LECTURE NOTES

ON

Estimation and Cost Evaluation-I

For

DIPLOMA 3rd SEMESTER

(TH. 4)

As per SCTE & VT Syllabus

Prepared By:

Er. Swapnashish Patel

Senior Lecturer

Department of Civil Engineering

Jharsuguda Engineering School, Jharsuguda

Po- Kalimandir Road, 768202

https://jesjharsuguda.org.in

Introduction:-

Plinth Area:-

Plinth area is built of up covered area of a building measured at floor level of any storey. Plinth area is ~~calculating~~ calculated by taking the external dimensions of the building at the ~~floo~~ floor level excluding plinth of sets if any court yard, open areas, balconies and cantilever projections are not including in the plinth area. Supported perches (other than cantilagered) are included in the plinth area.

The following shall be included in the plinth area.

i) All floors, area of walls at the floor level excluding plinth offsets, if any.

ii) Internal shafts for sanitary installations provide these do not ~~exceed~~ exceed 25 sq.m in ~~case~~ air condition ducts, lifts etc.

iii) The area of Barsati and the area of mumty at terrace level.

iv) Area of porches other than cantilayered.

The following are not included in the plinth area.

i) Area of lift

ii) Internal sanitary shafts provided these are more than 25 sq.m. in area.

iii) Under closed balconies.

iv) Towers, parrels, domes etc projecting above terrace level not forming a story at the terrace level.

v) Architectural bonds, carnies etc.

vi) Sunshades, vertical sun breakers or box louvers projecting out.

Floor area/ carpet area:-

Floor area of a building is the total area of the floor area in between walls and consists of floor of all rooms verandah passages, corridoors, staircase room, entrance halls, kitchen stores, bathroom and latrine (w.c) etc. Sills of doors and opening are not included in the floor. Areas occupied by walls, pillers, plaster and other intermediate. Supporter are not included in the floor area. In short floor area is equial to plinth area and minor area occupied by walls.

For deduction of walls area from plinth area to obtained floor area shall include.

i) Door and other opening in wall.
ii) Intermediate pillers and supporter.
iii) Plaster along walls excluding 300 sq.m in area.
iv) Flugs which are with in walls, but the following shall be excluded from the walls area.

⇒ Pilaster — along walls not excluding 300 sq.m in area.
⇒ Fire place projecting beyond the face of walls in living room.
⇒ Chula plat form projecting beyond the face of wall in kitchen.

The unit of measurement and payment for various items of works and materials:-

Principle of units for various items of works

i) Mass, voluminous and thick works shall be taken in cubic unit or volume.

ii) Shallow, thin and surface work shall be taken in cubic unit or in area.

iii) Long and thin works shall be taken in linear or running unit, and linear measurement shall be taken.

iv) Piece work, job work etc. shall be taken in number.

Types of estimate :-

1) Preliminary estimate of approximate of abstract estimate or rough cost estimate :-

It is only required for priliminary studies of various aspects of a work or project, to decide the financial position and policy for adminstrative sanctions by the complete adminstrative authority. It is prepared from practical knowledge and cost of the similar work. This estimate is prepared showing separately the approximate cost of all important items of work as cost of land, each building, roads, water supply sanitary works, electrification etc. The estimate is accumpained by a brieve report explaning the necessity and utility of the project and showing house the cost of separate items have been arrived.

2) Plinth area estimate for building :-

3) Cube rate estimate for building :-

This is calculated by finding the cubical content of building (Length x bredth x thickness) and multiplied it's by cube rate.

Cube rate estimate is most accurate as compained to the plinth area estimate.

4) Approximate quantity method estimate:-

In this method approximate total length of walls is found in running meter and this total length multiplied by the rate per running meter of wall gives a fairly accurate cost. In the method instruction may be devided into two parts.

i) Foundation including plinth

ii) Super structure

The running meter cost for foundation and super structure found be ~~calculated~~ calculation. First and these running meter rate should be multiplied by the total length to wall.

5) Detailed estimate or item rate estimate:-

A detailed estimate is prepared ~~after~~ it's complete set of drawing are ready. The quantity of various items of works are worked out from such drawings and are multiplied by the parent rate of items of work to arrive at the estimate cost of the work.

6) Revised estimate:-

Revised estimate is a detailed estimate and is required to be prepared under any one of the following circumstances.

i) When the original estimate is excluded or likely to exceed by more than 5%.

ii) When the expenditure on a work exceed or likely to exceed the amount of ~~adm~~ administrative ~~sanctions~~ sanction by more than 10%.

iii) When there are material deviation from the original proposal even though the cost may be not from the sanctional amount.

It should be accompanied by a comparative estimate showing the variations of each items of works. Its quantity, rate and cost under original and revised side by side the excess or saving and reason for variation.

7) Supplementary estimate :-

It is a detailed estimate and prepared when additional works are required and supplimen the original works or when further developmen required during the programes of work.

8) Supplimentary and revised estimate :-

When a work is partially abordoned and the estimated cost of the repairing work is less than 95 % of the original work or when there are material deviation and changes in the design which many causes substantial saving in the estimate. Then the cost of the original estimate is revised by the complete authority. A supplimentary and revised estimate is then prepared and fresh technical senction of the complete authority is obtained.

9) Annual repair and maintanance estimate :-

It is a detailed estimate and is prepared to maintaining the structure of work in proper order and safe condition.

10) Contiegencies :-

It indicates inidental expencess of miscellaneous characters which can not be classified under any destinate items sub - head.

A contain an in the form of contigances of 3% to 5% of estimated cost is provided for contigencies.

11) work charged establishment :-

It is the established which is changed to work directly. During the construction of a building or a projection a certain no. of work supervesios. chaukidors mates etc are required to be employed and their salaries are paid from the am to work changed established for this a percentage of ₹ 1½ to 2% of the estimate cost is included.

Sl.No	Particulars of items	Unit of measurement in MRS	Unit of payment in M.K.S
01	Earth work	CUM	Per CUM
	only for surface dressing and leveling and clearing etc.	Square meter (Sq.m)	Per Sq.m
02	cutting of trees	No	Per no
03	Concrete → For line concrete (L.C) or roof tracing thickness specified. → Jalli work or Jaffi work or c.c Tracery ponal.	Cubic meter (Cum) Sq.m / Cum Sq.m	
04	DPC	Sq.m	
05	Brick work → Brick work in foundation and plinth in super structure; in arches, etc in cement lines of mud-mortal sun a dried brick-work (BW) in jack arches, well staining; rainforced BW, Bw in fire place, chula chimeney.	Sqm / cub.m/mt Sq.mt	

	→ Honey comb Bcw, Jack arch roofing, half Bcw without or with reinf., Thin partition wall → Strain. cource. drip cource weather course, coping etc. course, Brick edging (Bywood side)	Sq.mt meter (m.l)	
06	Stone work	Cub.m/Sq.m/ mt	
07	wood work	cub.m/ sq.m/m.t/no	
08	steel work	kg/m / sq.m/mt / no	
09	Roofing → Rcc, RB slab roof	Sq.m Sq.m	
10.	Plaster, painting, Finishing	sq.m/m.t	
11.	Flooring	sq.m	
12	Miscellaneous Items	cub.m/sq.m/m.t/no	

Method of estimating:-

Estimate:-

Before undertaking the construction of a project, it is neccessary to know it's probable cost which worked out by estimating. An estimate is a compulation or calculation of the quality required and expenditure likely to be incured in the construction of work. The estimate is the probable cost of a work and is determined theoritically by mathmatically calculation based on the planes and drawing and current rates. Approx estimate may be prepared by various method but accurate estimate is prepared by detailed estimate method.

Actual cost:-

The actual cost is of work a work is known as completion of the work.

⇒ Detailed estimate consistes of working out the quantities of different items of work and ~~than~~ man working out of the cost i.e. 2-stages

Detailed measurement of calculation of quantities. The whole work is devided into different items of work as earth work, concrete, brick work etc and the items are classified the groped under different sub head and difference and measurement of each items of work are taken out.

Detailed of measurement form:-

Item no	Description of ~~perpendiculars~~ Perticulars	No	Length	Breadth	Height or depth	Content of quantity

Abstract of estimate cost:-

The cost of under item of work is calculated from the quantities all ready computed at workable rate and the total cost is worked out in a prescribed form.

Abstract of estimate form:-

Item no	Description of Perticulars	~~No~~ Quantity	Unit rate	Amount

Main items of work:-

1) Earth work
2) Concrete in foundation
3) Soiling
4) Damp proof course
5) Masonary
6) Arch masonary work
7) ~~Lintels~~ Lintels over opening
8) ~~Reinforce~~ R.C.C & R.B work
9) Flooring and Roofing
10) Plastering and painting
11) cornice
12) Pillers
13) Doors and window
14) Wood work
15) Iron work
16) white washing
17) Painting

Electrification 8-10% estimate cost

Water supply 8-10% estimate cost

Degree of accuracy in building:-

Depend on the rate of items and the unit of payment higher rate than greater accuracy.

General rules:-

i) Measurement shall be item wise for the finished item of work and the description of each items shall be held to include materials, Transport, Labour, Febrication, hosting tools and Plants over loads and other residental charges for finishing the work to the required shape, size, design, and specification.

ii) In booking dimension the order shall be in the sequence of length, bredth and height and depth or thickness.

iii) All work shall be measured net subject to following tolerance unless otherwise started.

a) Dimension shall be measured to the nearest 0.1m i.e. 1cm (1/2)%

b) All shall be measured to the nearest ~~0.01 cum. (0.1 cuft)~~ 0.01 sq.m (0.1 sq ft)

c) Cubic cost shall be worked up to the nearest 0.01 cum (0.1 cuft)

iv) Some type of work under different condition and nature shall be separately under separate items.

v) The bills of quantities shall fully describe the materials properties and work manships and accurately represent the work to be exculated.

vi) Incase of structural concrete, brick work or stone masonery the work under the following categories shall be measured separately and height shall be described

a) From foundation to plinth level

b) From plinth level to first floor level

c) From first floor to second floor level & so on.

