external dimensions of the building at the floor level & the height should be taken from the floor level to top of the roof or (halfway of sloped roof). For destroying building should be taken between the floor level of one story to top of next higher floor.
The foundation & plinth & the part perfect above roof are not taken into account in finding the cubical content.

Cubic rate estimate is most accurate as compared to the plinth area estimate as the height of the building is also compared.

Approximate quantity Method of Estimation:

In this method approximate total length of wall is found in running metres & this total length multiplied by the rate per running metre of walls gives a fairly accurate cost. For this method the structure may be divided into two viz
① Foundation including plinth
② Superstructure

The running mt. cost for foundation & superstructure should be calculated first & these running metre rate should be multiplied by the total length of walls for this method the plan or line plan of the structure should be available.

5. Detailed Estimate or Item Rate Estimate :

Detailed estimate is an accurate estimate & consist of working out the quantities of each item are taken out correctly from drawing quantities of each item are calculated & abstracting are & billing are done.

a) Detail of Measurement & Calculation of Quantities :

The detail measurement of each item of work are taken correctly from plan & drawing & quantities under each item are computed are calculated in a tabular form named as details of measurement form.

b) Abstract of Estimate course :

The cost of each item of work is calculated in a tabular form of the quantities already computed & total cost is worked out in abstract of estimate form. The rates of different items of work are taken as per schedule of rates or current wokable rates are analyses rates for finished item of work. A percentage usually 5% of the estimate cost is already added to allow for contingencies for miscellaneous petty item which do not come under any classified head of item of work & a percentage of about 2% is provide for workcharge establishment. The Grand

total thus obtained gives the estimated cost of work. The detailed estimate is usually prepared work size, under each sub-work as main building, servant quarters, garage, boundary etc.

The detail estimate accompanied with

- ① Report
- ② General specification
- ③ Detailed specification
- ④ Drawing - plan, elevation, section elevation. Detail drawing, site, plan or layout plan or so on etc.
- ⑤ Calculation & design : Design of foundation beam slab lintel, design of thickness of metal crust in case of road etc.
- ⑥ Analysis of rates : If rates are not as per schedule of rates are for the non-schedul items.

Detailed estimate is prepared for technical sanction of the complete authority, for arranging contact & for the execution work.

If in the Abstract of Estimate from the coloums of rates & amount are left blank (to be filled by contract) it is then known as bill of quantity.

6. Revised Estimate :

Revised Estimate is detailed estimate & is required to be under any one of the following circumstance.

- i) When the original sanction estimate is exceeded or likely to exceed by more than 5%.
- ii) When the expenditure on a work exceeds or likely to exceed the amount of the administrative sanction by more than 10%.
- iii) When there are material deviation from the original proposal even though the cost may be met from the sanction amount.

7. Supplementary Estimate :

Supplementary estimate is a detailed estimate & prepared when additional work are required to supplement the original works, or when further development is required during the progress of work - This is a fresh detailed estimate of the additional work in addition to the original estimate.

The Abstract should show the amount of the original estimate & the total amount including the supplementary amount of which Sanction is required.

8. Supplementary & Revised Estimate :

When a work is partially abandoned & the estimate cost of the remaining work is less than 95% of the original work, that is less than 95% of the original sanction estimate or when there are material deviation & changes in the design which may cause substantial saving in the estimate then the amount of the original estimate is revised by the competent Authority.

A supplementary & revised estimate is then prepared & fresh technical sanction of the competent Authority is obtained.

If at any time either before or during the execution of original work, it is found that the original estimate is excessive, then divisional officer may sanction a revised estimate of reduced amount while giving such sanction the accountant general & other higher authorities are informed.

9. Annual Repair or Maintenance Estimate:

Annual repair estimate is a detailed estimate and is prepared to maintain the structure or work in proper order & safe condition. For building this includes white washing colours, pointing masonry repair etc.

For road works the A.R.F provides for patch repairing, renewals, repair of bridge and culverts etc.

Furthermore, there are many may be special repair estimate monsoon damage repair estimate etc.

>Main Items of Works :

1. Earth Work :

Earth work in excavation & earth work in filling are usually taken out separately under different items & quantity are calculated in cu.m.

foundation trenches are usually dug to the exact width of foundation with vertical sides. Earth work in excavation in foundation is calculated by taking the dimension of each trench is $(L \times b \times h)$

2. Concrete in foundation :-

It is taken out in cum by $L \times b \times h$ thickness. the $L \times b$ of foundation concrete are usually the same as for excavation, only the depth or thickness different. The thickness of concrete varies from 20 cm to 45 cm usually 30 cm.

foundation concrete consist of lime concrete or weak cement concrete. The proportion of cement in foundation may be 1:4:8 or 1:5:10.

3. Soling

When soil is soft or bad, one layer of dry bricks or stone soling is applied below the foundation concrete. The soling layer is computed in sqm ($L \times b$) specifying the thickness.

4. Damp Proofing Course (DPC) :-

DPC usually of 2.5 cm (1") thick rich cement concrete 1:15:3 or 2 cm ($\frac{3}{4}$ ") thick cement more or less 1:2 mixed with standard waterproofing material is provided at the plinth level to full width of plinth wall & the quantities are computed in sqm. ($L \times B$) usually DPC is

not provided at the sillk. of doores & verandah openings. for which deductions are made 1kg of cement seal or impermo are others standard water proofing compound per bag of cement is generally used.

5. Masonry :-

It is computed in cum ($l \times b \times h$) foundation & plinth masonry is taken under one item & masonry in superstructure is taken under a separate item. In storeyed building the masonry is each story as ground floor above plinth level, first floor etc. is computed separately.

In taking at quantities the walls are measured as solids & then deduction are made for openings as doore windows etc. And such these portions are necessary. Masonry of different types or classes, masonry with different mortars etc. are taken out under separate item. Thin partition wall is measured in sqm no. deduction is made for holes, stone masonry is calculated in the same manners as for brick masonry.

Deduction for opening, bearing etc in masonry

No deduction is made for the following:-

- 1) opening each of to 1000 sqm or 0.1 sqm A.sq.m
- 2) Ends of beams, Posts, raffeters, Pervelins etc

upto 500 sqm are 0.05 sqm (25%) in section.
 iii) Bed plates, walls plate, boarding of chajjas
 the like upto 10cm (4") depth.
 Boarding of floors & roof slabs are not
 deducted from wall masonry.

Rectangular opening :

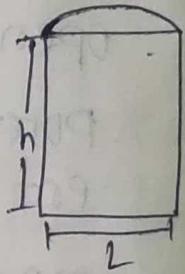
Full deduction is made

Deduct - $L \times h \times$ thickness of wall

Doors & windows with small segmental Arches :

Deduction is made for rectangle portion
 only upto the springing line the segment
 portion is considered as solid to allow for
 the extra expenses in constructing the
 arch & the filling up with thin wall

Deduction = $L \times h \times$ thickness of wall



Segmental Arch Openings :

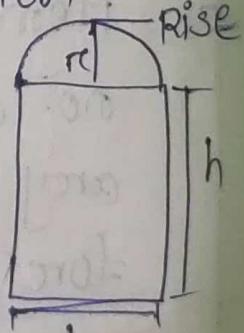
Deduction is made for the
 whole opening, the rectangular portion
 as well as the segmental portion.

The area of the segmental
 portion = $\frac{2}{3} \pi r c + \frac{\pi r^2}{2}$

$$\text{Portion} = \frac{2}{3} \pi r c + \frac{\pi r^2}{2}$$

Total deduction will be

$$= (L \times h) + \left(\frac{2}{3} \pi r c + \frac{\pi r^2}{2} \right) \text{ thickness of wall}$$



Semicircular Arch Opening :-

The area of semi-circular portion

$$= \frac{1}{2} \pi r^2$$

Total deduction will be

$$= (L \times h) + (\frac{1}{4} \pi L \times r) \times \text{thickness of wall}$$

Elliptical :-

Arch may be considered as semicircular arches & may be dealt in the same manner.

Arch Masonry Work :-

Quantity of arch masonry

$$= Lm \times t \times \text{thickness of wall}$$

$$\text{Deduction} = Lm \times t \times \text{thickness of wall}$$

Lintels Over Openings :-

Lintels are either of RCC or of RB. quantities are calculated in cum.

Length of the lintel is equal to the clear span plus two bearing. If dimension of bearing is not given the bearing may be taken as same as the thickness of lintel with a minimum of 12 cm ($\frac{1}{2}$ m). Thus the length of the

lintel $= S + 2t$ i.e. clear span plus two bearing. Quantity of lintel $= L \times t \times \text{thickness of wall}$
Deduction $= L \times t \times \text{thickness of wall}$

RCC & RB WORK

RCC & RB work may be in roof or floor slab, in beams, lintels, columns, foundation etc. & the quantities are calculated in cum 1, b, h & thickness are found correctly from the plan, elevation & section or from other detailed drawings. The quantities are calculated in cum exclusive of steel reinforcement & its bending but inclusive of centering & shuttering & fixing & building reinforcement in position.

The reinforce cement including its bending is taken up separately under steel works in quintal for this purpose 0.6% to 1% of RCC or RB work by volume may be taken for steel.

The volume of steel is not required to be deducted from the RCC or RB work.

In RCC work plastering is not taken separately, but the exposed surface are finished with this rich cement sand mortar plastering to give smooth & even surface, which usually is not taken into consideration.

9) Flooring & Roofing

- ▷ The quantity is calculated in sqm multiplying the length by the breadth. The L & B are measured as inside dim from wall to wall of superstructure. Both the works

of base concrete & floor finishing are paid under one item.

- II) Supporting structure is taken separately in cum as RCC & RB etc. & the floor finishing is taken separately in sqm as 2.5 cm or 4 cm. or masic etc.
- III) Roof supporting structure is taken separately in cum & the lime concrete terracing is computed in sqm with thickness specified under a separate item included surface rendering smooth. The compacted thickness of lime concrete terracing is 7.5 cm to 12 cm average, LC terracing may also be calculated in cm with average thickness.

The bearing of roof or floor slab is given same as the thickness of slab, usually 10 cm - 15 cm. opening should also be taken into account. In the case of ground floor slabs should be taken separately as there is no lime concrete in slabs.

10. Plastering & pointing :-

Plastering usually 12 mm thick is calculated in sqm. For walls the measurement are taken for the whole face the wall both sides as solid & deduction for opening are made in the following manner.

- i) No deduction is made for ends of beams poste rather.
- ii) for small opening up to 0.5 sqm no deduction is made & at the same time no addition are made for Jamb, soffits & of these openings.
- iii) for openings exceeding 0.5 sqm but not exceeding 3 sqm deduction is made for one face only & the other face is allowed for Jamb, soffits & sills which are not taken into account separately.
- iv) for openings above 3 sqm deduction is made for both faces of the opening & the Jamb, soffit & sills are taken into account & added.

As the outer Jamb etc much smaller than the inner ones the deduction is usually made from the outer face.

Pointing :-

Pointing in walls is calculated in sqm for whole surface & deduction similar to plastering are made.

Pillars :-

Pillars are taken separately in cum for their net volume & quantities are calculated by correct geometrical measurement by simple mensuration method.

g quantity = Sec area x ht

$$= \frac{\pi d^2}{4} \times h \text{ cum}$$

13) DOORS & WINDOWS:

If frames are chowkhats are computed in cum. Length is obtained by adding the length of all the members of the chowhat, top & two verticals if there is no sill member & adding bottom also if there is sill & this length is multiplied by two dimension of the cross-section of the members. If there is horn projection also should be added to the length. If there is no sill member, vertical members should be added to the inserted into the floore by about 2.5 cm to 4cm.

ii) If doors & windows leaves are shutters. They are computed in cum sqm by multiplying the breadth by the height of the shutters, the rebates in the chowhat shocld be taken into consideration in finding the b & h A clearance of 6mm may be allowed at the bottom of doore. if there is no sill member for estimate. The clearance may not be taken into consideration this may be negleected. The rebates in the chowkhats may be taken as 12 mm to 20 mm. the central overlap & not taken into account.

14: Wood Work:

Wooden beams, bungals, posts wooden roof trusses, chowkharts etc. come under this item & the quantities are computed in cem. The dimensions of finished work shall be taken.

15: Iron Work:

This is computed in weight in kg or quintal & the quantities are calculated correctly by multiplying the weights per running may be the length.

Density of mild steel is equal to 7850

Kg/cm or 78.59 cem or 0.785 gm.

Weight of iron hold facts may be taken as 1/2 kg each. doors 6 holds facts & for window 4 holds facts may be provided if not specified.

16: White - Washing / Coloure / Distempering :

The qualities are computed in sqm & are usually same as for plastering. The inside is usually white washed or distempered & this item will be same as for inside plaster. The outside coloure is washed & the quantities of coloure washing will be same as for outside plaster.

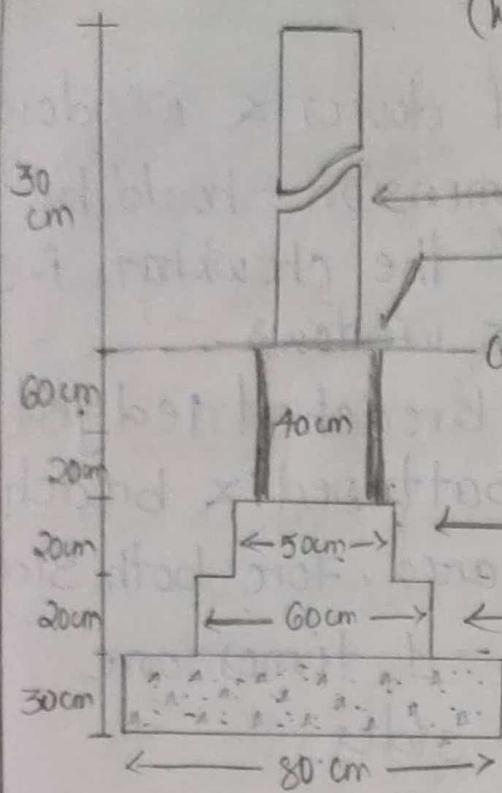
17. Painting :

Painting or varnishing of doors & windows are computed in sqm the dimension should be taken for outer dimension of the chowkhat i.e. outer dimension of doors & windows.

- i) Plain panelled, framed & breached ledged & battened are ledged battened & breached $\frac{2}{4}$ times one surface area, for both sides.
- ii) Fully glazed are gauged - 1 times one surface area, for both sides.
- iii) Partly panelled & partly - 2 times one surface area for both sides glazed are gauged.
- iv) Flush doore — 2 times one surface area, for both sides.
- v) Verction — 3 times one surface area, for both side.
- vi) Iron bars, grills in window — 1 time the area of cleare opening in between chowkhats for over all.

(ESTIMATING OF WALL)

(wall with standard modular bricks)



| Item No | Item description | No. | Length in (mm) | Breadth in (mm) | Height in (mm) | Quantity in (cubic meter) | Remarks |
|---------|--|-----|----------------|-----------------|----------------|---------------------------|---|
| 1 | Bench work Excavation of wall | 1 | 6.0 | 0.80 | 0.90 | 4.32 | $H = 0.3 + 0.2 + 0.2 + 0.2 = 0.9 \text{ m}$ |
| 2 | 1:3:6 CC in foundation | 1 | 6.0 | 0.80 | 0.30 | 1.44 | |
| 3 | 1st class B.W with 1:4 ceme. nt morton foundation | | | | | | |
| | 1st footing | 1 | 6.0 | 0.60 | 0.20 | 0.72 | |
| | 2nd footing | 1 | 6.0 | 0.50 | 0.20 | 0.06 | |
| | 3rd footing | 1 | 6.0 | 0.4 | 0.80 | 0.192 | |

| Item no. | Item description | No | Length in mm | Breadth in mm | Height in mm | Quantity in cum | Remark |
|----------|---|----|--------------|---------------|--------------|-----------------|--------|
| 4 | 2.5 cm DPC above plinth at Level | 1 | 6.0 | 0.4 | — | 2.4 | |
| 5 | 1st class BW (Brick wall) with 1:6 cm cement mortar or in super structure | 1 | 6.0 | 0.3 | 3.5 | 6.3 | |

Q The plan represent of superere structure wall of a room building of ~~5m~~ $5\text{m} \times 4\text{m}$ & section represent the cross-section of the walls with the foundation estimate the quantities of

- 1) Earth work in excavation in foundation
- 2) Reinforcement concrete in foundation
- 3) Brick work in foundation & plinth
- 4) Brick work in superere structure

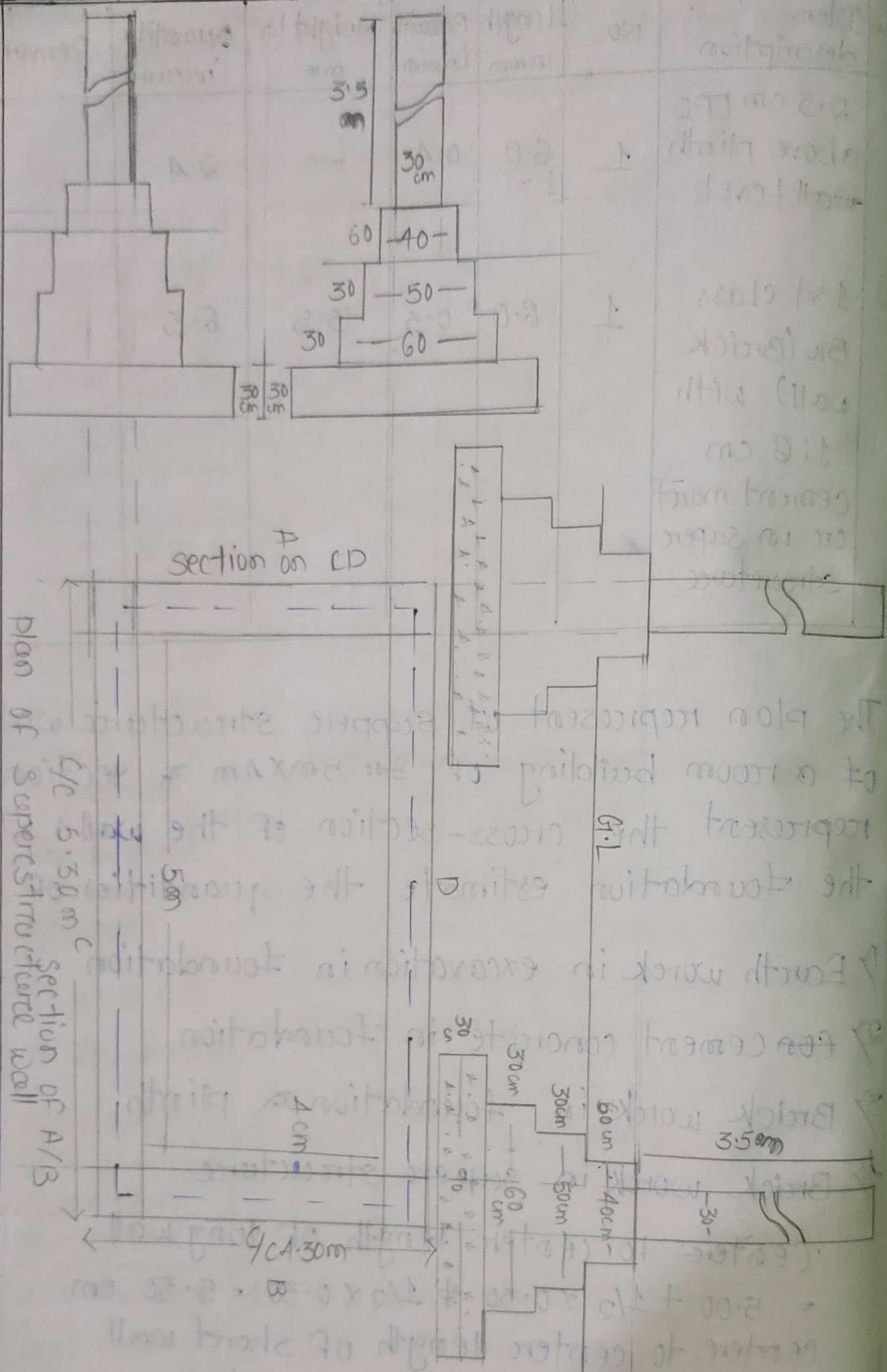
Center to center length of long wall

$$= 5.00 + \frac{1}{2} \times 0.30 + \frac{1}{2} \times 0.30 = 5.30 \text{ m}$$

center to center length of short wall

$$= 4.00 + \frac{1}{2} \times 0.30 + \frac{1}{2} \times 0.30 = 4.30 \text{ m}$$

Estimation of A Single room



| Item no | Item description | No. | Length in m | Breadth in(m) | Height in(m) | Quantity in (cum) | Remark |
|---------|-------------------------------------|-----|-------------|---------------|--------------|--------------------|--|
| ① | Earth work in excavation | | | | | | |
| | Long wall | 2 | 6.2 | 0.9 | 0.9 | 10.044 | $L = 5.3 + \frac{0.9}{2} + \frac{0.9}{2}$ $H = 0.3 + 0.3 + 0.3 = 0.9 \text{ m}$ |
| | Short wall | 2 | 3.4 | 0.9 | 0.9 | 5.508 | $L = 4.3 - \frac{0.9}{2} - \frac{0.9}{2}$ |
| ② | cement concrete in foundation | | | | | Total = 15.552 cum | $= 3.4 \text{ m}$ |
| | Long wall | 2 | 6.2 | 0.9 | 0.3 | 3.456 | $L = 5.3 + \frac{0.9}{2} + \frac{0.9}{2} = 6.2 \text{ m}$ |
| | Short wall | 2 | 3.4 | 0.9 | 0.3 | 1.836 | $L = 4.3 - \frac{0.9}{2} - \frac{0.9}{2}$ |
| ③ | 1st class BW in foundation & plinth | | | | | Total = 5.184 cum | $= 3.4 \text{ m}$ |
| | Long wall | | | | | | |
| | 1st footing | 2 | 5.9 | 0.6 | 0.3 | 2.124 | $L = 5.3 + \frac{0.6}{2} + \frac{0.6}{2} = 5.9 \text{ m}$ |
| | 2nd footing | 2 | 5.8 | 0.5 | 0.3 | 1.74 | $L = 5.3 + \frac{0.5}{2} + \frac{0.5}{2} = 5.8 \text{ m}$ |
| | 3rd footing | 2 | 5.7 | 0.4 | 0.6 | 2.736 | $L = 5.3 + \frac{0.4}{2} + \frac{0.4}{2} = 5.7 \text{ m}$ |
| | Short wall | | | | | | |
| | 1st footing | 2 | 3.7 | 0.6 | 0.3 | 1.332 | $L = 4.3 - \frac{0.6}{2} - \frac{0.6}{2} = 3.7 \text{ m}$ |
| | 2nd footing | 2 | 3.8 | 0.5 | 0.3 | 1.14 | $L = 4.3 - \frac{0.5}{2} - \frac{0.5}{2} = 3.8 \text{ m}$ |
| | Plinth | 2 | 3.9 | 0.4 | 0.6 | 1.872 | $L = 4.3 - \frac{0.4}{2} - \frac{0.4}{2} = 3.9 \text{ m}$ |
| | | | | | | Total = 10.944 cum | |

| Item no. | Item description | No. | Length in (m) | Breadth in (m) | Height in (m) | Quantity in (cum) | Remarks |
|----------|-------------------------|-----|---------------|----------------|---------------|-------------------|---|
| ④ | DPC over plinth | | | | | | |
| | Long wall | 2 | 5.7 | 0.4 | — | 4.56 | |
| | Short wall | 2 | 43.9 | 0.4 | — | 3.12 | |
| | | | | | Total = | 7.68 cum | 9m |
| ⑤ | 1st Bwin superstructure | | | | | | |
| | Long wall | 2 | 5.6 | 0.3 | 0.5 | 11.76 | $L = 5.3 + \frac{0.3}{2} = 5.6 \text{ m}$ |
| | Short wall | 2 | 4 | 0.3 | 3.5 | 8.4 | $L = 4.3 - \frac{0.3}{2} = 4 \text{ m}$ |
| | | | | | Total = | 20.16 cum | |

(Estimation of two roomed Building)

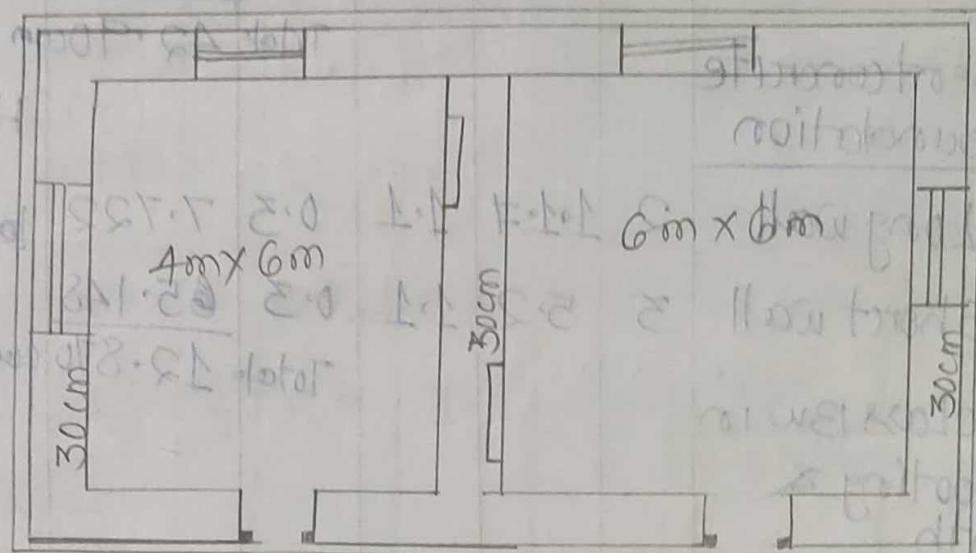
Estimate the quantities of the following item of a 2 roomed building.

- ① Earthwork in excavation, ② LC in Foundation
 - ③ 1st class b/w in foundation & plinth ④ 2.5 cm DPC
 - ⑤ 1st class b/w in lime mortar in superstructure.

solution?

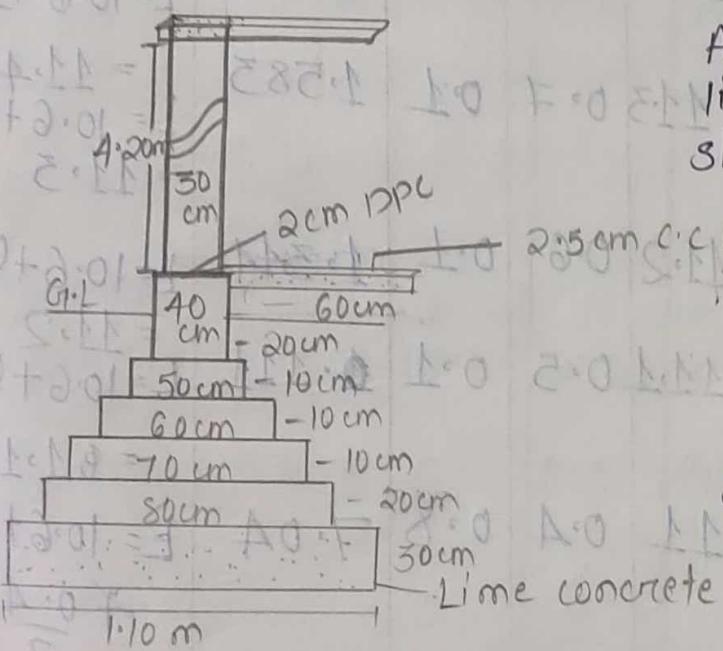
$$c/c \text{ length of long well} = 0.3/2 + 4 + 0.3 + 6 + 0.3/2 = 5.3 \text{ m}$$

$$c/c \text{ length of short wall} = 0.3/2 + 6 + 0.3/2 = 4.3 \text{ m}$$



(PLAN)

All walls are of same section
lintels over doors, windows &
shelves are 15 cm thick RB.