Method of building estimate:-

1) Separate or individual wall method:-

In this method, measure or find out the external length of walls running in the longitudinal direction generally the long walls out to out and the internal long wall of lengths of long walls running in the transverse direction in to in i.e. short walls care should be taken to note the difference in directions at different height due to offeset or footings.

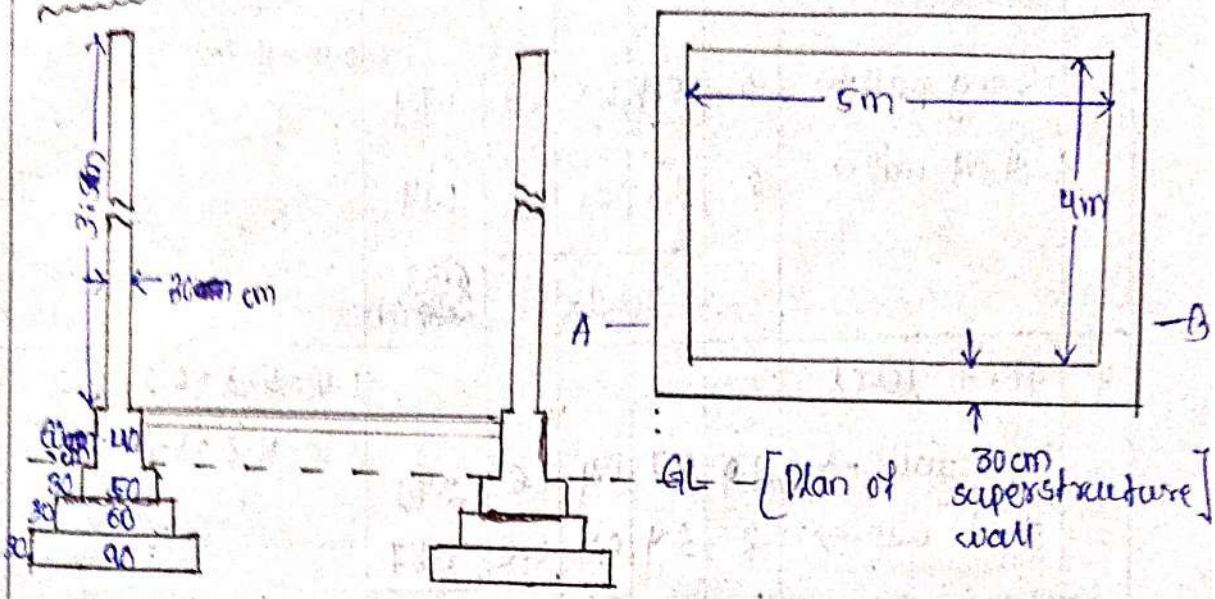
* Long wall length out to out = centre to centre length + half breadth one side + half breadth on the other side
= centre to centre length + one breadth

Question:-

Represents the plan of superstructure walls of a single room building of 5m x 4m and sections represents. Represent the c/s of the walls with foundation. Estimate the quantities of

① Earth work in excavation in foundation
② Concrete in foundation
③ Brick work in foundation and plinth
④ Brick work in super structure

Solution



[Section of AB]

Sl. No	Particulars of items	N	L	B	H or D	Quantity	Notes
1	Earth work in excavation in foundn						L.W = 5.3 + 0.45 + 0.45 = 6.2
	Long wall →	2	6.2	0.9	0.9	10.04	S.W = 4.3 - 0.45 - 0.45 = 3.4
	short wall →	2	3.4	0.9	0.9	5.50	
2	Concrete in foundation			Total =		15.54 cubm	L.W = 5.3 + 0.45 + 0.45 = 6.2
	Long wall →	2	6.2	0.9	0.3	3.34	S.W = 4.3 - 0.45 - 0.45 = 3.4
	Short wall →	2	3.4	0.9	0.3	1.83	
					Total =	5.17 cubm	
3	Brick work in foundation and plinth (First footing)						L.W = 5.3 + 0.3 + 0.3 = 5.9
	Long wall →	2	5.9	0.6	0.3	2.12	S.W = 3.7 - 0.3 - 0.3 = 3.7
	Short wall →	2	3.7	0.6	0.3	1.33	

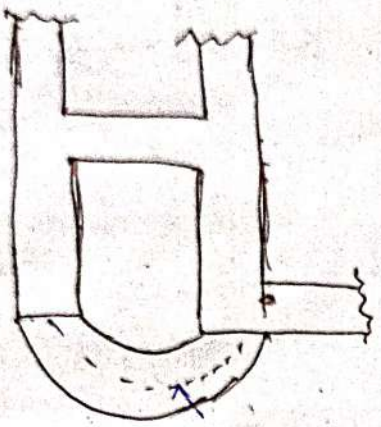
	Second Footing						L.W = 5.3 + 0.25 + 0.25 = 5.8 S.W = 4.3 - 0.25 - 0.25 = 3.8
	Long wall →	2	5.8	0.5	0.3	1.74	
	Short wall →	2	3.8	0.5	0.3	1.14	
				Total =		6.33 cubm	
4	Plinth level						L.W = 5.3 + 0.2 + 0.2 = 5.7 S.W = 4.3 - 0.2 - 0.2 = 3.9
	Long wall →	2	5.7	0.4	0.6	2.73	
	Short wall →	2	3.9	0.4	0.6	1.87	
					Total =	4.6 cubm	
5	Brick work in super-structure						L.W = 5.3 + 0.15 + 0.15 = 5.6 S.W = 4.3 - 0.15 - 0.15 = 4.0
	Long wall →	2	5.6	0.3	3.5	11.76	
	Short wall →	2	4.0	0.3	3.5	8.4	
					Total =	20.16 cubm	

2) centre line method :-

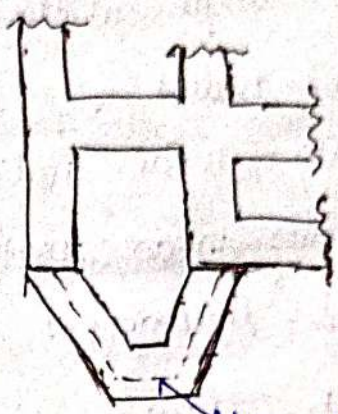
In this centre line method sum total length of the centre lines of walls, long and short has to be found out. Find out the total length of the centre lines of walls of same type, long and short having same type of foundation and footings and then find the quantities by multiplying the total centre length by the respective bredth and height. The method is quick but requires special attention and considration at the junctions, meeting pts. of partition or cross walls, etc. Here length will remain same for excavation in foundation, for concrete in foundation, for all footings and for super structure

* Circular, semi circular, hexagonal, half hexagonal etc rooms.

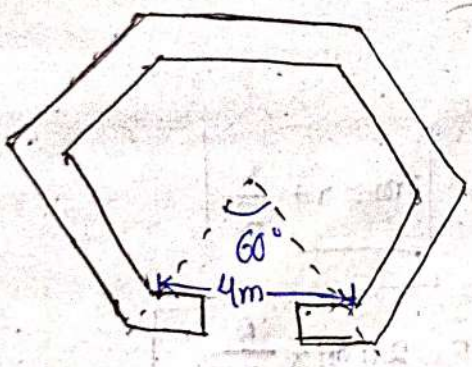
For these type of rooms the total centre line length of all walls may be found out and quantities may be calculated by multiplying respective breadth and height.



Mean Length



Mean Length



~~Line~~

Length of centre line of one side,

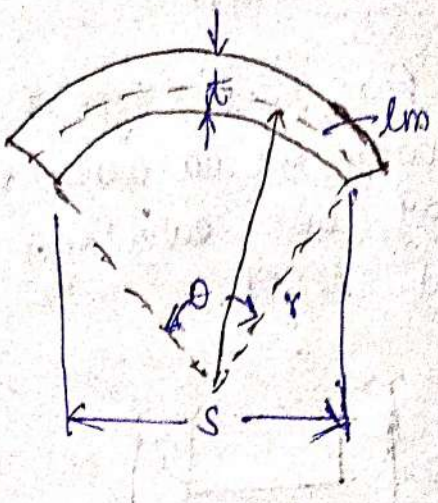
$$lm = 4 + 2 \times \frac{0.15}{\tan 60^\circ} = 4 + 2 \times \frac{0.15}{1.732}$$

Total centre line = $6 \times lm$

Arch masonary calculation:-

Case-1

Segmental arch with span and angle given:-



S = span

θ = angle at the centre

r = radius

rm = mean radius

lm = mean length

t = thickness of arch

b = breadth of wall

$$\sin\frac{\theta}{2} = \frac{S/2}{r}$$

$$\Rightarrow \boxed{r = \frac{S}{2} \times \frac{1}{\sin\frac{\theta}{2}}}, \quad \boxed{rm = r + \frac{t}{2}}$$

$$\frac{lm}{2\pi rm} = \frac{\theta}{360} \Rightarrow \boxed{lm = 2\pi rm \times \frac{\theta}{360}}$$

Quantity of arch masonary work (Q) = mean length of arch x breadth of wall x thickness of

$$\Rightarrow \boxed{Q = lm \times b \times t}$$

Case-2

Segmental arch of 60°:-

$r = S$ and $r_m = r + \frac{t}{2}$ (above figure)

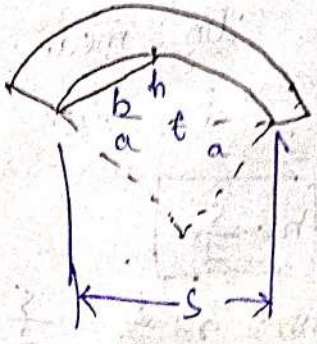
$$\frac{l_m}{2\pi r_m} = \frac{60^\circ}{360} = \frac{1}{6}$$

$$l_m = \frac{1}{6} \times 2\pi r_m = \frac{1}{3}\pi r_m$$

$$Q = l_m \times b \times t \Rightarrow \boxed{l_m = \frac{1}{3}\pi r_m}$$

Case-3

Segmental arch with span and rise given



r = radius of arch i.e. of intrados

r_m = radius of mean arch

t = length of arch of intrados

l_m = length of mean arch

From similar figure

$$\frac{l_m}{t} = \frac{r_m}{r} \text{ or } l_m = l \times \frac{r_m}{r}$$

To find 'r'