Doors - D + 1.20 m x 2.10 m

Windows $w = 1.00 \text{ m} \times 1.50 \text{ m}$

Shelf S = 1.00 m x 1.50 m

| Hem No. | Item description | No | Length in m | Breadth in m | Height in m | Quantity in cum | Remark |
|---------|---|----|-------------|--------------|-------------|-----------------|--|
| ① | <u>Earthwork Excavation</u> | | | | | | |
| | Long wall | 2 | 11.7 | 1.1 | 1 | 25.74 | $L = 10.6 + \frac{1}{2} + \frac{1}{2}$ $= 11.7$ |
| ② | <u>Cement concrete in foundation</u> | | | | | | |
| | Short wall | 3 | 5.2 | 1.1 | 1 | 17.16 | $L = 6.3 - \frac{1}{2} - \frac{1}{2}$ |
| ③ | <u>1st class BW in footing & plinth</u> | | | | | Total 42.90 cum | - 5.2 H = 1m |
| | Long wall 1st footing | 2 | 11.4 | 0.8 | 0.2 | 3.648 | $L = 10.6 + \frac{0.8}{2} + \frac{0.2}{2}$ |
| | 2nd footing | 2 | 11.3 | 0.7 | 0.1 | 1.583 | $L = 11.4$ $L = 10.6 + \frac{0.7}{2} + \frac{0.1}{2}$ $= 11.3$ |
| | 3rd footing | 2 | 11.2 | 0.6 | 0.1 | 1.344 | $L = 10.6 + \frac{0.6}{2} + \frac{0.1}{2}$ $= 11.2$ |
| | 4th footing | 2 | 11.1 | 0.5 | 0.1 | 0.111 | $L = 10.6 + \frac{0.5}{2} + \frac{0.1}{2}$ $= 0.111$ |
| | Plinth | 2 | 11 | 0.4 | 0.8 | 7.04 | $L = 10.6 + \frac{0.4}{2}$ $+ \frac{0.8}{2} =$ |

| Item no. | Item description | No. | Length in 'm' | Breadth in 'm' | Height in 'm' | Quantity in (cm) | Remark |
|----------|---|-----|---------------|---|---------------|---------------------|--|
| | Short wall 1st footing. | 3 | 5.5 | 0.8 | 0.2 | 2.64 | $L = 6.3 - \frac{0.8}{2} - \frac{0.8}{2}$ = 5.5 |
| | 2nd footing | 3 | 5.6 | 0.7 | 0.1 | 1.16 | $L = 6.3 - \frac{0.7}{2} - \frac{0.7}{2}$ = 5.6 |
| | 3rd footing | 3 | 5.7 | 0.6 | 0.1 | 1.026 | $L = 6.3 - \frac{0.6}{2} - \frac{0.6}{2}$ = 5.7 |
| | 4th footing | 3 | 5.8 | 0.5 | 0.1 | 0.87 | $L = 6.3 - \frac{0.5}{2} - \frac{0.5}{2}$ = 5.8 |
| | plinth | 3 | 5.9 | 0.8 0.1 0.4 | 0.8 | 5.64 | $L = 6.3 - \frac{1.1}{2} - \frac{1.1}{2}$ = 5.9 |
| ④ | DPC (2 cm) above plinth level | | | | | 26.1 | , |
| | Long wall | 2 | 10.11 | 0.84 | — | 8.8 | $L = 10.6 + \frac{0.4}{2} + \frac{0.1}{2}$ = 11 |
| | Short wall | 3 | 5.9 | 1.1 | — | 7.08 | $L = 6.3 - \frac{1.1}{2} - \frac{1.1}{2}$ = 5.9 |
| | <u>Deduct</u> | | | | | 15.88 square | |
| | Doors opening | 2 | 1.2 | 0.4 | — | 0.96 | |
| ⑤ | 1st class BW in 3 with lime mortar in super- structure | | | | | Net total 14.92 sqm | |
| | Long wall | 2 | 10.9 | 0.3 | 4.2 | 27.468 | $L = 10.6 + \frac{0.3}{2} + \frac{0.3}{2}$ = 10.9 m |
| | Short wall | 3 | 6 | 0.3 | 4.2 | 22.68 | $L = 6.3 - \frac{0.3}{2} - \frac{0.3}{2}$ = 6 |
| | <u>Deduct</u> | | | | | 50.148 cm | |
| | Doors | 2 | 1.2 | 0.3 | 2.1 | 1.512 | |
| | windows | 4 | 1.0 | 0.3 | 1.5 | 1.8 | |

| Item No. | Item description | No. | Length in m | Breadth in m | Height in m | Quantity in cuem | Remark |
|-------------|----------------------|-----|----------------|-----------------|----------------|---------------------|--|
| | shelves | 2 | 1.0 | 0.3 | 0.15 | 0.6 | take 20cm bearing in wa |
| | lintels over doors | 2 | 1.4 | 0.3 | 0.15 | 0.1206 | take both side of lintels in bearing of 10cm |
| | lintels over windows | 2 | 1.2 | 0.3 | 0.15 | 0.216 | |
| | lintels over shelves | 2 | 1.2 | 0.3 | 0.15 | 0.108 | |
| | | | | | Total | 4.362 | |
| | | | | | Net = | 45.786 | |

Q. Estimate the quantities of the following from the drawing:

- ① Earth work in excavation in foundation
- ② Lime concrete in foundation
- ③ 1st class brick work in foundation & plinth
- ④ 2.5 cm DPC above plinth.
- ⑤ 1st class brick work in lime mortar in super structure.

center to center length of walls :-

① left side bedroom & drawing room

$$= \frac{0.3}{2} + 4 + 0.3 + 6 + \frac{0.3}{2} = 10.6 \text{ m } (\text{C/C length of long wall})$$

C/C length of short wall

$$= 0.3/2 + 5 + 0.3/2 = 5.3$$

numbers of long walls = 2

" " short walls = 3

② Right side both bed room :-

C/C length of long wall

$$= \frac{0.3}{2} + 5 + 0.3 + 4 + \frac{0.3}{2} = 9.60 \text{ m}$$

numbers of long wall = 2

C/C length of short wall

$$= 0.3/2 + 4.5 + 0.3/2 = 4.8 \text{ m}$$

numbers of short wall = 2

③ Front verandah

C/C length of long wall

$$= 0.3/2 + 5 + 0.3/2 + 4 + 0.3 - 0.2/2 = 9.65$$

numbers of long wall = 1

C/C length of short wall

$$= 0.3/2 + 2 + 0.2/2 = 2.25 \text{ m}$$

numbers of short wall = 1

④ Back verandah with bath room

C/C length of long wall

$$= 0.3/2 + 5 + 4 + 0.3 + 0.3/2 = 9.65 \text{ m}$$

numbers of walls = 1

c/c length of short walls

$$= 0.3/2 + 0.2/2 + 2.50 + 0.3/2 = 2.75 \text{ m}$$

number of walls = 1

Bathroom

c/c length of long walls

$$= 0.2/2 + 2.5 + 0.3/2 = 2.75 \text{ m}$$

number of walls = 2

c/c length of short walls

$$= 0.2/2 + 2 + 0.2/2 = 2.2 \text{ m}$$

number of walls = 1

| Item no | Description | No. | Length in(m) | Breadth in (m) | Height in (m) | Quantity in (ccm) | Remark |
|--------------------------------------|-------------|-----|--------------|----------------|---------------|-------------------|---|
| i) Bath work in excavation | | | | | | | |
| ii) left side bedroom & drawing room | long wall | 2 | 11.5 | 0.9 | 1 | 20.7 | $L = 10.6 + \frac{0.9}{2} + \frac{0.9}{2} = 11.5 \text{ m}$ |
| | short wall | 3 | 4.4 | 0.9 | 1 | 11.88 | $L = 5.3 - 0.9/2 - 0.9/2 = 4.4 \text{ m}$ |
| iii) Right side bath bedroom | long wall | 2 | 9.6 | 0.9 | 1 | 17.28 | $L = 9.60 + 0.9/2 + 0.9/2 = 9.6 \text{ m}$ |
| | short wall | 2 | 3.9 | 0.9 | 1 | 7.02 | $L = 4.8 - 0.9/2 - 0.9/2 =$ |

| | | | | | | | |
|-------|--|---|------|-----|-------|-------|--|
| (iii) | Front verandah at long wall | 1 | 9.5 | 0.6 | 0.5 | 2.85 | $L = 9.65 + 0.6/2$ $0.9/2 =$ |
| | short wall | 1 | 1.5 | 0.6 | 0.5 | 0.45 | $H = 0.5 \text{ m}$ $L = 0.9/2 - 2.2$ |
| (iv) | Back verandah with bathroom | | | | | | $= 1.5 - 0.6/2$ |
| | long wall | 1 | 9.5 | 0.6 | 0.5 | 2.85 | $L = 9.65 + 0.6 - 0.9/2$ $= 9.5 \text{ m}$ |
| 2 | short wall | 1 | 2.0 | 0.6 | 0.5 | 0.6 | $L = 2.75 - 0.6/2 - 0.9/2$ |
| | | | | | Total | 63.63 | $\div 2 \text{ m}$ |
| (i) | Lime concrete in foundation | | | | | | cent |
| | Left side bed room & draw ing room | | | | | | |
| (ii) | long wall | 2 | 11.5 | 0.9 | 0.3 | 6.21 | $L = 10.6 + \frac{0.9}{2} + \frac{0.9}{2}$ $= 11.5 \text{ m}$ |
| | short wall | 3 | 4.4 | 0.9 | 0.3 | 3.564 | $L = 5.3 - \frac{0.9}{2} - \frac{0.9}{2}$ $= 4.4 \text{ m}$ |
| (iii) | Right side both bedroom | | | | | | |
| | long wall | 2 | 9.6 | 0.9 | 0.3 | 5.184 | $L = 9.6 + \frac{0.9}{2} - \frac{0.9}{2}$ $= 9.6 \text{ m}$ |
| (iv) | short wall | 2 | 3.9 | 0.9 | 0.3 | 2.106 | $L = 4.8 - \frac{0.9}{2} - \frac{0.9}{2}$ $= 3.9 \text{ m}$ |
| | Front verandah at long wall | 1 | 9.7 | 0.6 | 0.2 | 1.164 | $L = 9.65 - \frac{0.5}{2} + \frac{0.6}{2}$ $= 9.7 \text{ m}$ |
| (v) | short wall | 1 | 1.7 | 0.6 | 0.2 | 0.204 | $L = 2.25 - \frac{0.5}{2} - \frac{0.6}{2}$ $= 1.7 \text{ m}$ |
| | Back verandah at with bath room | | | | | | |
| (vi) | long wall | 1 | 9.7 | 0.6 | 0.2 | 1.164 | $L = 9.6 + 0.6/2$ $- 0.5/2 = 9.7 \text{ m}$ |

| Item no. | Item description | No. | Length in(m) | Breadth in(m) | Height in(cm) | Quantity in(ccm) | Remark |
|----------|-----------------------------------|-----|--------------|---------------|---------------|------------------|--|
| (3) | Short wall | 1 | 2.20 | 0.6 | 0.2 | 0.528 | $L = 2.75 - 2 - 0.5$ $- 0.6/2 = 2.20 \text{ m}$ |
| | 1st Bl/win foundation & plinth | | | | | | |
| (11) | left side bed room & drawing room | | | | | | |
| | 1st footing | 2 | 11.2 | 0.6 | 0.2 | 2.688 | $L = 10.6 + \frac{0.6}{2} + \frac{0.6}{2}$ $= 11.2 \text{ m}$ |
| | 2nd footing | 2 | 11.1 | 0.5 | 0.2 | 2.22 | $L = 10.6 + \frac{0.5}{2} + \frac{0.5}{2}$ $= 11.1 \text{ m}$ |
| | 3rd footing | 2 | 11 | 0.4 | 0.9 | 7.092 | $L = 10.6 + \frac{0.4}{2} + \frac{0.4}{2}$ $= 11 \text{ m}$ |
| | Short wall plinth | 2 | 4.7 | 0.6 | 0.2 | 1.602 | $L = 5.3 - \frac{0.6}{2} - \frac{0.6}{2}$ $= 4.7 \text{ m}$ |
| | 1st footing | 2 | 4.8 | 0.5 | 0.2 | 1.44 | $L = 5.3 - \frac{0.5}{2} - \frac{0.5}{2}$ $= 4.8 \text{ m}$ |
| | plinth | 3 | 4.9 | 0.4 | 0.9 | 5.292 | $L = 5.3 - \frac{0.4}{2} - \frac{0.4}{2}$ $= 4.9 \text{ m}$ |
| (11) | Right side both bed room | | | | | | |
| | long wall | | | | | | |
| | 1st footing | 2 | 9.6 | 0.6 | 0.2 | 2.304 | $L = 9.6 - \frac{0.6}{2} + \frac{0.6}{2}$ $= 9.6 \text{ m}$ |
| | 2nd footing | 2 | 9.6 | 0.5 | 0.2 | | $L = 9.6 - \frac{0.5}{2} + \frac{0.5}{2}$ $= 9.6 \text{ m}$ |
| | plinth | 2 | 9.6 | 0.4 | 0.9 | | $L = 9.6 - \frac{0.4}{2} + \frac{0.4}{2}$ $= 9.6 \text{ m}$ |
| | Short wall | | | | | | |
| | 1st footing | 2 | 4.2 | 0.6 | 0.2 | | $L = 4.8 - \frac{0.6}{2} - \frac{0.6}{2}$ $= 4.2 \text{ m}$ |

| I per sq | | | | | | |
|-------------|--|---|---|------|-----|-----|
| | | 2nd footing | 2 | 4.3 | 0.5 | 0.2 |
| | | Plinth | 2 | 4.4 | 0.4 | 0.9 |
| (iii) | | Front verandah | | | | |
| | | long wall | | | | |
| | | 1st footing | 1 | 9.65 | 0.4 | 0.2 |
| | | 2nd footing | 1 | 9.6 | 0.3 | 0.7 |
| | | Plinth | | | | |
| | | Short wall | 4 | | | |
| | | 1st footing | 1 | 2.25 | 0.4 | 0.2 |
| | | Plinth | 1 | 2.25 | 0.3 | 0.7 |
| (iv) | | Back verandah with bath room | | | | |
| | | long wall | | | | |
| | | 1st footing | 1 | 9.65 | 0.4 | 0.2 |
| | | plinth | 1 | 9.6 | 0.3 | 0.7 |
| | | Short wall | | | | |
| | | 1st footing | 2 | 2.35 | 0.4 | 0.2 |
| | | plinth | 2 | 2.4 | 0.3 | 0.7 |
| A) | | 2.5cm DPC above plinth | | | | |
| | | left side bed room & drawing room | | | | |
| | | long wall | 2 | 1.1 | 0.4 | — |
| | | | | | | 8.8 |

$$L = 4.8 - \frac{0.5}{2} - \frac{0.5}{2}$$

$$= 4.3 \text{ m}$$

$$L = 24.8 - \frac{0.4}{2} - \frac{0.4}{2}$$

$$= 24.4 \text{ m}$$

$$L = 9.65 - \frac{0.4}{2} +$$

$$\frac{0.3}{2} = 9.65 \text{ m}$$

$$L = 9.65 - \frac{0.1}{2} +$$

$$0.3/2 = 9.6 \text{ m}$$

$$L = 2.25 - \frac{0.4}{2} - \frac{0.4}{2}$$

$$= 1.85$$

$$L = 2.25 - \frac{0.1}{2}$$

$$\frac{0.4}{2} = 1.90$$

$$L = 9.65 - \frac{0.4}{2} +$$

$$\frac{0.3}{2} = 9.65 \text{ m}$$

$$L = 9.65 - \frac{0.1}{2} +$$

$$0.3/2 = 9.6 \text{ m}$$

$$L = 2.75 - \frac{0.1}{2} -$$

$$\frac{0.4}{2} = 2.35 \text{ m}$$

$$L = 2.75 - \frac{0.1}{2}$$

$$+ \frac{0.3}{2} = 2.4 \text{ m}$$

| | | | | | | | |
|------|--|---|------|-----|-----------|----------|--|
| | Shortwall | 3 | 4.9 | 0.4 | — | 5.88 | Walls (i) |
| (i) | Right side bed room | | | | | | room bed How good |
| | long wall | 2 | 9.6 | 0.4 | — | 7.68 | How Front |
| | Shortwall | 1 | 4.4 | 0.4 | — | 3.52 | door room (ii) |
| (ii) | verandah pillars | 4 | 0.5 | 0.3 | — | 0.6 | verandah (vi) |
| (ii) | Backside Bath room | | | | | | How do |
| | long wall | 2 | 2.7 | 0.3 | — | 1.62 | $L = 2.75 - \frac{0.4}{2} + 0.3/2$ = 2.7 m |
| | Shortwall | 1 | 1.9 | 0.3 | — | 0.57 | $L = 2.2 - 0.3/2 - 0.3/2$ |
| | Deduct | | | | Total | 28.679m | = 1.9 m (v) |
| | Doors opening | | | | | | |
| | D ₁ | 6 | 1.2 | 0.4 | — | 2.88 | How good |
| | D ₂ | 2 | 1.0 | 0.4 | — | 0.8 | How good |
| | D ₃ | 1 | 0.75 | 0.3 | — | 0.225 | How good 3 bays (v) |
| | | | | | Net total | 3.9059m | |
| | 1st | | | | | 24.7659m | |
| 5) | 1st BW in superstruc- cture | | | | | | |
| (i) | left side bedroom & drawing room | | | | | | trusses (v) |
| | long wall | 2 | 10.9 | 0.3 | 4 | 26.16 | $L = 10.6 + \frac{0.3}{2} + \frac{0.3}{2}$ = 10.9 m |
| | shortwall | 3 | 5 | 0.3 | 4 | 18 | $L = 5.3 - \frac{0.3}{2} - \frac{0.3}{2}$ = 5 m |

| | | | | | | | |
|-------|--|----|------|-----|------|-------|--|
| (ii) | Right side bath bed room | | | | | | |
| | long wall | 2 | 9.6 | 0.5 | 4 | 23.04 | $L = 9.6 + 0.3\frac{1}{2} + 0.3\frac{1}{2}$ $= 9.6 \text{ m}$ |
| | short wall | 2 | 4.5 | 0.3 | 4 | 10.8 | $L = 4.2 - 0.3\frac{1}{2} - 0.3\frac{1}{2}$ $= 4.5 \text{ m}$ |
| (iii) | verandah pillars | 4 | 0.4 | 0.2 | 24 | 0.768 | |
| (iv) | Front verandah on wall above pillars | | | | | | |
| | long wall | 21 | 9.65 | 0.2 | 0.65 | 1.248 | $L = 9.65 - \frac{0.3}{2} + \frac{0.2}{2}$ $= 9.65 \text{ m}$ |
| | short wall | 1 | 2 | 0.2 | 0.65 | 0.26 | $L = 2.25 - 0.3\frac{1}{2} - 0.2\frac{1}{2}$ $= 2 \text{ m}$ |
| (v) | Back verandah wall above pillars | | | | | | |
| | long wall | 1 | 17.2 | 0.2 | 0.65 | 0.956 | $L = (9.65 - 2.2) - 0.3\frac{1}{2}$ $- 0.2\frac{1}{2} = 17.2 \text{ m}$ |
| (vi) | short wall Backside bath room | | | | | | |
| | long wall | 2 | 2.7 | 0.2 | 3.05 | 3.294 | $L = 2.75 - \frac{0.3}{2} + \frac{0.2}{2}$ $= 2.7 \text{ m}$ |
| | short wall | 1 | 2.2 | 0.2 | 3.05 | 1.342 | $L = 2.2 - \frac{0.2}{2} + \frac{0.2}{2}$ $= 2.2 \text{ m}$ |
| (vii) | Deduct | | | | | | |
| | D | 6 | 1.2 | 0.3 | 2.1 | 4.536 | |
| | D ₂ | 2 | 1 | 0.3 | 2 | 1.2 | |
| | D ₃ | 1 | 0.75 | 0.2 | 1.8 | 0.27 | |
| | windows | | | | | | |
| | W ₁ | 11 | 1 | 0.3 | 1.5 | 4.95 | |
| | W ₂ | 1 | 2 | 0.3 | 1.5 | 0.9 | |

| | | | | | | |
|---|----|------|-----|------|--------|--|
| w_3 | 2 | 0.75 | 0.2 | 1.2 | 0.36 | |
| CW window | 18 | 0.75 | 0.3 | 0.6 | 2.43 | |
| Shelfe | 5 | 1 | 0.2 | 1.5 | 1.5 | Take 20cm bearing |
| lintels over Doors + | | | | | | |
| D ₁ | 6 | 1.4 | 0.3 | 0.15 | 0.378 | |
| D ₂ | 2 | 1.2 | 0.3 | 0.15 | 0.108 | Take 10 cm bearing |
| D ₃ | 1 | 0.95 | 0.2 | 0.15 | 0.028 | |
| lintels over windows | | | | | | |
| w ₁ | 11 | 1.2 | 0.3 | 0.15 | 0.594 | |
| w ₂ | 1 | 2.2 | 0.3 | 0.15 | 0.108 | |
| w ₃ | 2 | 0.95 | 0.2 | 0.15 | 0.057 | |
| EW window lintels over CW windows | 18 | 0.95 | 0.3 | 0.15 | 0.7695 | |
| lintels over stshelve | 5 | 1.2 | 0.3 | 0.15 | 0.27 | |
| lintels over pillars front verandah | | | | | | |
| long wall | 1 | 9.6 | 0.2 | 0.15 | 0.288 | $L = 9.65 - \frac{0.3}{2} + \frac{0.2}{2}$ |
| short wall | 1 | 2 | 0.2 | 0.15 | 0.065 | $= 9.6\text{ m}$ |
| lintels over pillars back verandah | | | | | | $L = 2.25 - \frac{0.3}{2} - \frac{0.2}{2}$ |
| long wall | 1 | 7.2 | 0.2 | 0.15 | 0.216 | $= 2\text{ m}$ |

→ Center line Method :

Estimation of a single room building by long wall short wall method.

Estimate of a single room building by center line method.

- ① Earth work in excavation in foundation
- ② concrete in foundation
- ③ 1st class brick work in foundation & plinth
- ④ 1st brick work in superstructure

Solution :-

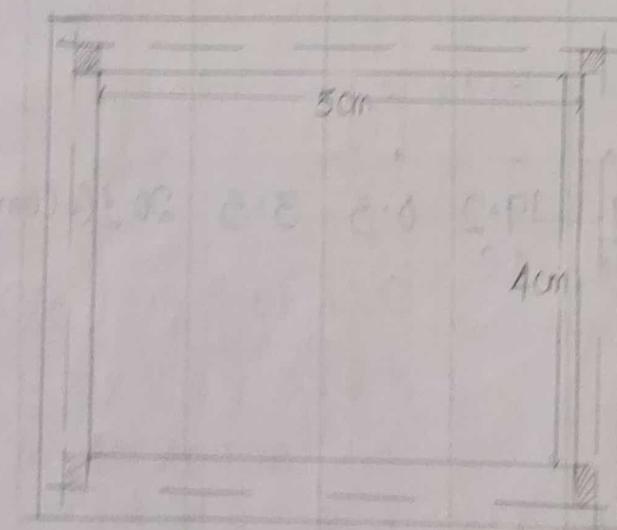
C/C length of long wall

$$= 5 + 0.32 + 0.3 / 2 = 5.30 \text{ m} \quad \text{no. of walls} = 2$$

C/C length of short wall

$$= 4 + 0.3 / 2 + 0.3 / 2 = 4.30 \text{ m}$$

no. of walls = 2



| Item no. | Item description | No. | length in m | Breadth in m | Height in m | Quantity in cum | Remark |
|----------|--|-----|-------------|--------------|-------------|-----------------|--------------------------------|
| ① | Earth work in excavation | 1 | 19.2 | 0.9 | 0.9 | 15.552 cum | $H = 0.3 + 0.3$ $0.3 = 0.9$ |
| ② | Cement concrete in foundation | 1 | 19.2 | 0.9 | 0.3 | 5.184 cum | |
| ③ | + 1st class B/W in foundation & plinth | | | | | | |
| | 1st footing | 1 | 19.2 | 0.6 | 0.3 | 3.456 | |
| | 2nd footing | 1 | 19.2 | 0.5 | 0.3 | 2.88 | |
| | 3 plinth | 1 | 19.2 | 0.4 | 0.6 | 4.608 | |
| | | | | | | 10.944 cum | |
| ④ | 2.5 cm DPC in above plinth | 1 | 19.2 | 0.4 | — | 7.685 cum | |
| ⑤ | 1st class B/W in superstructure | 1 | 19.2 | 0.5 | 3.5 | 20.16 cum | |

Estimation of a two roomed building by ~~cent~~
center line method:

- (I) Earth work in excavation in foundation
- (II) Lime concrete in foundation
- (III) 1st class brickwork in cement mortar 1:6 in plain
- (IV) 2.5 cm C.C. damp proof coarse,
- (V) 1st class brick work in superstructure with lime mortar.