$a^2 = h(d-h)$, where d = diameter of intrados

a = semichord $= \frac{1}{2} \times$ span $= \frac{S}{2}$,

h = rise of arch (given)

Hence, 'd' can be found

$r = d/2$

$$\boxed{r = \frac{h}{2} + \frac{S^2}{8h}}$$

$r_m = r + \frac{t}{2}$

$l = \frac{8b - 2a}{3}$, $b = \sqrt{a^2 + h^2}$, $a = \frac{1}{2} \times s$

$l_m = l \times \frac{r_m}{r}$

$Q = l_m \times b \times t$

Case-4

Semi circular arches :-

s : span

r : radius of arch

r_m : mean radius

l_m : mean length of arch

h : rise

$h = \frac{s}{2}$

$r_m = r + \frac{t}{2} = \frac{s}{2} + \frac{t}{2}$

$l_m = \pi r_m = \frac{22}{7} \times \left(\frac{s}{2} + \frac{t}{2}\right)$

$Q = l_m \times b \times t$ → $l_m = \pi \times \left(\frac{s}{2} + \frac{t}{2}\right)$

Case-5

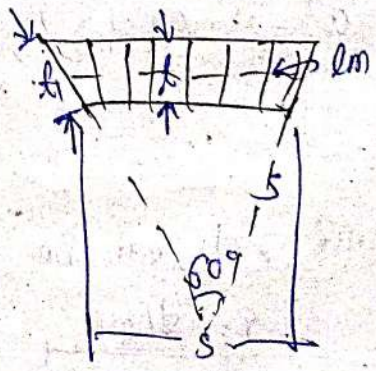
Flat arches :-

Usually subtends 60°

$t_1 = \frac{t}{\sin 60} = \frac{t}{0.866} = 1.15t$

$l_m = s + \frac{t_1}{2}$

$Q = l_m \times b \times t$



Q) An arch of 2.5m span subtends an angle of 80° at the centre. The thickness of arch is 30cm and the bredth of wall is 40cm. Calculated the quantity of arch masonary work.

Ans

Given that

Span (s) = 2.5m, angle(θ) = 80°, thickness (t) = 30cm = 0.3m

bredth (b) = 40cm = 0.4m

~~Single~~ $\sin\frac{\theta}{2} = \frac{s/2}{r}$

$\Rightarrow r = \frac{s}{2} \times \frac{1}{\sin\frac{80}{2}}$

$= \frac{2.5}{2} \times \frac{1}{0.74}$

$= 1.25 \times 1.35$

$\Rightarrow r = 1.68$

$r_m = r + \frac{t}{2}$

$= 1.68 + \frac{0.3}{2}$

$= 1.68 + 0.15$

$\Rightarrow r_m = 1.83$

$l_m = 2\pi r_m \times \frac{\theta}{360}$

$= 2 \times 3.14 \times 1.83 \times \frac{80}{360}$

$= 2 \times 3.14 \times 1.83 \times 0.22$

$\Rightarrow l_m = 2.52$

Quantity of arch masonary work = $l m \times b \times t$

$= 2.52 \times 0.4 \times 0.3$

$= 0.30\ m^3$.

Q) Calculate the quantity of BCO in a segmental arch of 2.2m span, 50 cm rise and 30 cm thick. The breadth of the wall is 30 cm.

Ans

Given that

Span (S) = 2.2m

Rise (h) = 50 cm = 0.5m

Thickness (t) = 30cm = 0.3m

Breadth (b) = 30cm = 0.3m

$a = \frac{1}{2} \times S$

$= \frac{2.2}{2}$

$\Rightarrow a = 1.1$

$b = \sqrt{a^2 + h^2} = \sqrt{(1.1)^2 + (0.5)^2}$

$= 1.21m$

$r = \frac{h}{2} + \frac{S^2}{8h}$

$= \frac{0.5}{2} + \frac{(2.2)^2}{8 \times 0.5}$

$= 0.25 + \frac{4.84}{4}$

$= 0.25 + 1.21$

$\Rightarrow r = 1.46\ m$

$\therefore r_m = r + \frac{b}{2}$

$= 1.467 + \frac{0.3}{2}$

$= 1.46 + 0.15$

$\Rightarrow r_m = 1.61 m$

$L = \frac{8b - 2a}{3}$

$= \frac{8 \times 1.21 - 2 \times 1.1}{3}$

$\Rightarrow L = 2.49$

$l_m = L \times \frac{r_m}{r}$

$= 2.49 \times \frac{1.61}{1.46}$

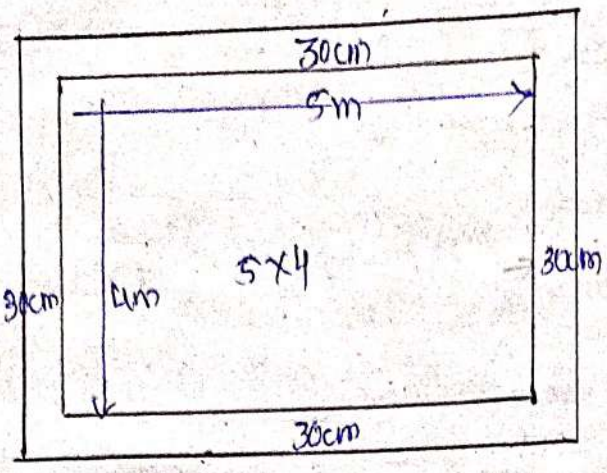
$\Rightarrow l_m = 2.75 m$

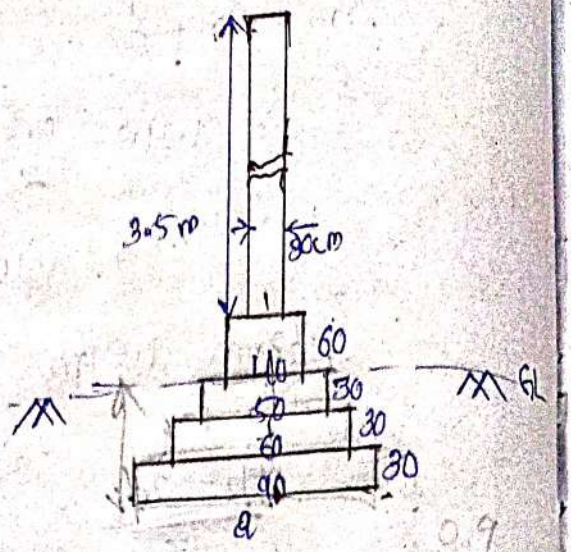
Quantity $= l_m \times b \times t$

$= 2.75 \times 0.3 \times 0.3$

$= 0.247 m^3$

1)

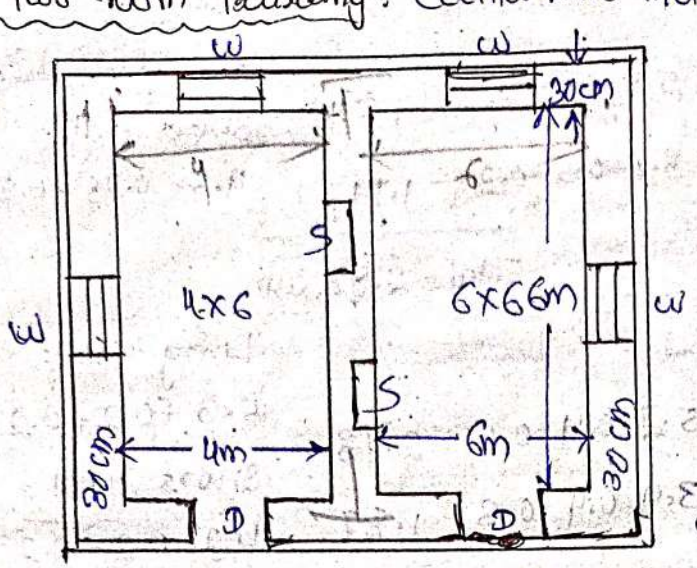


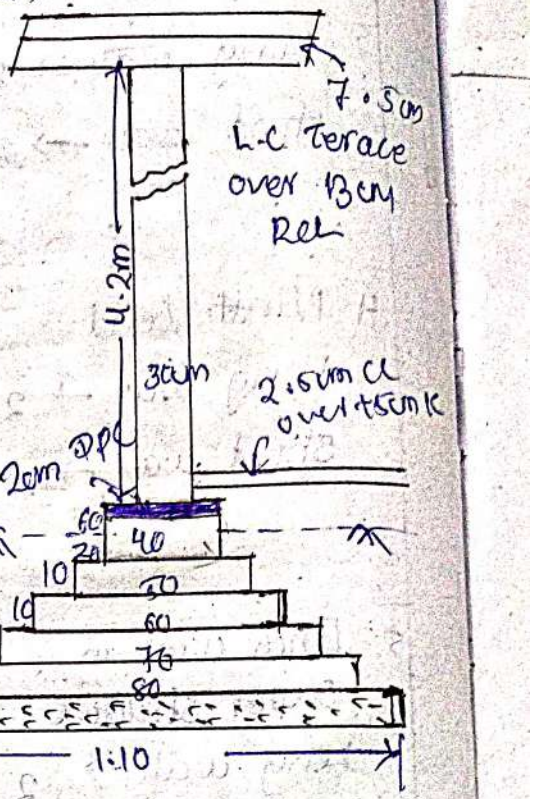


S No	Particulars	N	L	B	H/D	Quantity	Remarks
1	Earth work in excavation in foundation						Long wall = 5.3 + 0.45 + 0.45 = 6.2
	Long wall →	2	6.2	0.9	0.9	10.04	Short wall = 4.3 - 0.45 - 0.45 = 3.4
	Short wall →	2	3.4	0.9	0.9	5.5	
					Total =	15.54	cum
2	concrete in foundation						Long wall = 5.3 + 0.45 + 0.45 = 6.2
	Long wall →	2	6.2	0.9	0.3	3.34	Short wall =
	Short wall →	2	3.4	0.9	0.3	1.83	4.3 - 0.45 - 0.45 = 3.4
					Total =	5.17	cum
3	Brick work in foundation (First footing)						Long wall = 5.3 + 0.3 + 0.3 = 5.9
	Long wall →	2	5.9	0.6	0.3	2.12	Short wall =
	Short wall →	2	3.7	0.6	0.3	1.35	4.3 - 0.3 - 0.3 = 3.7
					Total =	3.45	cum