Solution :-

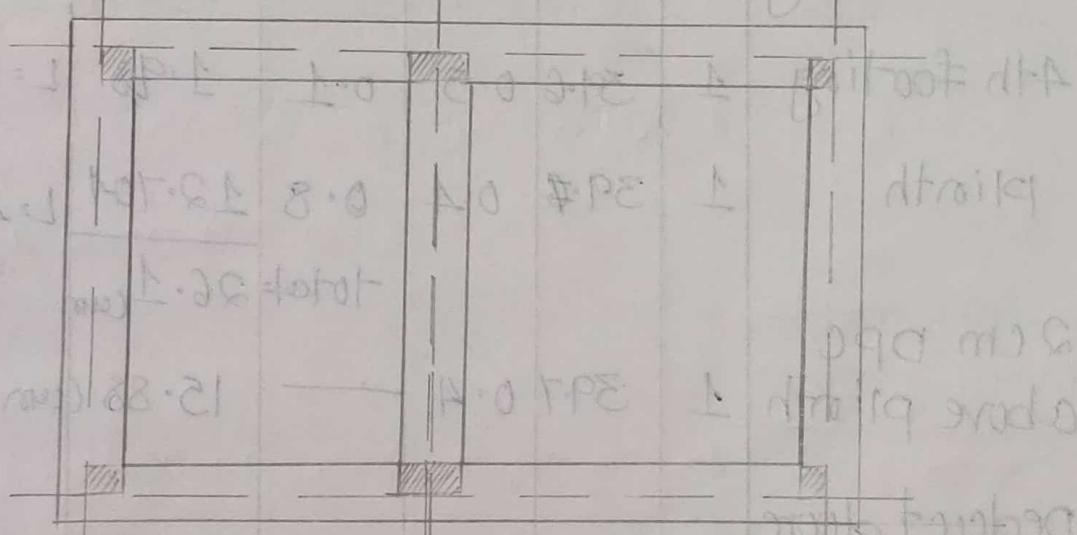
C/C length of long wall

$$= 0.3/2 + 4 + 0.3/2 + 6 + 0.3/2 = 10.6 \text{ m}$$

C/C length of short wall

$$= 0.3/2 + 6 + 0.3/2 = 6.3 \text{ m}$$

No. of R wall = 3



Total C/C length of wall

$$= 2 \times 10.6 + 3 \times 6.3$$

$$= 40.1 \text{ m}$$

No. of junction = 2

| Item no. | Item description | No. | | | | | |
|----------|--|-----|------|-----|-------|-----------|---|
| ① | Earth work in excavation | 1 | 39 | 1.1 | 1 | 42.9 | $L = 40.1$ $L = 40.1 - 2 \times 1.1$ $= 39\text{ m}$ |
| ② | cement lime concrete in foundation | 1 | 39 | 1.1 | 0.3 | 12.87 | |
| ③ | 1st class B/W in foundation & plinth | | | | | | |
| | 1st footing | 1 | 39.5 | 0.8 | 0.2 | 6.288 | $L = 40.1 \times 2 \times \frac{0.8}{2}$ $= 39.3\text{ m}$ |
| | 2nd footing | 1 | 39.4 | 0.7 | 0.1 | 2.758 | $L = 40.1 \times 2 \times \frac{0.7}{2}$ $= 39.4\text{ m}$ |
| | 3rd footing | 1 | 39.5 | 0.6 | 0.1 | 2.37 | $L = 40.1 \times 2 \times \frac{0.6}{2}$ $= 39.5\text{ m}$ |
| | 4th footing | 1 | 39.6 | 0.5 | 0.1 | 1.98 | $L = 40.1 \times 2 \times \frac{0.5}{2}$ $= 39.6\text{ m}$ |
| | plinth | 1 | 39.7 | 0.4 | 0.8 | 12.704 | $L = 40.1 \times 2 \times \frac{0.4}{2}$ $= 39.7\text{ m}$ |
| | | | | | Total | 26.1 | |
| ④ | 2 cm DPC above plinth | 1 | 39.7 | 0.4 | | 15.88 | cem |
| ⑤ | Deduct door opening | 12 | 1.2 | 0.4 | — | 0.96 | |
| | | | | | | Net total | 14.92 cem |
| 5) | 1st class B/W in superstructure | 1 | 39.8 | 0.3 | 4.2 | 50.148 | cem |
| | | | | | | | $L = 40.1 \times 2 \times \frac{0.3}{2}$ $= 39.8\text{ m}$ |

| <u>Deduct</u> | | | | | |
|-------------------------|---|-----|------------|------|----------------------|
| door | 2 | 1.2 | 0.3 2.1 | 2.1 | 1.512 |
| window | 4 | 1 | 0.3 | 1.5 | 1.8 |
| shelve | 2 | 1 | 0.2 | 1.5 | 0.6 |
| lintels over doors | 2 | 1.4 | 0.3 | 0.15 | 0.126 |
| lintels over windows | 4 | 1.2 | 0.3 | 0.15 | 0.216 |
| lintels over shelve | 2 | 1.2 | 0.3 | 0.15 | 0.108 |
| | | | | | 4.362 cum |
| | | | | | Net total 45.786 cum |

Estimation of multroom Building with Verandah

(1) For 30 cm wall

Total length C/C length of wall

$$= 2 \times 10.6 + 3 \times 5.3 + 2 \times 9.6 + 2 \times 4.8$$

$$= 65.9 \text{ m}$$

NO OF JUNCTION = 6

(1) For 20 cm wall

$$1 \times 9.65 + 1 \times 2.25 + 1 \times 9.65 + 2 \times$$

$$= 27.05$$

NO. OF JUNCTION WITH (30cm wall) = 5

" " " (20cm wall) = 1

| Item no. | Item description | No. | Length in m | Breadth in m | Height in m | Quantity in cum | Remark |
|----------|--------------------------------------|-----|-------------|--------------|-------------|-------------------|---|
| 1 | Earth work in excavation | | | | | | |
| | 30 cm wall | 1 | 63.2 | 0.9 | 1 | 56.88 | $L = 65.9 - 6 \times \frac{0.9}{2}$ $= 63.2 \text{ m}$ |
| | 20 cm wall | 1 | 24.5 | 0.6 | 0.5 | 7.35 | $L = 26.27 - 5 \times \frac{0.9}{2}$ $\times 0.9/2 = 24.5$ |
| | | | | | | Total = 64.23 cum | $1 \times \frac{0.6}{2} = 24.5 \text{ m}$ |
| 2 | Lime concrete in foundation | | | | | | |
| | 30 cm wall | 1 | 63.2 | 0.9 | 0.3 | 17.064 | |
| | 20 cm wall | 1 | 25.2 | 0.6 | 0.2 | 3.06 | $L = 27.05 - 5 \times \frac{0.9}{2}$ $= 1 \times 0.6/2$ $= 25.2 \text{ m}$ |
| 3 | 1st class B/W in foundation & plinth | | | | | | |
| | 30 cm wall | | | | | | |
| | 1st footing | 1 | 64.1 | 0.6 | 0.2 | 7.692 | $L = 65.9 - 6 \times 0.9$ $= 64.1 \text{ m}$ |

| | | | | | | |
|------------------------|---|-------|-----|-------|--------|--|
| 2nd footing | 1 | 64.4 | 0.5 | 0.2 | 6.44 | $L = 65.9 - 6 \times 0.5/2$ $= 64.4 \text{ m}$ |
| Plinth | 1 | 64.7 | 0.4 | 0.9 | 23.292 | $L = 65.9 - 6 \times 0.4/2$ $= 64.7 \text{ m}$ |
| 20cm wall | | | | | | |
| 1st footing | 1 | 25.85 | 0.4 | 0.2 | 2.068 | $L = 27.05 - 5 \times 0.4/2$ $- 1 \times 0.4/2 = 25.85$ |
| 2nd footing | | | | | | |
| Plinth | 1 | 25.90 | 0.3 | 0.7 | 5.459 | $L = 27.05 - 5 \times 0.4/2 -$ $1 \times 0.3/2 = 25.90$ |
| | | | | Total | 44.931 | cm |

4) 25 cm DPC
above plinth

| | | | | | | |
|-----------|---|------|-----|-------|-------|---|
| 30cm wall | 1 | 64.7 | 0.4 | — | 25.88 | $L = 65.9 - 6 \times 0.4/2$ $= 64.7 \text{ m}$ |
| verandah | | | | | | |
| pillars | 4 | 0.5 | 0.3 | — | 0.6 | |
| real bath | | | | | | |
| room | 1 | 7.3 | 0.3 | | 2.19 | $L = (2.75 \times 2) + 2.2$ $- 2 \times 0.4/2 = 7.3 \text{ m}$ |
| | | | | Total | 28.67 | Sq.m |
| Deduct | | | | | | |

Door opening

| | | | | | | |
|----------------|---|------|-----|-------|-------|------------------------------|
| D ₁ | 6 | 1.2 | 0.4 | — | 2.88 | |
| D ₂ | 2 | 1 | 0.4 | — | 0.8 | Net total |
| D ₃ | 1 | 0.75 | 0.3 | — | 0.225 | $= 28.67 - 3.905$ |
| | | | | Total | 3.905 | $\frac{24.765}{\text{Sq.m}}$ |

5) 1st class
B/w in sep
ere structure

| | | | | | | |
|-----------|---|-----|-----|-----|-------|---|
| 30cm wall | 1 | 65 | 0.3 | 4 | 78 | $L = 65.9 - 6 \times 0.3/2$ $= 65 \text{ m}$ |
| pillars | 4 | 0.4 | 0.2 | 2.4 | 0.768 | |

| | | | | | | |
|---|---|------|-----|------|-------|--|
| Front bathroom up to pillar level | 1 | 7.3 | 0.2 | 2.4 | 3.504 | |
| Verandah wall above pillars (including back side bathroom) | 1 | 26.2 | 0.2 | 0.65 | 3.406 | L = 24.05 - 5 x 0.3 $1 \times \frac{0.2}{2} = 26.2$ |

Long wall Short wall p
- Method -

Q.

Prepare a detailed estimate of a single room building having a front verandah from the given plan, elevation & sectional drawing.

Foundation & plinth:

First class brick work in 1:6 cement & local sand mortar over lime concrete, 2cm D.P.C of wall 1:2 cement mortar mixed with standard water proofing material.

Superstructure:

Walls shall be of first class brick work in L.O. mortar. Inside & out side wall shall be 12mm plaster with 1:1:6 cement:lime:sand, ceiling shall be 12m 1:3 cement plaster. Inside shall be white washed 3 coats & outside shall be coloured washed on coat over 2 coat of white washing.

Doors & windows: Doors & windows chowkhat shall be of sal wood & shutters shall be 4cm panneled of deodar priming. Painted two coats over one coat of

Solution:

c/c length of long wall →
 $= 4.2 + 0.3/2 + 0.3/2 = 4.5 \text{ m}$

c/c length of short wall
 $= 3.0 + 0.3/2 + 0.3/2 = 3.3 \text{ m}$

room

c/c length of ~~veranda~~ long wall
 $= 4.2 + 0.3/2 + 0.3/2 = 4.5 \text{ m}$

verandah

c/c length of short wall
 $= 2.0 + 0.3 = 2.3 \text{ m}$

| Item no. | Item description | No. | Length in(m) | Breadth in(m) | Height in (cm) | Quantity in cu.m | Remark |
|----------|-------------------------|-----|--------------|---------------|----------------|------------------|--|
| ① | Earthwork in excavation | | | | | | |
| | Room :- | | | | | | |
| | long wall | 2 | 5.3 | 0.8 | 0.65 | 5.512 | $L = \frac{4.5}{2} + \frac{0.8}{2} + \frac{0.8}{2}$ |
| | Short wall | 2 | 2.5 | 0.8 | 0.65 | 2.6 | $L = 5.3 m$ |
| | Pillars | 3 | 0.7 | 0.7 | 0.65 | 0.96 | $L = 3.3 + \frac{-0.8}{2} - \frac{0.8}{2} = 2.5 m$ |
| | Dwarf wall :- | | | | | | |
| | long wall | 1 | 3.1 | 0.4 | 0.25 | 0.31 | $L = 4.5 - 2 \times 0.7 = 3.1 m$ |
| | short wall | 2 | 1.55 | 0.4 | 0.25 | 0.31 | $L = 2.3 - \frac{0.8}{2} - \frac{0.7}{2} = 1.55 m$ |
| | step | 1 | 2.1 | 0.65 | 0.1 | 0.14 | |
| | | | | | Total = | 9.832 cu.m | Take 0.5 cm projection of these length. |
| 2) | sand filling | | | | | | |
| | Room | 1 | 4.1 | 2.9 | 0.375 | 4.458 | $L = 4.5 - \frac{0.4}{2} - \frac{0.4}{2} = 3.41 m$ |
| | | | | | | | $B = 3.3 - \frac{0.4}{2} - \frac{0.4}{2} = 2.9 m$ |
| | | | | | | | $H = 0.45 + 0.075 = 0.375 m$ |
| | Vernandah | 1 | 4.5 | 2.1 | 0.375 | 3.54 | $L = 4.5 + \frac{0.4}{2} + \frac{0.4}{2} - 0.2 \times 2 = 4.5$ |
| | | | | | | | $B = 2.3 - \frac{0.4}{2} - \frac{0.4}{2} - 0.2 = 2.1 m$ |

| | | | | | | |
|--------------------------------------|---|------|------|-----------|---------------------|---|
| <u>Deduct</u> | | | | | | |
| central pillars | 1 | 0.4 | 0.2 | 0.375 | 0.03 | |
| side pillars | 2 | 0.4 | 0.2 | 0.375 | 0.06 | |
| | | | | Total | 0.09 cum | |
| Lime & concrete in foundation | | | | Net total | 0.09 cum | |
| Room | | | | | | |
| long wall - | 2 | 5.3 | 0.8 | 0.3 | 2.54 | $L = 4.5 + \frac{0.8}{2} + \frac{0.8}{2}$ $= 5.3 m$ |
| short wall | 2 | 2.5 | 0.8 | 0.3 | 1.2 | $L = 2.3 - \frac{0.8}{2} - \frac{0.8}{2}$ $= 2.5 m$ |
| Pillars :- | 3 | 0.7 | 0.7 | 0.3 | 0.44 | |
| Door/Window | | | | | | |
| long wall | 1 | 3.7 | 0.4 | 0.1 | 0.15 | $L = 4.5 - 0.4 - 2 \times \frac{0.4}{2}$ $= 3.7 m$ |
| short wall | 2 | 1.85 | 0.4 | 0.1 | 0.15 | $L = 2.3 - \frac{0.5}{2} - \frac{0.4}{2}$ $= 1.85 m$ |
| step | 1 | 2.1 | 0.65 | 0.06 | 0.08 | |
| | | | | Total | 4.56 cum | |
| 1st class B/w in foundation & plinth | | | | | | |
| Room :- | | | | | | |
| long wall | 2 | 5.1 | 0.6 | 0.1 | 0.61 | $L = 4.5 + \frac{0.6}{2} + \frac{0.6}{2}$ $= 5.1 m$ |
| 1st footing | 2 | 5.0 | 0.5 | 0.1 | 0.50 | $L = 4.5 + \frac{0.5}{2} + \frac{0.5}{2}$ $= 5 m$ |
| 2nd footing | 2 | 4.9 | 0.4 | 0.6 | 2.35 | $L = 4.5 + \frac{0.4}{2} + \frac{0.4}{2}$ $= 4.9 m$ |
| plinth | 2 | 8.0 | — | — | — | |
| | | | | Total | | |
| | | | | | | |

| | | | | | | |
|---------------|---|-----|-----|-----|------|--|
| Short wall :- | | | | | | |
| 1st footing | 2 | 2.7 | 0.6 | 0.1 | 0.61 | $L = 3.3 - \frac{0.6}{2} - \frac{0.6}{2}$ = 2.7 m |
| 2nd footing | 2 | 2.8 | 0.5 | 0.1 | 0.50 | $L = 3.3 - \frac{0.5}{2} - \frac{0.5}{2}$ = 2.8 m |
| Plinth | 2 | 2.9 | 0.4 | 0.6 | 2.35 | $L = 3.3 - \frac{0.4}{2} - \frac{0.4}{2}$ = 2.9 m |

| | | | | | | |
|-------------|---|-----|-----|-----|-------|--|
| Pillars :- | | | | | | |
| 1st Footing | 3 | 0.5 | 0.5 | 0.1 | 0.015 | |
| Plinth | 3 | 0.4 | 0.4 | 0.7 | 0.336 | |

| | | | | | | |
|-------------------|---|-----|-----|-----|------|--|
| Dwarf wall :- | | | | | | |
| Long wall plinth | 1 | 3.7 | 0.2 | 0.6 | 0.44 | $L = 4.5 - 2 \times 0.4$ = 3.7 m |
| Short wall plinth | 2 | 1.9 | 0.2 | 0.6 | 0.46 | $L = 2.3 - \frac{0.4}{2} - \frac{0.4}{2}$ = 1.9 |

| | | | | | | |
|----------|---|-----|-----|------|------|--|
| Step :- | | | | | | |
| 1st step | 1 | 2.0 | 0.6 | 0.19 | 0.23 | |
| 2nd step | 1 | 1.4 | 0.3 | 0.15 | 0.06 | |