	Second footing						Long wall =
							5.3 + 0.25 + 0.25 = 5.8
	Long wall →	2	5.8	0.5	0.3	1.74	Short wall =
	Short wall →	2	3.8	0.5	0.3	1.14	4.3 - 0.25 - 0.25 = 3.8
					Total =	2.88 cum	
4	Plinth level						Long wall =
	Long wall →	2	5.7	0.4	0.6	2.73	5.3 + 0.2 + 0.2 = 5.7
	Short wall →	2	3.9	0.4	0.6	1.87	Short wall =
							4.3 - 0.2 - 0.2 = 3.9
					Total =	4.60 cum	
5	Brick work in						Long wall =
	super structure						5.3 + 0.15 + 0.15 = 5.6
	Long wall →	2	5.6	0.3	3.5	11.76	Short wall =
	Short wall →	2	4	0.3	3.5	8.4	4.3 - 0.15 - 0.15 = 4
					Total =	20.16 cum	

2) Two room Building :- (Center line method)





D = 1.2m x 2.1m

w = 1.0m x 1.5m

S = 1.0m x 1.5m

All walls are of same section Lintels over door, windows, shelves are 15cm thick RB.

c/c Length of Long wall = 10.6m

Long walls = 2 x 10.6 = 21.2m

c/c Length of short wall = 6.3m

short wall = 3 x 6.3 = 18.9m

∴ Total centre length of the wall = 21.2m + 18.9m = 40.10m

Net centre line length = 40.10 - (2 x 0.5 x 0.3)

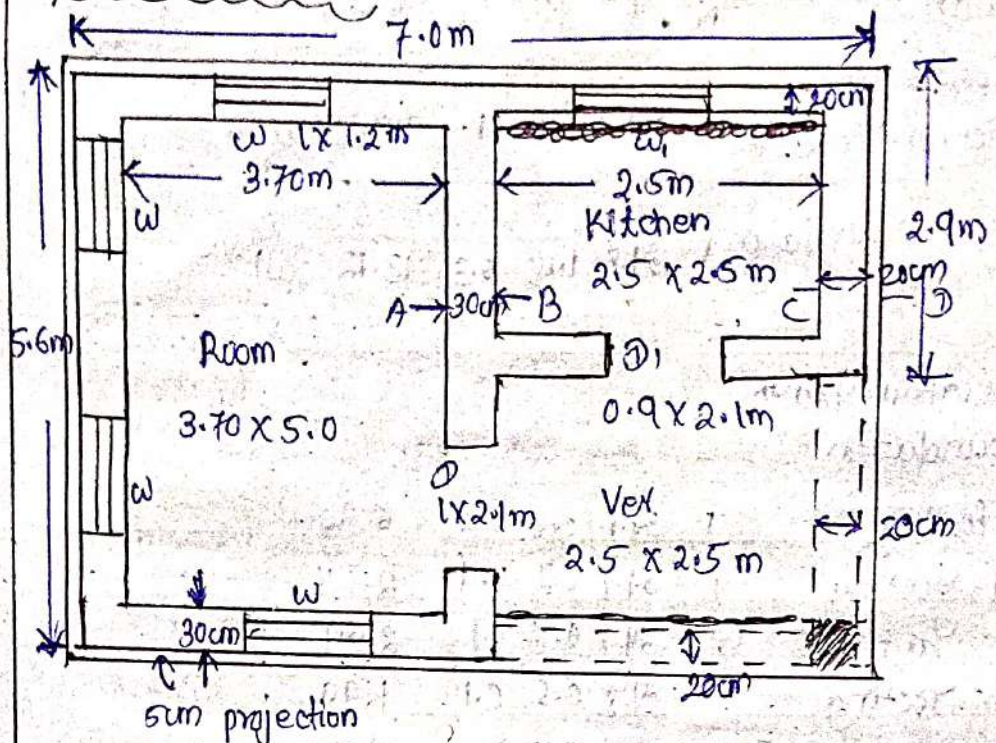
= 39.8m [As there are two T-junctions

$\frac{0.3}{2}$ $\frac{1}{2} \times 0.3$ 0.3

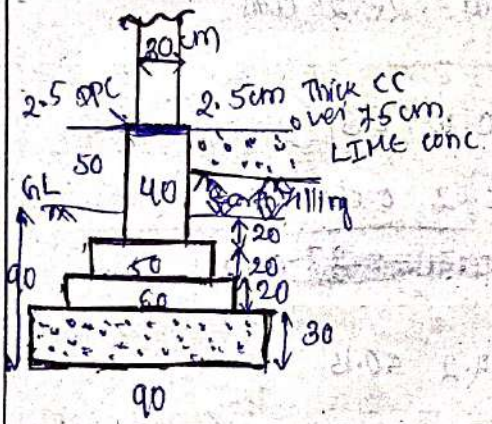
Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
1	Earth work in excavation in foundation	1	39.8	1.10	1	43.78 cum	
2	Concrete in foundation	1	39.8	1.10	0.3	13.12 cum	
3	Brick work in plinth and foundation						
	First footing	1	39.8	0.8	0.2	6.36	
	second footing	1	39.8	0.7	0.1	2.79	
	Third footing	1	39.8	0.6	0.1	2.39	
	Fourth footing	1	39.8	0.5	0.1	1.99	
	Plinth	1	39.8	0.4	0.8	12.73	
					Total =	26.26 cum	
4	DPC	1	39.8	0.4	0.02	0.31	
	Deduction doors	2	1.2	0.4	0.02	0.02	
						~~39 cum~~	
5	Brick work in super structure	1	39.8	0.3	4.2	50.15	
	Deduction						
	Door opening	2	1.2	0.3	2.1	1.51	
	Window opening	4	1	0.3	1.5	1.8	
	Selves opening	2	1	0.2	1.5	0.6	
	Linted over doors	2	1.5	0.3	0.15	0.14	L = 1.2 + 0.15 + 0.15 = 1.5
	Lintel over window	4	1.3	0.3	0.15	0.23	L = 1 + 0.3 = 1.3
	Lintel over selves	2	1.3	0.3	0.15	0.12	L = 1 + 0.3 = 1.3
						Total = 4.40 cum	

Net total = 50.15 − 4.40 = 45.75 cum

3) Single room Quater:-



PLAN



Section AB

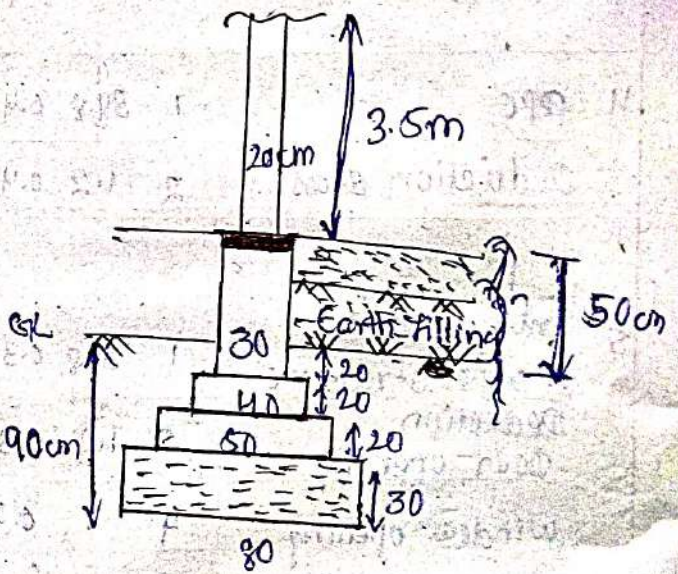
Long wall c to c length = 5.3m

Short wall c to c length = 4.0m

W = 1 X 1.2m

D = 1 X 2.1m

D1 = 0.9 X 2.1m



Section on

Kitchen and Naranda

Long wall c to c length = 5.0m

Short wall c to c length = 2.75m

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
1	Earth work in excavation in foundation						
	Rooms						
	a) Long wall →	2	6.2	0.9	0.9	10.04	L = 5.3 + 0.9 = 6.2
	b) Short wall →	2	3.1	0.9	0.9	5.02	L = 4.0 - 0.9 = 3.1
	Kitchen & Veranda						
	a) Long wall →	1	6.2	0.8	0.9	4.46	L = 5.4 + 0.8 = 6.2
	b) Short wall →	3	1.9	0.8	0.9	4.10	L = 2.75 - 0.45 - 0.4 = 1.9
						Total = 23.62 cum	
2	Concrete in foundation						
	Room						
	a) Long wall →	2	6.2	0.9	0.3	3.53	L = 5.3 + 0.9 = 6.2
	b) Short wall →	2	3.1	0.9	0.3	1.67	L = 4.0 - 0.9 = 3.1
	Kitchen & Veranda						
	a) Long wall →	1	6.2	0.8	0.3	1.49	L = 5.4 + 0.8 = 6.2
	b) Short wall →	3	1.9	0.8	0.3	1.37	L = 2.75 - 0.45 - 0.4 = 1.9
						Total = 7.88 cum	
3	Brick work in foundation						
	Room						
	a) Long wall →						
	~~Short wall →~~						
	First footing	2	5.9	0.6	0.2	1.42	L = 5.3 + 0.6 = 5.9