5) 2cm DPC of
1:2 cement
mortar above
plinth :-

Room

| | | | | | |
|------------|---|------|-----|---|------|
| long wall | 2 | 4.9 | 0.4 | - | 3.92 |
| short wall | 2 | 42.9 | 0.4 | - | 2.32 |
| Pillars | 3 | 0.4 | 0.4 | - | 0.48 |

Deduct

| | | | | | |
|--------------|---|-----|-----|---|----------|
| Door opening | 2 | 1.0 | 0.4 | - | 0.8 |
| Net Total | | | | | 5.92 sqm |

6) 1st class B/w
with lime
mortar in
superstructure

Room :-

Long wall

| | | | | | |
|---|-----|-----|-----|-------|---|
| 2 | 4.8 | 0.3 | 3.5 | 10.08 | $L = 4.5 + \frac{0.3}{2} + \frac{0.3}{2}$ |
|---|-----|-----|-----|-------|---|

$$= 4.8 \text{ m}$$

$$L = 3.3 - \frac{0.3}{2} + \frac{0.3}{2}$$

$$= 3 \text{ m}$$

Pillars

| | | | | |
|---|-----|-----|-----|------|
| 3 | 0.3 | 0.3 | 2.2 | 0.59 |
|---|-----|-----|-----|------|

Vercanda oh
wall above
pillars.

Long wall

| | | | | | |
|---|-----|-----|-----|------|---|
| 1 | 4.8 | 0.3 | 0.6 | 0.86 | $L = 4.5 + \frac{0.3}{2} + \frac{0.3}{2}$ |
|---|-----|-----|-----|------|---|

$$= 4.8 \text{ m}$$

shortwall

| | | | | | |
|---|---|-----|-----|------|---|
| 2 | 2 | 0.3 | 0.6 | 0.72 | $L = 2.3 - \frac{0.3}{2} + \frac{0.3}{2}$ |
|---|---|-----|-----|------|---|

$$= 2 \text{ m}$$

Parapet wall
above room

Long wall

| | | | | | |
|---|-----|-----|-------|------|---|
| 2 | 4.8 | 0.2 | 0.375 | 0.72 | $L = 4.5 + \frac{0.3}{2} + \frac{0.3}{2}$ |
|---|-----|-----|-------|------|---|

$$= 4.8 \text{ m}$$

shortwall

| | | | | | |
|---|-----|-----|-------|------|---|
| 2 | 3.2 | 0.2 | 0.375 | 0.48 | $L = 3.3 + \frac{0.3}{2} + \frac{0.3}{2} - 0.2$ |
|---|-----|-----|-------|------|---|

$$= 3.2 \text{ m}$$

Total - 19.75
cum

Deduct

Door

| | | | | |
|---|---|-----|---|-----|
| 2 | 1 | 0.3 | 2 | 1.2 |
|---|---|-----|---|-----|

Windows

| | | | | |
|---|---|-----|-----|------|
| 3 | 1 | 0.3 | 1.4 | 1.26 |
|---|---|-----|-----|------|

Shelf

| | | | | |
|---|---|-----|-----|------|
| 1 | 1 | 0.2 | 1.1 | 0.34 |
|---|---|-----|-----|------|

Take 20 cm bearing
in wall.

Lintel over
door

| | | | | |
|---|-----|-----|-----|-------|
| 2 | 1.2 | 0.3 | 0.1 | 0.072 |
|---|-----|-----|-----|-------|

Lintel over
window

| | | | | |
|---|-----|-----|-----|------|
| 3 | 1.2 | 0.3 | 0.1 | 0.11 |
|---|-----|-----|-----|------|

Take 10 cm
bearing of
lintel.

Lintel over
shelf

| | | | | |
|---|-----|-----|-----|-------|
| 1 | 1.2 | 0.3 | 0.1 | 0.036 |
|---|-----|-----|-----|-------|

| | | | | | |
|------------------------|---|-----|-----|-------|-------|
| Lintel over ventilator | 2 | 0.8 | 0.3 | 0.1 | 0.048 |
| Lintel over Pillars → | | | | | |
| long wall | 1 | 4.8 | 0.3 | 0.2 | 0.29 |
| short wall | 2 | 2 | 0.3 | 0.2 | 0.24 |
| | | | | Total | |

7) RB working
1:3 cement
mortar excluding steel &
it's bending

Inclining
centering ish-
utting &
binding RB.
~~Slab of Room~~

1 5 3.8 0.15

2.85

$$L = 4.5 + \frac{0.3}{2} + \frac{0.3}{2}$$

$$= 4.8 + 0.5 + 0.5$$

$$= 5.8 m$$

$$B = 3.3 + \frac{0.3}{2} + \frac{0.3}{2}$$

$$= 3.6 + 0.5 + 0.5$$

$$= 3.8 m$$

(b) RB slab of verandah

1 5 2.5 0.1

1.25

Take 10 cm
bearing into wall

$$B = 2.5 + 0.3 + 0.1 + 0.1$$

$$= 2.5 m$$

(c) RB lintels
above pillars

1 4.8 0.3 0.2

0.288

$$L = 4.5 + \frac{0.3}{2} + \frac{0.3}{2}$$

$$= 4.8$$

long wall

2 2.1 0.3 0.2

0.252

$$take 10 cm bearing$$

short wall

2 1.2 0.3 0.1

0.072

RB lintels
over doors.

3 1.2 0.3 0.1

0.108

RB lintels
over windows

RB lintel over
shelf

| | | | | | |
|--|---|-----|-----|-----|-------|
| | 1 | 1.2 | 0.3 | 0.1 | 0.036 |
|--|---|-----|-----|-----|-------|

RB lintel over
ventilator

| | | | | | |
|--|---|-----|-----|-----|-------|
| | 2 | 0.8 | 0.3 | 0.1 | 0.048 |
|--|---|-----|-----|-----|-------|

Total 4.904
cum

8) 7.5 cm Lime
concrete in
roof terrace
complete with
surface fini-
shing.

| | | | | | |
|--------------|---|-----|-----|---|-------|
| Roof of room | 1 | 4.4 | 3.2 | — | 14.08 |
|--------------|---|-----|-----|---|-------|

$$L = 4.5 + \frac{0.3}{2} + \frac{0.3}{2} - 0.2 - 0.2 \\ = 4.4 \text{ m}$$

$$B = 3.3 + \frac{0.3}{2} + \frac{0.3}{2} - 0.2 - 0.2 \\ = 3.2 \text{ m}$$

Roof of veran-
dah

| | | | | | |
|--|---|-----|-----|---|-------|
| | 1 | 4.5 | 2.4 | — | 12.00 |
|--|---|-----|-----|---|-------|

$$L = 4.8 + 0.1 + 0.1 = 5 \text{ m}$$

$$B = 2 + 0.3 + 0.1 =$$

9) Sol wood work
in chowkhat

| | | | | | |
|--|---|------|-----|------|-------|
| Door & Ac m insertion (into floor) | 2 | 5.08 | 0.1 | 0.08 | 0.081 |
|--|---|------|-----|------|-------|

$$\text{Horizontal} = 1 \\ \text{vertical} = 2 \\ L = (1 \times 1) + 2 \times (2 + 0.04) \\ = 5.08 \text{ m}$$

| | | | | | |
|---------|---|-----|-----|------|-------|
| Windows | 3 | 4.8 | 0.1 | 0.08 | 0.115 |
|---------|---|-----|-----|------|-------|

$$\text{Horizontal} = 2$$

$$\text{vertical} = 2$$

$$L = (2 \times 1) + 2 \times 1.4$$

$$= 4.8 \text{ m}$$

Total 0.196
cum

10) 4cm thick paneled shutters of Deodar wood

Doors

2

0.87

—

1.935

3.367

$$L = 1 - (2 \times 0.08) + 6 \times 0.015 \\ = 0.87 \text{ m}$$

window

3

0.87

—

1.27

3.315

$$H = 2 - 0.08 + 0.015 \\ = 1.935 \text{ m}$$

$$A = H = 1.4 - (2 \times 0.08) - (2 \times 0.015) \\ = 1.27$$

11) Iron fitting including screwing & fixing

Doors

2

0.87

—

1.935

3.367

windows

3

0.87

—

1.27

3.315

6.682

sqm

12) Precast R.C.C slab shelves complete work including steel reinforcement & form work

3

1.08

0.2

0.05

0.032

cu m

4cm boarding

$$L = 1 + 0.04 + 0.04 \\ = 1.08 \text{ m}$$

13) RCC slab work 4cm thick in ventilators complete work including steel reinforcement & form work

2

0.6

—

0.3

0.36

cu m

& Grooving

14) Mild steel in reinforcement bars including bending in RB work.

@ 0.7% of
RB work

$$0.03 \text{ cum} \quad 4.9 \times \frac{0.7}{100} = 0.03 \text{ cum}$$

$$@ 78.5 \text{ cum}$$

$$48.5$$

$$2.359 \quad 48.5 \text{ quintal/cum}$$

Hold fast in
doors &
windows

24

$$24 \text{ kg} \quad 6 \text{ no. force each doors &} \\ 0.24 \text{ kg} \quad 4 \text{ no. force each window}$$

Total 2.399

15) 2.5 cm CC 1:2:4
floore over &
including 7.5
cm LC \rightarrow

Room

14.2 3

-

12.60

$$L = 4.5 - 2 \times \frac{0.4}{2} - 2 \times 0.2$$

$$L = 4.5 - \frac{0.3}{2} - \frac{0.3}{2} = 4.2$$

vercandah

1 4.5 2.15

-

9.68

Total $\frac{22.28}{2}$

$$B = 3.3 - \frac{0.3}{2} - \frac{0.3}{2} = 3m$$

$$L = 4.5 + 2 \times \frac{0.4}{2} - 2 \times 0.2 \\ 39m = 4.5m$$

Deduct

ceontral pillars

1 0.3 0.15 -

0.045

$$B = 2.3 - \frac{0.3}{2} + \frac{0.4}{2} \\ = - 0.2 = 2.15m$$

side pillars

2 0.15 0.15 -

0.045

Total 0.090

Net Total 22.195m

16) 2.5 cm 1:2:4

floore with
lime concrete

DOore

2 1 0.3 -

0.6

Follow front
of room
lenth

dwarf wall:

4.2 3.0 -

8.4

Follow front
of room
lenth

long wall

1 3.9 0.2 -

0.78

L = 4.5 - 2(0.3) = 3.9

short wall

2.2 0.2 -

0.80

Follow short
wall room

| | | | | | | | |
|------|--|---|-----|-----|-------|-----------|--|
| 17 | 12 mm plastering in ceiling with 1:3 cement & coarse sand mortar | | | | | | |
| | Room | 1 | 4.2 | 3 | — | 12.60 | |
| | verandah | 1 | 4.2 | 2 | — | 8.40 | |
| | | | | | Total | 21.00 sqm | |
| 18 | 12 mm thick plastering of 1:1:6 cement lime & sand mortar. | | | | | | |
| (a) | <u>Dashiki</u> | | | | | | |
| (i) | <u>front wall of room up to pillar</u> | 1 | 4.8 | — | 2.2 | 10.56 | |
| (ii) | <u>room m</u> | 2 | 4.2 | — | 3.5 | 29.4 | |
| | long wall | 2 | 3.0 | — | 3.5 | 21.0 | |
| | jamb, sill, soffit, perches ons of shelf | 1 | 5.4 | 0.2 | — | 1.08 | |
| | <u>verandah</u> | | | | | | |
| | front wall of room upto lintel | 1 | 4.8 | — | 2.2 | 10.56 | |
| | front wall of room above pillars | 2 | 4.2 | — | 0.6 | 5.04 | |
| | side wall above pillars | 2 | 2 | — | 0.6 | 2.4 | |

$$L = 2 \times 1.7 + 2 \times 5.4 \\ = 5.4 \text{ m}$$

~~side wall above pillars~~

verandah front
wall bottom
portion

verandah side
wall bottom
portion

Inside pillars

Inside
product

Door

outside
Room :-

Back side wall

side wall

plinth wall of
back side 10
cm below G.L

plinth wall of
side wall 10 cm
below G.L

verandah

Pillars outside

Front wall of
verandah

Side wall of
verandah

| | | | | | |
|---|-----|-----|-----|------|-------------------------------------|
| 2 | 2.0 | - | 0.8 | 2.4 | |
| 1 | 3.9 | 0.3 | - | 1.17 | $L = 4.8 - 3 \times 0.3$ $= 3.9$ |

| | | | | | |
|---|-----|-----|---|-----|--|
| 2 | 2.0 | 0.3 | - | 1.2 | |
|---|-----|-----|---|-----|--|

| | | | | | |
|---|-----|---|-----|------|--|
| 7 | 0.5 | - | 2.2 | 4.62 | |
|---|-----|---|-----|------|--|