Second Footing	2	5.8	0.5	0.2	1.16	L = 5.3 + 0.5 = 5.8
Plinth	2	5.7	0.4	0.7	3.19	L = 5.3 + 0.5 = 5.7
b) Short wall →						
First Footing	2	3.4	0.6	0.2	0.82	L = 4.0 - 0.6 = 3.4
Second Footing	2	3.5	0.5	0.2	0.70	L = 4.0 - 0.5 = 3.5
Plinth	2	3.6	0.4	0.7	2.02	L = 4.0 - 0.4 = 3.6
Kitchen & Varanda						
a) Long wall →						
First Footing	1	5.9	0.5	0.2	0.59	L = 5.4 + 0.5 = 5.9
Second Footing	1	5.8	0.4	0.2	0.46	L = 5.4 + 0.4 = 5.8
Plinth	1	5.7	0.3	0.7	1.20	L = 5.4 + 0.3 = 5.7
b) Short wall →						
First Footing	3	2.2	0.5	0.2	0.66	L = 2.7 - 0.3 - 0.25 = 2.2
Second Footing	3	2.3	0.4	0.2	0.55	L = 2.7 - 0.2 - 0.2 = 2.3
Plinth	3	2.4	0.3	0.7	1.51	L = 2.7 - 0.2 - 0.15 = 2.4
					Total = 14.28 cum	
4 DPC						
Room						
a) Long wall →	2	5.7	0.4		4.56	L = 5.3 + 0.4 = 5.7
b) Short wall	2	3.6	0.4		2.88	L = 4.0 - 0.4 = 3.6

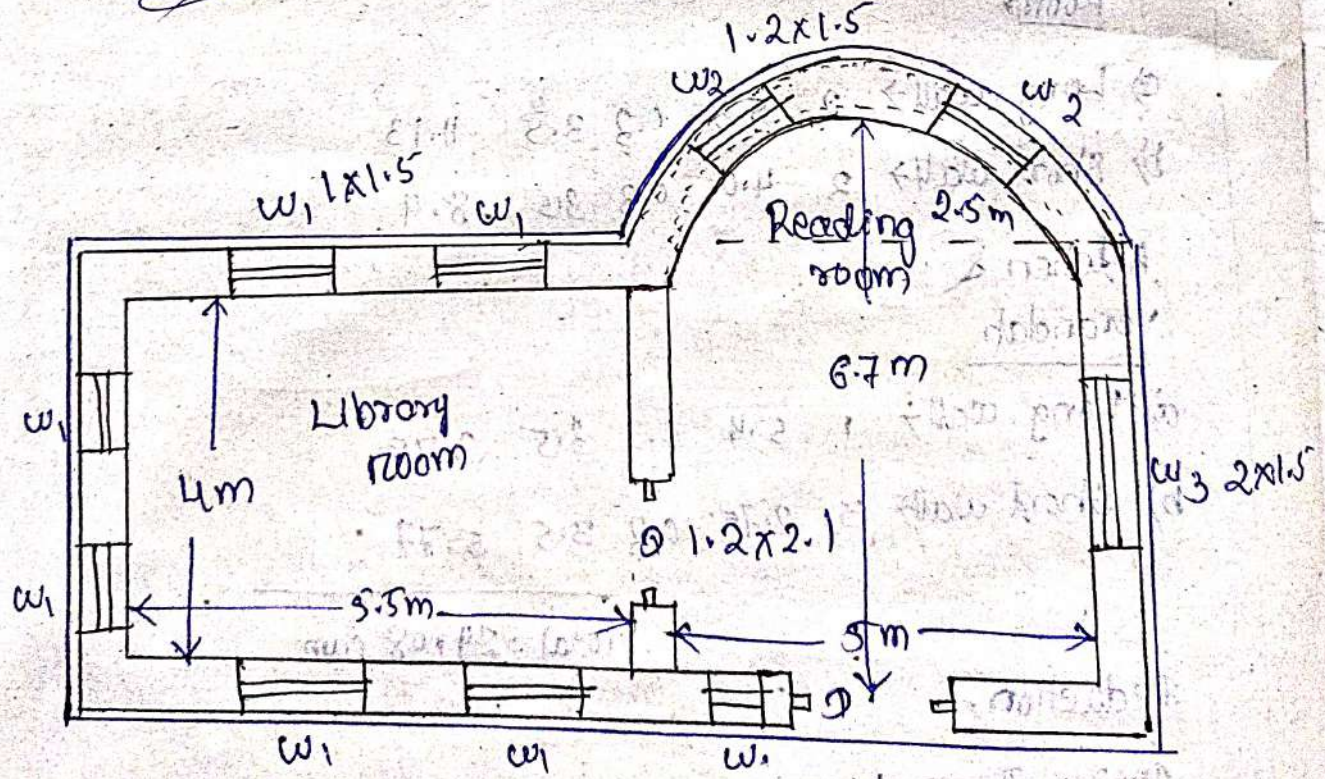
Kitchen & Varanda						
a) Long wall →	1	5.7	0.3		1.71	L = 5.4 + 0.3 = 5.7
b) Short wall →	3	2.4	0.3		2.16	L = 2.75 − 0.2 − 0.15 = 2.4
					Total = 11.31 sqm	
Deduction						
Door D	1	1	0.4		0.4	
Door D1	1	0.9	0.3		0.27	
opening verandah	2	2.5	0.3		1.5	
					Total = 2.17 sqm	
					Net Total = 11.31 − 2.17 = 9.14 sqm	
5 Brick work in superstructure						
Rooms						
a) Long wall →	2	5.3	0.2	3.5	11.13	
b) Short wall →	2	4.0	0.3	3.5	8.4	
Kitchen & verandah						
a) Long wall →	1	5.4	0.2	3.5	3.78	
b) Short wall →	3	2.75	0.2	3.5	5.77	
					Total = 29.08 cum	
Deduction,						
Door, D	1	1	0.3	2.1	0.63	
Door, D1	1	0.9	0.2	2.1	0.37	

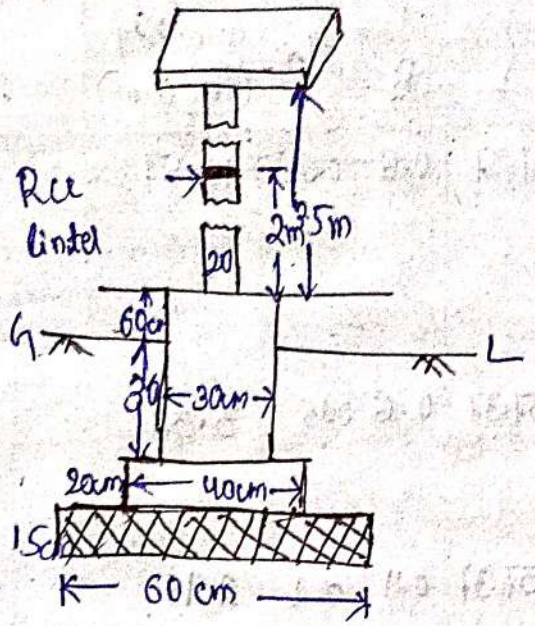
Window, W	4	1	0.3	1.2	1.44	
Window, W_1	1	1	0.2	1.2	0.24	
Opening Verandah	2	2.5	0.2	3.5	3.5	
Lintel over Door, D	1	1.3	0.3	0.15	0.05	L = 1 + 0.3 = 1.3
Lintel over Door, D_1	1	1.1	0.2	0.15	0.03	L = 0.9 + 0.2 = 1.1
Lintel over window, W	4	1.3	0.3	0.15	0.23	L = 1 + 0.3 = 1.3
Lintel over window, W_1	1	1.3	0.2	0.15	0.04	L = 1 + 0.3 = 1.3

Total = 6.53 cum

Net total = 29.08 − 6.53 = 22.55 cum

4)





$$\left[\begin{array}{l} D = 1.2 \times 2.1 \\ w_1 = 1 \times 1.5 \\ w_2 = 1.2 \times 1.5 \\ w_3 = 2 \times 1.5 \end{array}\right]$$