Total 76.41
sqm

Net Total 72.41
sqm

one surface
to each

(b)

Back side wall

1 4.8 - 3.5 16.8

side wall

2 3.8 - 3.5 25.2

plinth wall of
back side 10
cm below G.L

1 4.9 - 0.6 2.94 $H = 0.5 + 0.05 + 0.45 + 0.1 = 0.6$

plinth wall of
side wall 10 cm
below G.L

2 3.85 - 0.6 4.38

verandah

Pillars outside

5 0.3 - 2.2 3.3

Front wall of
verandah

1 4.8 - 0.6 2.88

Side wall of
verandah

2 2.3 - 0.6 2.76

| | | | | | | | |
|-----|--|---|------|-----|-------|-------|---|
| | Front wall of room above verandah roof | 1 | 4.8 | — | 0.525 | 2.25 | $H = 3.5 - 2.8 - 0.1 = 0.6$ $- 0.075 = 0.525$ |
| (C) | Roof projection above verandah | 1 | 5 | 0.2 | — | 0.1 | $0.1 + 0.1 = 0.2$ |
| | front | 1 | 5 | 0.2 | — | 0.96 | $L = 2.0 + 0.3 + 0.1 = 2.4$ |
| | back side | 2 | 2.4 | 0.2 | — | | $B = 0.1 + 0.1 = 0.2$ |
| | Roof Projection | | | | | | |
| (d) | on above room | | | | | | |
| | Front & back | 2 | 5 | — | 0.25 | 2.50 | $L = 4.8 + 0.1 + 0.1 = 5.0$ |
| | side | 2 | 3.8 | — | 0.25 | 1.9 | $H = 0.1 + 0.15 = 0.25$ |
| | verandah plinth upto 10 cm below G.I. | | | | | | $2 = 3.8 + 0.1 + 0.1 = 3.8$ |
| (e) | Front wall | 1 | 4.9 | — | 0.55 | 2.695 | $L = 4.8 + 0.05 + 0.05 = 4.9$ |
| | side wall | 2 | 2.35 | — | 0.55 | 2.585 | $H = 0.45 + 0.1 = 0.55$ |
| | Parapet wall | 1 | 1.6 | — | 0.875 | 1.4 | $L = 2 + 0.3 + 0.05 = 2.35$ |
| | | | | | | | $C/C 1 \text{ of long wall}$ |
| | | | | | | | $4.8 + 0.2/2 + 0.2/2 = 4.8 + 0.1 + 0.1 = 5.0$ |
| | | | | | | | $C/C 1 \text{ of short wall}$ |
| | | | | | | | $3.8 + 0.2/2 - 0.2/2 = 3.8 - 0.1 + 0.1 = 3.8$ |
| | | | | | | | $= 3.4 \text{ m}$ |
| | | | | | | | $L = 2 \times 4.6 + 2 \times 3.4 = 16 \text{ m}$ |
| | | | | | | | $H = 0.3 + 0.2 + 0.075 = 0.575 \text{ m}$ |
| | | | | | | | $(\text{inner}) + (\text{width}) + 0.075 = 0.3 + 0.2 + 0.075 = 0.575 \text{ m}$ |

Deduct

window

3 1 - 1.4 1.2

NO deduction

ventilators

— — — —

steps

1 2 - 0.55 1.10
5.30 sqm

Net Total = 81.04 sqm

19) 20 mm cement
plaster 1'3in
steps finish
with neat
cement

First step:

Tread 1 2.6 0.3 — 6.78

$$L = 2 \times 0.45 + 1.7 \\ = 2.6 \text{ m}$$

Rise with
sides

1 3.2 — 0.15 0.48

2nd steps:

Tread 1 1.4 0.3 — 0.42

Rise with
sides 1 2.0 — 0.15 0.30

$$L =$$

plinth wall
above 2nd
step

1 2.0 — 0.15 0.30

Plinth wall
2nd step
sides

1 0.3 — 0.15 0.09

Total 2.37 sqm

20) with the washing
3 coats

Inside:

wall

Same as plastering of
wall item no 18 72.47

| | | | | |
|--|--|---------|-------------|---|
| ceiling | same as ceiling plastering item no. 17 | 21 | 93.47 | sqm |
| 21) white washing of 2 coat with one coat of coloured washing | | | | |
| out side - wall | same as outside plastering in item no. (b) | | 81.04 | |
| <u>deduct</u> | | | | |
| 10cm below G.L plastering | 1 19.8 - 0.1 | 1.98 | Total 79.06 | $L = 6 \times 2 + 4.9 \times 2 - 21.8m - 2 = 19.8m$ |
| | | | | |
| 22) painting of doors & windows 2 coat 1 coat of priming | | | | |
| doors | 2x $\frac{2}{4}$ | 1 - 2 | 9 | |
| windows | 3x $\frac{2}{4}$ | 1 - 1.4 | 9.45 | |
| | | Total | 18.45 | |
| 23) coat hanger in two coats in back of chowkhoot | | | | |
| doors | 2 5.08 0.1 - | 1.016 | | |
| window | 3 4.8 0.1 - | 1.44 | | |
| | Total | 2.456 | sqm | |

Analysis of Rate

- The determination of rate per unit of a particular job work from the cost of quantity of materials, the cost of Labours & other miscellaneous petty expenses required for it's complitions is know as the analysis of rate.
- The analysis of rate is usually worked out for the unit of payment of the particolare item of work under two heads :-
- ① Materials
 - ② Labours

Materials

Particulars

Rate at site

| | |
|-------------------------------------|--------------------|
| ① 1st class Brick | Rs. 450/- per nos |
| ② 2nd class Brick | Rs. 400/- per nos |
| ③ Brick ballast (Grama) 40 mm gauge | Rs. 650/- per cum |
| ④ Brick ballast 25 mm | Rs. 700/- per cum |
| ⑤ Stone ballast 40 mm | Rs. 1800/- per cum |
| ⑥ Stone ballast 20 mm | Rs. 1800/- per cum |
| ⑦ Stone ballast 12 mm | Rs. 1700/- per cum |
| ⑧ Stone ballast 8 mm | Rs. 1500/- per cum |
| ⑨ Cement | Rs. 260/- per bag |
| ⑩ Steel | Rs. 4400/- per q. |
| ⑪ White or stone lime (unslaked) | Rs. 650/- per q. |

| <u>Particulars</u> | <u>Rate at site</u> |
|-------------------------------------|------------------------|
| XII white or stone lime (slaked) | Rs. 800/- per c.c.m |
| XIII Sircukhi | Rs. 500/- per c.c.m |
| XIV sand fine local | Rs. 700/- per c.c.m |
| XV sand coarse (maurang) | Rs. 1500/- per c.c.m |
| XVI Teak wood | Rs. 40,000/- per c.c.m |
| XVII Shimsham wood | Rs. 30,000/- per c.c.m |
| (XVIII) Salwood | Rs. 40,000/- per c.c.m |

Labour

| <u>Particulars</u> | <u>Rate at site</u> |
|-----------------------|---------------------|
| I Head mason (mistry) | Rs. 350/- per day |
| II Mason | Rs. 300/- per day |
| III Mazdoor (Beldar) | Rs. 220/- per day |
| IV Bisthi | Rs. 200/- per day |
| V Boy or woman coolie | Rs. 200/- per day |
| VI carpenter | Rs. 300/- per day |
| VII Blacksmith | Rs. 300/- per day |
| VIII painter | Rs. 300/- per day |

~~Concrete~~ Concrete :-

Q.1 Lime concrete in Foundation with 40 mm gauge

Ans

Take 10 cem

Proportion = 1:1:6

Add 50% due to reduction in volume

Dry volume of mixture = 15 cem

Total parts = $1+1+6 = 8$ parts

1 part = 15 cem

1 part = $15/8 = 1.9$ cem (lime)

1 part = $1.9 \times 1 = 1.9$ cem (surkhi)

6 parts = $1.9 \times 6 = 11.4$ cem (corca)

| Particulars | Quantity | Rate/Unit | Amount |
|-------------|----------|-----------|--------|
|-------------|----------|-----------|--------|

(1) Materials

| | | | |
|------------------|----------|-----|------|
| Lime (Slaked) | 1.9 cem | 800 | 1520 |
| Surkhi | 1.9 cem | 500 | 950 |
| Corca (40 mm) | 11.4 cem | 650 | 7410 |

Total = 160

9880 (for material)

(2) Labour

| NO | | | |
|------------------------|-------|-----|----------------------------|
| Head mason | 1/2 | 350 | 175 |
| Mason | 6 | 300 | 1800 |
| Mazdoor | 10 | 220 | 2200 |
| Boys & women coolie | 12 | 200 | 2400 |
| Bishti | 4 | 200 | 800 |
| | Total | | <u>6495/-</u> (for labour) |

| | | | |
|----------------------------|---------|--------------|---------|
| Sundries tools a plants | Lumpsum | 150 LS | 150 |
| | | Total cost = | 16525/- |

Add 10% as contractor's profit = 1652.21/-

Add $\frac{1}{2}\%$ as water charge = 247.875/-

Grand total = 18426/-

for 10 cum total cost = 18426/-

for 1 cum " " = $\frac{18426}{10} = 1842.61$

Cement Concrete:

Take 10 cum volume.

add 5% for the reduction of volume

$$\text{Dry volume} = 10 + 5 = 10.5 \text{ cum}$$

Proportion = $1 : 1\frac{1}{2} : 3$

Total parts = $1 + 1\frac{1}{2} + 3 = 5.5 \text{ parts}$

1 part = $\frac{10.5}{5.5} = 2.8 \text{ cum} = 84 \text{ bags cement}$

$1\frac{1}{2}$ parts = $2.8 \times 1\frac{1}{2} = 4.2 \text{ cum (sand)}$

3 parts = $10.5 \times 3 =$

3 parts = $2.8 \times 3 = 8.4 \text{ cum (aggregate)}$

1) Proportion = 1:2:4

$$\text{Total parts} = 1+2+4 = 7 \text{ parts}$$

$$1 \text{ part} = \frac{15.4}{7} = 2.2 \text{ cum} = 66 \text{ bags (cement)}$$

$$2 \text{ parts} = 2.2 \times 2 = 4.4 \text{ cum (sand)}$$

$$4 \text{ parts} = 2.2 \times 4 = 8.8 \text{ cum (aggregate)}$$

2) Proportion = 1:3:6

$$\text{Total parts} = 1+3+6 = 10 \text{ parts}$$

$$1 \text{ part} = \frac{15.4}{10} = 1.5 \text{ cum} = 45 \text{ bags (cement)}$$

$$3 \text{ parts} = 1.5 \times 3 = 4.5 \text{ cum (sand)}$$

$$6 \text{ parts} = 1.5 \times 6 = 9.0 \text{ cum (aggregate)}$$

3) Proportion = 1:4:8

$$\text{Total parts} = 1+4+8 = 13 \text{ parts}$$

$$1 \text{ part} = \frac{15.4}{13} = 1.15 \text{ cum} = 34.5 \text{ bags (cement)}$$

$$4 \text{ parts} = 1.15 \times 4 = 4.6 \text{ cum (sand)}$$

$$8 \text{ parts} = 1.15 \times 8 = 9.2 \text{ cum (aggregate)}$$

4) Proportion = 1:5:10

$$\text{Total parts} = 1+5+10 = 16 \text{ parts}$$

$$1 \text{ part} = \frac{15.4}{16} = 0.95 \text{ cum} = 28 \frac{1}{2} \text{ bags (cement)}$$

$$5 \text{ parts} = 0.95 \times 5 = 4.75 \text{ cum (sand)}$$

$$10 \text{ parts} = 10 \times 0.95 = 9.5 \text{ cum (aggregate)}$$

Q) Proportion = 1:6:12
 total parts = $1+6+12 = 19$ cum parts
 1 parts = $\frac{15.4}{19} = 0.8$ cum 24 bags (cement)
 6 parts = $\frac{15.4}{19} = 4.8$ cum sand
 6 parts = $0.8 \times 6 = 4.8$ cum (sand)
 12 parts = $0.8 \times 12 = 9.6$ cum (aggregate)

Q.1

Cement concrete 1:2:4 in foundation or floor with stone ballast 40 mm (20 mm gauge).

Ans

~~Total~~ Given

Proportion = 1:2:4

total parts = $1+2+4 = 7$ parts

take 10 cum volume

add 54% due to the reduction in volume

Dry volume = 15.4 cum

1 parts = $\frac{15.4}{7} = 2.2$ cum = 66 bags (cement)

2 parts = $2.2 \times 2 = 4.4$ cum (sand)

4 parts = $2.2 \times 4 = 8.8$ cum (aggregate)

| Particulars | Quantity | Rate/unit | Amount |
|-------------------------------|--------------------|-----------|---------|
| <u>Materials</u> | | | |
| cement | 2.2 cum 86 bags | 260/- | 572 |
| sand (local) | 4.4 cum | 700/- | 3080 |
| stone ballast (20mm gauge) | 8.8 cum | 1800/- | 15840 |
| | | Total = | 19492/- |
| <u>Labours</u> | | | |
| Head mason | 1/2 | 350/- | 175 |
| Mason | 4 | 300/- | 1200 |
| mazdoor | 6 | 220/- | 1320 |
| Boy & women | 10 | 200/- | 2000 |
| Colie | | | |
| Bhisti | 4 | 200/- | 800 |
| scundries | | | |
| tools & plants | 1cum cum | 150/- | 150 |
| | | Total = | 5645/- |

total amount = 25137/-

Add 10% contractore charge = 2513.71/-

Add $1\frac{1}{2}\%$ water charge = 371.055/-

Grand total = 28021.755/-
(for 10 cum)

$$\text{for } 1 \text{ cum} = \frac{28027}{10}$$

$$= 2802.7 \text{ l-}$$

RCC Work

Q-1

RCC work in beam slab, etc 1:2:4 unit 1 cum.

Ans

Take 10 cum

Add 5% due to reduction in volume

$$\text{dry volume} = 10 + 5\% = 10 + 0.5 = 10.5 \text{ cum}$$

proportion = 1:2:4

$$\text{total parts} = 1 + 2 + 4 = 7 \text{ parts}$$

$$1 \text{ part} = 10.5 / 7 = 1.5 \text{ cum} \quad 66 \text{ bags (cement)}$$

$$2 \text{ parts} = 1.5 \times 2 = 3 \text{ cum}$$

$$4 \text{ parts} = 1.5 \times 4 = 6 \text{ cum}$$

| Particulars <u>Materials</u> | Quantity | Rate/cum | Amount |
|---|----------------------|----------|---------|
| cement | 2.2 cum (66 bags) | 260/cum | 17160 |
| sand (local fine) | 4.4 cum | 700/cum | 3080 |
| 20 mm gauge stone ballast | 8.8 cum | 1800/cum | 15840 |
| Mild steel of weight 78.59 @ 1% of concrete = 0.1 cum | 0.1 cum | 4400/cum | 34540 |
| Binding Binding wire (2 kg) (unit of 100) | 2 kg | 65/cum | 130 |
| | | Total = | 70730/- |

Labours

| | | | |
|----------------------------|---------|---------|----------|
| Head mason | 1/2 | 350/day | 175 |
| Mason | 8 | 300/day | 2400 |
| Mazdoor | 12 | 220/day | 2640 |
| BOY & WOMEN COOLIE | 120 | 200/day | 4000 |
| sandries tools & plants | Lcomsum | 120 LS | 2000 120 |
| Bhisti | 10 | 200/day | 2000 |
| | | Total = | 11335/- |

Bending, binding
creancking etc

| | | | |
|----------------------------|---------|---------|--------|
| Blacksmith | 8 | 300/day | 2400 |
| Mazdoor | 10 | 220/day | 2200 |
| sandries tools & plants | Lcomsum | 120 LS | 100 |
| | | Total | 4700/- |

centering shuttring
(both, erection &
dismantion)

| | | | |
|----------------|---------|---------|--------|
| Timber | Lcomsum | 1500LS | 1500 |
| carpeorters | 6 | 300 | 1800 |
| Mazdoor | 10 | 220 | 2200 |
| Nails | Lcomsum | 150LS | 150 |
| sandries T & P | Lcomsum | 80LS | 80 |
| | | Total = | 5730/- |

Total cost = 9251/-

Add 10% contractor profit = $\frac{9251}{100} \times 10$

= 9251.51-

Add 1.5% of water charge
= 1387.7/-
Grand total = 103153.5/-
(For 10 cum)
For 1 cum = 10,315,35/-

Brick work:

Brick nos

Mortar = cement, sand

Wall = 20 cm length, 20 m height, 30 cm thickness

$$\text{Volume of wall} = 20 \times 5 \times 0.3 = 30 \text{ cum}$$

⇒ Standard size of brick = $20 \times 10 \times 10 \text{ cm}$

Suppose the thickness of joint = 1 cm

$$\text{Volume of brickwork} = 20 \times 5 \times 30 - 1 = 29 \text{ m}$$

$$\text{Volume of 1 brick} = 0.2 \times 0.1 \times 0.1 = 0.002 \text{ cum}$$

$$\text{No. of brick} = \frac{\text{Total volume of brickwork}}{\text{Volume of 1 brick}}$$

$$= \frac{29}{0.002} = 14500 \text{ nos}$$

Add 5% due to wastage, breakage

$$= 14500 + \frac{5}{100} \times 14500 = 15225$$

(For 30 cum)

$$\text{For 30 cum no of bricks} = 15225$$

$$\text{For 1 cum no of bricks} = \frac{15225}{30} = 507.5$$

$$\text{For 10 cum no of bricks} = 10 \times 500 = 5000$$

⇒ Actual volume of brickwork = 29 cum

Nominal size of brick = $19 \times 9 \times 9 \text{ cm}$

$$\text{Volume of 1 brick} = 0.19 \times 0.09 \times 0.09 = 0.001539 \text{ cum}$$

Total volume of brick = no of bricks \times volume of 1 brick

$$= 14500 \times 0.001539$$

$$= 22.31 \text{ cum}$$

Moretare:

Volume of moretare = volume of total brickwork -
volume of brick

$$= 29 - 22.31 = 6.69 \text{ cum}$$

Add 15% due to frog filling, uniform joint bonding etc.

$$\text{Total volume of moretare} = 6.69 + 1.0035$$

$$\text{Add } 25\% \text{ in dry material due to reduction in volume} = 7.693 \text{ cum}$$

$$\text{Dry volume} = 9.61 \text{ cum (For 30 cum)}$$

$$\text{For 1 cum} = 9.61/30 = 0.32 \text{ cum}$$

$$\text{For 10 cum} = 10 \times 0.32 = 3.2 \text{ cum}$$

Q.1

Brickwork in foundation with 1:4 cement mortar.
Unit = 1 cum.

Take - 10 cum

Bricks no - 5000

Dry moretare = 3 cum

Proportion = ~~10~~ 1:4

Total parts = $1+4 = 5$ parts

1 parts = $3/5 = 0.6 \text{ cum} = 18 \text{ bags of cement}$

4 parts = $4 \times 0.6 = 2.4 \text{ cum sand}$

| <u>Particulars</u> | <u>Quantity</u> | <u>Rate/unit</u> | <u>Amount</u> |
|--------------------|--------------------|------------------|---------------|
| <u>Materials</u> | | | |
| Bricks | 5000 no. | 450/- | 2250/- |
| Cement | 0.6 cem 18 bags | 20/-/bag | 4680/- |
| Sand (coarse) | 2.4 cem | 1500/cem | 3600/- |
| | | Total | 30780/- |

Labourers

Head mason No 1/2 350/day 175

Mason 4

STONE MASONRY

Ro a? Random rubble stone masonry in foundation

(unit - 1 cum)

Ans

Take - 10 cum

Add 25% due to reduction in volume.

$$\text{Stone} = 10 + 2.5 = 12.5 \text{ cum}$$

$$\text{Mortar} = 42\% = 4.2 \text{ cum (dry volume)}$$

Proportion - 1:6

$$\text{total parts} = 1+6 = 7$$

$$1 \text{ part} = 4.2/7 = 0.6 \text{ cum} \quad 18 \text{ bags (cement)}$$

$$6 \text{ parts} = 0.6 \times 6 = 3.6 \text{ cum sand}$$

Particulars
Materials

Quantity

Rate/unit

Amount

Stone

1.25

1200/cum

1500/-

Cement

0.6/18 bags

260/bag

4680/-

Sand (local)

3.6 cum

700/cum

2520/-

Labour

Hand NO

Rate/d Amou

Total = 22200/-

Head mason

1/2

350/d

175/-

Mason

8

300/d

2400/-

Mazdoor

12

220/d

2640/-

Boy & women

10

200/d

2000/-

coolie

6

200/d

1200/-

Bhisti

6

150/d

150/-

Sundries + sp

lumpsum

150/l

150/-

Total

8565/-

Total cost = 30765/-

Add 10% contractor profit = 30765.5/-

Add $\frac{1}{2}\%$ water charge = 461.47/-

Grand total = 343023/-

(For 10 cem)

For 1 cem = 3430/-

Q.2

Random Rubble stone masonry in Steep structure. Proportion 1:4. 1 unit 1 cem?

Ans

Take = 10 cem

Add 25% due to reduction in volume
Stone = $10 + 2.5 = 12.5$ cem

Mortar = 42% = 4.2 cem (Dry volume)

Proportion = 1:4

Total parts = $1+4=5$ parts

1 parts = $4.2/5 = 0.84$ cem

= 0.9 cem = 27 bags (Cement)

4 parts = $0.9 \times 4 = 3.6$ cem sand

| <u>Particulars</u> | <u>Quantity</u> | <u>Rate/unit</u> | <u>Amount</u> |
|-----------------------|-------------------|------------------|---------------|
| <u>Materials</u> | <u>Volume</u> | | |
| stone | 12.5 cem | 1200/cem | 15000/- |
| cement | 0.9 cem / 27 bags | 260/bags | 7020/- |
| sand (local, fine) | 3.6 cem | 700/cem | 2520/- |
| | | Total | 24540/- |

| <u>Labours</u> | <u>No</u> | <u>Rate/unit</u> | <u>Amount</u> |
|-----------------------------------|-----------|------------------|--------------------------|
| Head mason | 1/2 | 350 115/day | 350/- 175/- |
| Mason | 6 | 850/d | 1800/- |
| Mazdoor | 12 | 220/d | 2640/- |
| Boy & women coolie | 10 | 200/d | 2000/- |
| Bhisti | 10 | 200/d | 2000/- |
| scaffolding | Lemsum | 420/- | |
| sundries tools plants | Lemsum | 70/- | 70/- |
| | | | Total = 9105/- |
| | | | Total cost = 33645/- |
| Add 10% contractor profit | | | = 3364.5/- |
| Add $1\frac{1}{2}\%$ water charge | | | = 504.67/- |
| | | | Grand total - 37514.17/- |
| | | | (For 10 cem) |
| For 1 cem | | | = 3751.417/- |

{ Plastering }

Wall - 100 sqm

- 12 mm thick plastering, 20 mm supposed to wall.

$$\text{Volume} = \text{Area} \times \text{thickness}$$

$$= 100 \times 0.012 = 1.2 \text{ cu m}$$

Add 30% due to uniform joint

$$\text{volume} = 1.2 + 30/100 \times 1.2 = 1.56 \text{ cu m}$$

Add 25% due to reduction in volume

$$= 1.56 + 25/100 \times 1.56 = 1.95 \text{ cu m or } 2 \text{ cu m}$$

\rightarrow dry volume of mortar required for 12 mm thick plastered in 100 sqm area is 2 cu m.

\rightarrow for 20 mm thick plaster in 100 sqm area
dry volume of material = 3 cu m

\rightarrow for 6 mm thick plastering in 100 sqm area, dry volume of material = 1 cu m.

for 20 mm thick plastering ?

$$\text{volume} = \text{Area} \times \text{thickness}$$

$$= 100 \times 0.02 = 2 \text{ cu m}$$

Add 30% due to uniform joint

$$= 2 + 30/100 \times 2 = 2.66 \text{ cu m}$$

Add 25% due to reduction in volume

$$= 2.66 + 25/100 \times 2.66 = 3 \text{ cu m}$$

For 6mm thick plastering

volume = Area x thickness

$$= 100 \times 0.006 = 0.6 \text{ cum}$$

Add 30% due to uniform joint

$$= 0.6 + 30/100 \times 0.6 = 0.78 \text{ cum}$$

Add 25% due to reduction in volume

$$= 0.78 + 25/100 \times 0.78 = 0.975 \text{ cum or } 1 \text{ cum}$$

Q.1

20 mm thick plaster in 1:5 cement mortar
unit - 1 cum.

Ans

Take - 100 sqm

Proportion = 1:5

Dry volume of mortar = 3 cum

Total parts = 1+5 = 6

1 parts = $\frac{3}{6} = 0.5 \text{ cum (cement) } 15 \text{ bags}$

5 parts = $5 \times 0.5 = 2.5 \text{ cum (sand)}$

ANSWER = 100

(Ans) = answer to similar question

A-E = answer to question

C-P-H = strong lot lot

Cement Concrete Flooring

Suppose 2cm thick C.C flooring provided above 100 sqm RCC slab

$$\text{volume} = 100 \times 0.02 = 2 \text{ cum}$$

Add 30% due to uniform joint

$$2 + \frac{0.30}{100} \times 2 = 2.6 \text{ cum}$$

Add 54% in dry material due to reduction in volume

$$2.6 + \frac{54}{100} \times 2.6 = 4.004 \text{ cum}$$
$$4.125 \text{ cum}$$

For 2cm CC flooring in 100sqm area the dry material is 4.125 cum.

For 4cm CC flooring in 100sqm area the dry material required is 8.6 cum.

Q.1

2cm thick of $1:1\frac{1}{2}:3$ C.C flooring : unit - 1sqm
Ans

Take - 100sqm

Dry volume of material = 4.125 cum

Proportion = $1:1\frac{1}{2}:3$

Total parts = $1 + 1\frac{1}{2} + 3 = 5.5$ parts

1 parts = $\frac{4.125}{5.5} = 0.75 \text{ cum}$ $22\frac{1}{2}$ (Cement)

$1\frac{1}{2}$ parts = $0.75 \times 1\frac{1}{2} = 1.125 \text{ cum}$ (Sand)

3 parts = $0.75 \times 3 = 2.25 \text{ cum}$ 3 stone