$rm = r + \frac{t}{2} = 2.5 + \frac{0.2}{2} = 2.5 + 0.1 = 2.6$

$lm = \pi * rm = \frac{22}{7} \times 2.6 = 8.17m$

Total centre line length = $(4.2 \times 3) + (5.7 \times 2) + 5.2 + 8.17 + 0.2$

$= 12.6 + 11.4 + 5.2 + 8.17 + 0.2$

$= 37.57m$

So net centre line length = $37.57 - (2 \times 0.5 \times 0.2)$

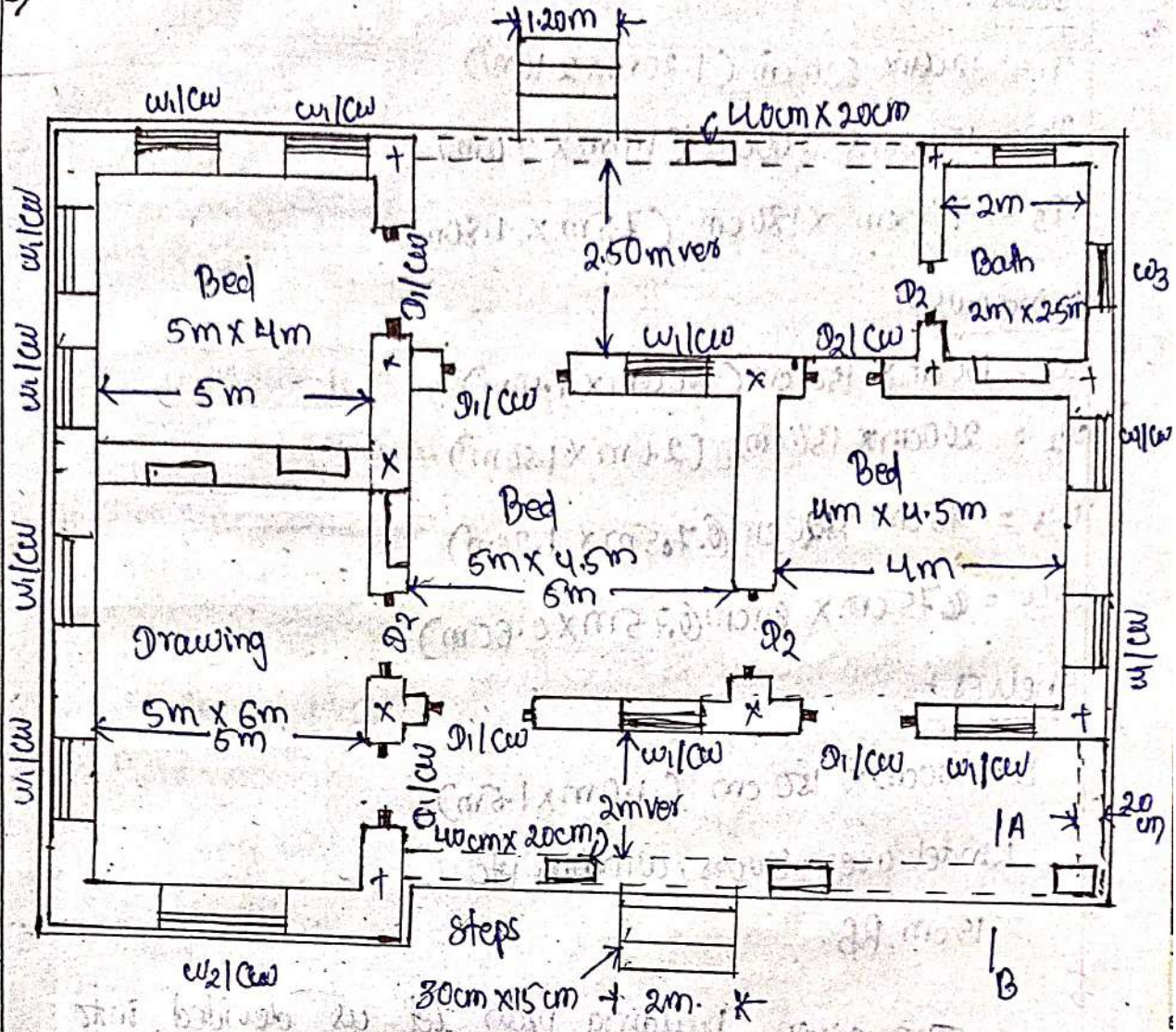
$= 37.57 - 0.2$

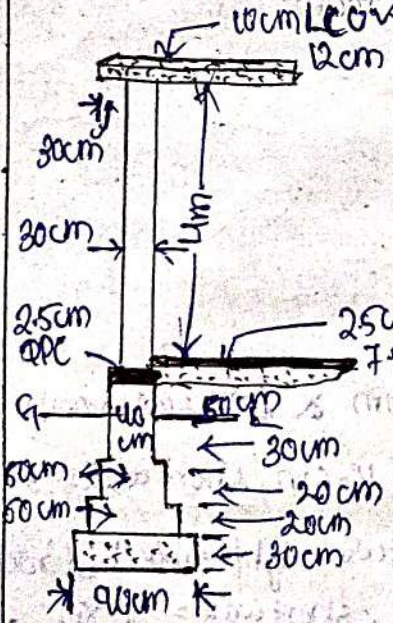
$= 37.37$ [As two 'T' junctions]

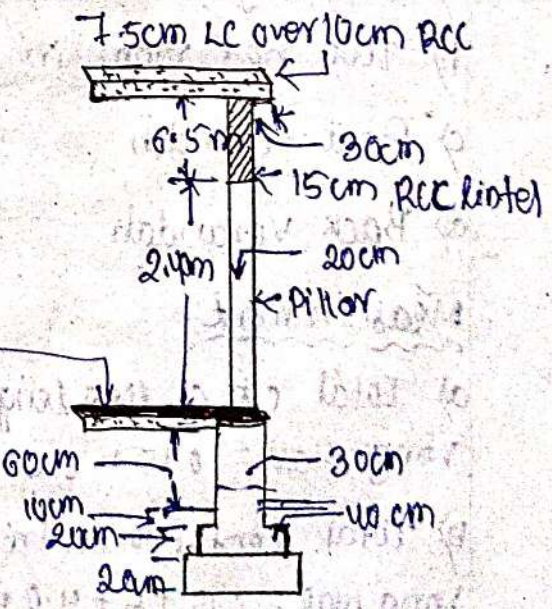
Sl No	Particulars	N	L	B	H/D	Quantity (in cum)	Notes
1	Earth work in excavation in foundation	1	37.37	0.6	0.65	14.57	
2	Concrete in foundation	1	37.37	0.6	0.15	3.36	
3	Brick work in foundation	1	37.37	0.4	0.2	2.98	
4	Plinth	1	37.37	0.3	0.9	10.08	
5	Brick work in super structure	1	37.37	0.2	3.5	26.15	
	Deduction →						
	Door (D)	2	1.2	0.2	2.1	1.1	
	window (w_1)	7	1.0	0.2	1.5	2.1	
	window (w_2)	2	1.2	0.2	1.5	0.72	
	window (w_3)	1	2.0	0.2	1.5	0.6	
	Rcc lintel	1	37.37	0.2	0.15	1.12	
					Total =	5.64	

Net total = 26.15 - 5.64 = 20.51 cum

5)


1.20m
w1/cw
40cm x 20cm
2.50m ver
2m
Bath
2m x 2.5m
w3
D2
D1/cw
Bed
5m x 4m
5m
w1/cw
D2/cw
Bed
5m x 4.5m
6m
Bed
4m x 4.5m
4m
Drawing
5m x 6m
6m
D2
2m ver
40cm x 20cm
20 cm
1A
Steps
30cm x 15cm
2m.
w2/cw
B


10cm LC over
12cm RCC
30cm
30cm
4m
2.5cm
RPC
25cm CC over
7.5cm L.C FLOOR
50cm
30cm
20cm
20cm
30cm
9cm


7.5cm LC over 10cm RCC
6.5m
30cm
15cm RCC lintel
2.4m
20cm
Pillar
60cm
30cm
10cm
40 cm
2cm
2cm

Doors:-

D_1 = 120cm x 210 cm (1.20m x 2.10m)

D_2 = 100 cm x 200cm (1.0m x 2.0m)

D_3 = 75 cm x 180 cm (7.5m x 1.80m)

Windows:-

W_1 = 100cm x 150 cm (1.00m x 1.50m)

W_2 = 200cm x 150 cm (2.0m x 1.50m)

W_3 = 75cm x 120 cm (0.75m x 1.20m)

C.W = 75 cm x 60cm (0.75m x 0.60m)

Shelves :-

S = 100cm x 150 cm (1.0m x 1.5m)

Lintel over Doors, windows etc

15cm RB

The given building plan let us devided into four parts -

a) Drawing room and left hand side room

b) Two bed room in right hand side

c) Front verandah

d) Back verandah

Measurement

a) Total c.to.c Line length of drawing room & left side room -

Long wall = 0.15 + 6.0 + 0.3 + 4.0 + 0.15 = 10.6m, short wall = 5.3m

b) Total centre to centre Line length of two right side bed room -

Long wall = 0.15 + 5 + 4.0 + 0.3 + 0.15 = 9.6m, short wall = 4.8m

c) Total c to c line length of front verandah - LW = 9.65m, SW = 2.8

d) Total c to c " " " back " - LW = 9.6m, SW = 2.75m

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
1	Earth work in excavation in foundation						
	a) Drawing room and left hand side bed room :-						
	Long wall	2	11.5	0.9	1	20.70	L = 10.6 + 0.9 = 11.5
	Short wall	3	4.4	0.9	1	11.88	L = 5.3 - 0.9 = 4.4
	b) Two bed room in right side :-						
	Long wall	2	9.6	0.9	1	17.28	L = 9.6 - 0.45 + 0.45 = 9.6
	Short wall	2	3.9	0.9	1	7.02	L = 4.8 - 0.45 - 0.45 = 3.9
	c) Front verandah :-						
	Long wall	1	9.5	0.6	0.5	2.85	L = 9.65 + 0.3 - 0.45 = 9.5
	Short wall	1	2.0	0.6	0.5	0.45	L = 2.25 - = 2.0
	d) Back verandah :-						
	Long wall	1	9.5	0.6	0.5	2.85	L = 9.65 + 0.3 - 0.45 = 9.5
	Short wall	2	2.6	0.6	0.5	1.20	L = 2.75 - 0.3 - 0.45 = 2.6
						Total = 64.23 cum	
2	Lime concrete in foundation						
	a) Drawing room and left hand side bed room :-						
	Long wall	2	11.5	0.9	0.3	6.21	L = 10.6 + 0.9 = 11.5
	Short wall	3	4.4	0.9	0.3	3.56	L = 5.3 - 0.9 = 4.4
	b) Two bed room in right side :-						
	Long wall	2	9.6	0.9	0.3	5.18	L = 9.6 - 0.45 + 0.45 = 9.6
	Short wall	3	3.9	0.9	0.3	2.11	L = 4.8 - 0.45 - 0.45 = 3.9

Sl.No	Particulars	N	L	B	H/D	Quantity	Remarks
	c) Front verandah:-						
	Long wall	1	9.7	0.6	0.2	1.16	$L = 9.65 - \frac{0.5}{2} + \frac{0.6}{2} = 9.7$
	Short wall	1	1.7	0.6	0.2	0.20	$L = 2.25 - \frac{0.5}{2} - \frac{0.6}{2} = 1.7$
	d) Back verandah:-						
	Long wall	1	9.7	0.6	0.2	1.16	$L = 9.65 - \frac{0.5}{2} + \frac{0.6}{2} = 9.7$
	Short wall	2	2.2	0.6	0.2	0.53	$L = 2.75 - \frac{0.5}{2} - \frac{0.5}{2} = 2.2$
						Total = 20.11 cum	
3	First class Bw in foundation and plinth.						
	First Footing						
	a) Drawing room and left hand side room:-						
	Long wall	2	11.2	0.6	0.2	2.69	$L = 10.6 + 0.6 = 11.2$
	Short wall	3	4.7	0.6	0.2	1.69	$L = 5.3 - 0.6 = 4.7$
	b) Two room in right side:-						
	Long wall	2	9.6	0.6	0.2	2.30	$L = 9.6 - \frac{0.6}{2} + \frac{0.6}{2} = 9.6$
	Short wall	2	4.2	0.6	0.2	1.0	$L = 4.8 - \frac{0.6}{2} - \frac{0.6}{2} = 4.2$
	c) Front verandah:-						
	Long wall	1	9.65	0.4	0.2	0.76	$L = 9.65 - \frac{0.4}{2} + \frac{0.4}{2} = 9.65$
	Short wall	1	1.85	0.4	0.2	0.37	$L = 2.25 - \frac{0.4}{2} - \frac{0.4}{2} = 1.85$
	d) Back verandah:-						
	Long wall	1	9.65	0.4	0.2	0.76	$L = 9.65 - \frac{0.4}{2} + \frac{0.4}{2} = 9.65$
	Short wall	2	2.35	0.4	0.2	0.18	$L = 2.75 - \frac{0.4}{2} - \frac{0.4}{2} = 2.35$

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
	Second footing						
	a) Drawing room and left hand side room :-						
	Long wall	2	11.1	0.5	0.2	2.22	L = 10.6 + 0.5 = 11.1
	Short wall	3	4.8	0.5	0.2	1.44	L = 5.3 - 0.5 = 4.8
	b) Two room in right side :-						
	Long wall	2	9.6	0.5	0.2	1.92	$L = 9.6 - \frac{0.5}{2} + \frac{0.5}{2}$
	Short wall	2	4.3	0.5	0.2	0.86	$L = 4.8 - \frac{0.5}{2} - \frac{0.5}{2}$
	c) Front verandah :-						
	Long wall	1	9.6	0.4	0.2	0.76	$L = 9.85 - \frac{0.4}{2} + \frac{0.3}{2}$
	Short wall	1	1.85	0.4	0.2	0.14	$L = 2.25 - \frac{0.4}{2} - \frac{0.3}{2}$
	d) Back verandah :-						
	Long wall	1	9.6	0.4	0.2	0.76	$L = 9.65 - \frac{0.4}{2} + \frac{0.3}{2}$
	Short wall	2	1.9	0.4	0.2	0.36	$L = 2.75 - \frac{0.4}{2} - \frac{0.3}{2}$
	Plinth wall above footing						
	a) Drawing and left hand side room :-						
	Long wall	2	11	0.4	0.9	7.9	L = 10.6 + 0.4 = 11
	Short wall	3	4.9	0.4	0.9	12.58	L = 5.3 - 0.4 = 4.9
	b) Two room in right side :-						
	Long wall	2	9.6	0.4	0.9	6.91	$L = 9.6 + \frac{0.4}{2} - \frac{0.4}{2}$
	Short wall	2	4.4	0.4	0.9	3.16	$L = 4.8 - \frac{0.4}{2} - \frac{0.4}{2}$
	c) Front verandah :-						
	Long wall	1	9.6	0.3	0.7	2.01	$L = 9.65 - \frac{0.4}{2} + \frac{0.3}{2}$
	Short wall	1	1.9	0.3	0.7	0.39	$L = 2.25 - \frac{0.4}{2} - \frac{0.3}{2}$

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
	a) Back verandah :-						
	Long wall	1	9.6	0.3	0.7	2.01	$L = 9.65 - \frac{0.4}{2} + \frac{0.3}{2}$
	Short wall	2	2.4	0.3	0.7	1.00	$L = 2.75 - \frac{0.4}{2} - \frac{0.3}{2}$
						Total = 44.96 cum	
4	2.5 cm DPC						
	a) Drawing room & Left hand side bed room :-						
	Long wall	2	11	0.4	2.5	8.80	$L = 10.6 + 0.4 = 11$
	Short wall	3	4.9	0.4	2.5	5.88	$L = 5.3 - 0.4 = 4.9$
	b) Bed room inner side :-						
	Long wall	2	9.6	0.4	2.5	7.68	$L = 9.6 - \frac{0.4}{2} + \frac{0.4}{2}$
	Short wall	2	4.4	0.4	2.5	3.52	$L = 4.8 - \frac{0.4}{2} - \frac{0.4}{2}$
	c) Verandah both front and back :-						
	Pillars -	4	0.5	0.3	2.5	0.60	$L = 0.4 + 0.1 = 0.5$
	d) Both room :-	1	2.5	0.3	2.5	0.75	$L = 2.20 + 0.15 + 0.15 = 2.5$
	e) Side and inner wall	2	2.4	0.3	2.5	1.44	
						Total = 28.76 sqm	
	Deduction						
	Door skill, D_1	6	1.20	0.4		2.88	
	Door skill, D_2	2	1.0	0.4		0.88	
	Door skill, D_3	1	0.75	0.3		0.23	
						Total = 3.91 sqm	
						Net total = 28.76 - 3.91 = 24.76 sqm	

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
5	First class Bw in superstructure in lime mortar-						
	⇒ Drawing and left bed room :-						
	Long wall	2	10.9	0.3	4.0	26.16	L = 10.6 + 0.3 = 10.9
	Short wall	3	5	0.3	4.0	18.0	L = 5.3 - 0.3 = 5
	⇒ Bed room in right side :-						
	Long wall	2	9.6	0.3	4.0	23.4	$L = 9.6 - \frac{0.2}{2} + \frac{0.3}{2}$
	Short wall	2	4.5	0.3	4.0	10.8	$L = 4.8 - \frac{0.3}{2} - \frac{0.2}{2}$
	⇒ Front verandah :-						
	Front wall solid	1	9.6	0.2	3.05	5.86	
	Side wall solid	1	2.0	0.2	3.05	1.22	
	⇒ Back verandah :-						
	Back Long wall solid		9.6	0.2	3.05	5.86	
	Side interwall & B both		2.50	0.2	3.05	3.05	
						Total = 93.99 cum	
	Deduction						
	Door opening :-						
	Door opening D_1	6	1.2	0.3	2.1	4.54	
	Door opening D_2	2	1.0	0.3	2.0	1.20	
	Door opening D_3	1	0.75	0.2	1.80	0.27	
	Widow opening :-						
	window opening w_1	11	1.20	0.3	1.50	4.95	
	window opening w_2	1	2.0	0.3	1.5	0.90	
	window opening w_3	2	0.75	0.2	1.2	0.36	

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
	Clestory window:-						
	Clestory window opening	18	0.75	0.3	0.6	2.43	
	Shelves opening	5	1.0	0.2	1.5	1.50	
	⇒ Front verandah opening in betn pillars	1	8.4	0.2	2.40	4.03	L = 9.6 - 3x0.4 = 8.4
	⇒ Front verandah opening side	1	2	0.2	2.4	0.96	
	⇒ Back verandah opening	1	6.8	0.2	2.4	3.26	L = 9.6 - 2x0.4 = 6.8
	Lintel over doors:-						
	D_1	6	1.5	0.3	0.15	0.405	
	D_2	2	1.3	0.3	0.15	0.117	
	D_3	1	0.95	0.2	0.15	0.029	
	Lintel over window:-						
	W_1	11	1.3	0.3	0.15	0.644	
	W_2	1	2.3	0.3	0.15	0.103	
	over CW CW_3	2	0.95	0.2	0.15	0.057	
	Lintel over shelves	18	0.95	0.3	0.15	0.770	
	Lintel over verandah:-						
	Front verandah	5	1.3	0.3	0.15	0.293	
		1	9.75	0.2	0.15	0.293	L = 9.6 + 0.15
	Back verandah	1	2.15	0.2	0.15	0.065	L = 2 + 0.15
	Side verandah	1	7.5	0.2	0.15	0.225	L = 9.6 - 2.40 + 2x0.15
						Total = 27.40 cum	

Net total = 93.99 - 27.40 = 66.59 cum

The given plan is devided into two parts

1) Rooms

2) Verandah

1) Room

Total c to c length of long wall = 0.15 + 3.5 + 0.3 + 4 + 0.15 = 8.1m

Total c to c length of short wall = 0.15 + 4 + 0.15 = 4.3m

2) Verandah

Total c to c length of Long wall = 8.1 + 0.5 + 0.5 = 8.2m

Total c to c length of short wall = 2.5 + 0.15 + 0.1 = 2.75m

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
01	Earth work in excavation in foundation						
	i) Room						
	a) Long wall	2	9.0	0.9	0.9	14.58	L = 8.1 + 0.45 + 0.45 = 9.0
	b) short wall	3	3.4	0.9	0.9	8.26	L = 4.3 - 0.45 - 0.45 = 3.4
	ii) Verandah						
	a) Long wall	1	8.9	0.7	0.9	5.61	L = 8.2 + 0.7 = 8.9
	b) short wall	2	1.95	0.7	0.9	2.46	L = 2.75 - 0.9/2 - 0.7/2 = 1.95
	Front stair	1	2.9	1	0.15	0.43	L = 2.7 + 0.2 = 2.9
					Total =	31.34 cum	
02	Earth work in filling						
	Room - 1	1	3.4	3.4	0.54	6.24	
	Room - 2	1	3.9	3.9	0.54	8.21	
	Verandah	1	7.9	2.4	0.54	10.23	
					Total =	25.61 cum	
03	Concrete in foundation						
	i) Room						
	a) Long wall	2	9.0	0.9	0.3	4.56	L = 8.1 + 0.45 + 0.45 = 9.0
	b) short wall	3	3.4	0.9	0.3	2.75	L = 4.3 - 0.45 - 0.45 = 3.4
	ii) Verandah						
	a) Long wall	1	8.9	0.7	0.3	1.87	
	b) short wall	2	1.95	0.7	0.3	0.82	
	steps	1	2.9	1	0.15	0.44	
					Total =	10.74 cum	

Sl No	Particulars	N	L	B	H/D	quantity	Remarks
4	BW in foundation & Plinth						
	ROOM →						
	a) Long wall						
	1st footing	2	8.8	0.7	0.2	2.46	L = 8.1+0.7 = 8.8
	2nd footing	2	8.7	0.6	0.1	1.04	L = 8.1+0.6 = 8.7
	3rd footing	2	8.6	0.5	0.1	0.86	L = 8.1+0.5 = 8.6
	Plinth	2	8.5	0.4	0.8	5.44	L = 8.1+0.4 = 8.5
	b) Short wall						
	1st footing	3	3.6	0.7	0.2	1.51	L = 4.3 - 0.7 = 3.6
	2nd footing	3	3.7	0.6	0.1	0.67	L = 4.3 - 0.6 = 3.7
	3rd footing	3	3.8	0.5	0.1	0.57	L = 4.3 - 0.5 = 3.8
	Plinth	3	3.9	0.4	0.8	3.74	L = 4.3 - 0.4 = 3.9
	VERANDAH →						
	a) Long wall						
	1st footing	1	8.7	0.5	0.2	0.87	L = 8.2+0.5 = 8.7
	2nd footing	1	8.6	0.4	0.1	0.34	L = 8.2+0.4 = 8.6
	Plinth	1	8.5	0.3	0.9	2.30	L = 8.2+0.3 = 8.5
	b) Short wall						
	1st footing	2	2.15	0.5	0.2	0.43	$L = 2.75 - \frac{0.5}{2} - \frac{0.7}{2} = 2.15$
	2nd footing	2	2.25	0.4	0.1	0.18	$L = 2.75 - \frac{0.4}{2} - \frac{0.6}{2} = 2.25$
	Plinth wall 10cm above footing	2	2.35	0.3	0.1	0.14	$L = 2.75 - \frac{0.3}{2} - \frac{0.5}{2} = 2.35$
	Plinth wall remaining Projection	2	2.4	0.3	0.8	1.15	$L = 2.75 - \frac{0.3}{2} - \frac{0.4}{2} = 2.4$
	Steps →						
	1st step	1	2.7	0.9	0.15	0.36	
	2nd step	1	2.1	0.6	0.15	0.19	
	3rd step	1	1.5	0.3	0.15	0.07	
					Total =	22.33	cum
5	DPC (2.5 cm)						
	ROOM →						
	Long wall	2	8.5	0.4		6.8	
	Short wall	3	3.9	0.4		4.68	
					Total =	11.48	sqm
	Deduction :-						
	Doors	2	1.2	0.4		0.96	
					Total =	0.96	

Net total = DPC − Deduction

= 11.48 − 0.96

= 10.52 sqm

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
6	1st class BW in super structure						
	ROOMS →						
	Long wall	2	8.4	0.3	4.0	20.16	L = 8.1 + 0.3 = 8.4
	Short wall	3	4.0	0.3	4.0	14.4	L = 4.3 - 0.3 = 4.0
	Verandah above lintel (over pillar)						
	Long wall	1	8.4	0.2	0.3	0.504	L = 8.2 + 0.2 = 8.4
	Short wall	2	2.5	0.2	0.3	0.3	L = 2.75 - 0.2/2 - 0.2/2 = 2.5
	Parapet over rooms						
	Long wall	2	8.4	0.2	0.6	2.02	L = 8.4, H = 0.47 + 0.1 + 0.03 = 0.6
	Short wall	2	4.2	0.2	0.6	1.01	L = 4.3 + 0.3 - 0.2 - 0.2 = 4.2
	VERANDAH →						
	Long wall	1	8.4	0.2	0.4	0.67	H = 0.27 + 0.1 + 0.03 = 0.4
	Short wall	2	2.5	0.2	0.4	0.40	L = 2.75 - 0.3/2 - 0.2/2 = 2.5
					Total=	39.46	cum
	Deduction →						
	Door opening	2	1.2	0.3	2.1	1.51	
	Window opening	10	1	0.3	1.5	4.50	
	CS window opening	12	1	0.3	0.5	1.80	
	Shelves opening	2	1	0.2	1.5	0.60	Back of self 10 cm
	RB Lintel over						
	Door	2	1.4	0.3	0.1	0.08	10 cm bearing
	Window	10	1.2	0.3	0.1	0.36	
	CS window	12	1.2	0.3	0.1	0.43	
	Shelves	2	1.2	0.3	0.1	0.07	
					Total=	9.36	cum
					Net total=	39.46 - 9.36	
					⇒ Net total	= 30.10	cum
7	RB work in Lintel excluding steel and its bending but including centring & shuttering and bending steel						
	Over doors, windows, shelves also same as for item no-6 marked as 'a'					0.895	
	over verandah pillar						
	Long wall	1	8.4	0.2	0.3	0.50	
	Short wall	2	2.8	0.2	0.3	0.34	
					Total=	1.79	cum

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
8	RCC work in verandah column excluding steel and its bending but including form work and binding steel complete					0.19	
					Total = 0.19 cum		
9	RCC work excluding steel and it's bending but including centering and shuttering and bending fair finished.						
	Roof slab of rooms	1	8.64	4.84	0.12	5.018	12 cm projection .10 cm bending excluding chajja
	Roof slab of verandah	1	8.4	2.8	0.1	2.352	
	Chajja projection						
	Verandah front	1	9.3	0.45	0.08	0.335	L = 8.4 + 0.45 + 0.45 = 9.3
	Verandah side	2	2.7	0.45	0.08	0.194	Avg thickness
	window						
	Top	4	2.5	0.45	0.05	0.225	
	Bottom	4	2.5	0.15	0.05	0.075	Sem insertion
	Sides	8	1.5	0.325	0.05	0.195	
	Shelf slab	6	1.1	0.2	0.05	0.066	
					Total = 8.460	cum	
10	Mild steel bar including bending reinforcement 1% of RB and RCC work					8.19	1% of total of items 7.8 & 9
			10.44	$(\frac{1}{100})$	X	8.19 / 78.5	= 8.192
					Total = 8.192		
11	10 cm lime concrete in roof terracing complete with surface finishing						
	Rooms	1	8	4.2		33.6	clear roof are in between
	Verandah	1	8	2.5		20	Parapet
					Total =	53.6	sqm

Sl No	Particulars	N.	L	B	D/D	Quantity	Remarks
12	3cm thick insulation layer of sand & clay						
	Rooms	1	8	4.2		33.6	
	Verandah	1	8	2.5		20	
					Total=	53.6	sqm
13	Sal wood work in chowkhat wrought framed & fixed						
	Doors (3cm insertion into floor)	2	5.46	0.12	0.08	0.105	L= 2x2.1+1.2 =5.46
	Windows	10	5	0.1	0.08	0.400	L=2x1.5+2x1 = 5
	CS windows	12	3	0.08	0.08	0.230	L= 2x0.5 + 2x1 = 3
					Total=	0.735	cum
14	4-cm thick Indian teek wood glazed ~~shutter including fitting~~ parallel doors and window shutters including fitting						
	Doors	2	1.07		2.035	4.355	
	windows	10	0.87		1.37	11.919	
					Total=	16.274	sqm
15	4 cm thick Indian teek wood glazed shutter including fitting						
	CS window	12	0.87		0.37	3.863	
					Total=	3.863	sqm
16	Iron work (milled steel) in hold fasts and window gratings						
	Hold fast in doors	2x6				12 nos	
	Hold fast in windows	10x4				40 nos	
	Hold fast in CS windows	12x2				24 nos	
					Total=	76 kg	
	Window bars 10mm diameter @ 1.58 kg/m						
	windows	10x8	1.5			120	vertical bars at 10 cm c/c
	CS windows	12x2	1			24	2 Horizontal bars
					Total=	144m	
					@ 1.58 kg/m		
					Total =	227.52 kg	
					Net total = 227.52 + 76 = 303.52 kg = 3.035Q		

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
17	12mm thick plastering in walls (1:1:16) cement sand lime mortar						
	INSIDE →						
	ROOMS						
	Room-i	2	3.5		4	28	
	~~Room-i~~	2	4		4	32	
	Room - ii	4	4		4	64	
	Verandah inner wall	1	8.4		3	25.2	
	Verandah front above column innerface	1	8		0.6	4.8	
	Verandah sides above column innerface	2	2.5		0.6	3	
	Jambs, sills, soffits of shelves	2	5	0.2		2	L = 2×1 + 2×1.5 = 5
	soffits of verandah lintel →						
	Front	1	8.4	0.2		1.68	
	Sides	2	2.5	0.2		1	
					Total =	161.68	sqm
	Deduction →						
	Opening door and window in between rooms and verandah						
	Door opening	2	1.2		2.1	5.04	
	window opening	2	1		1.5	3	
					Total =	8.04	sqm
					Net total =	161.68 - 8.04 = 153.64	sqm
	OUT SIDE →						
	ROOMS -						
	Back plinth including 10 cm GL	1	8.5		0.72	6.12	L = 8.4 + 0.05 + 0.05 = 8.5
	Back superstructure ~~inside plinth including 10 cm below GL~~	1	8.4		4	33.6	
	side plinth including 10cm below GL	2	4.65		0.72	6.70	
	Side superstructure	2	4.6		4	36.80	
	VERANDAH -						
	Above columns front outer face	1	8.4		0.6	5.04	
	Above columns side outer face	2	2.7		0.6	3.24	
	Plinth front including 10cm below GL	1	8.5		0.72	6.12	

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
	Plinth sides including 10cm below GL	2	2.75		0.72	3.96	
	Wall above verandah roof	1	8.4		0.77	6.47	H = 4 - 3.23 = 0.77
	Parapet →						
	ROOM						
	Long wall outer face	2	8.4		0.6	10.08	
	Long wall inner face	2	8		0.47	7.52	L = 8.4 - 2x0.2 = 8
	Long wall top face	2	8.4	0.2		3.36	
	Short wall outer face	2	4.6		0.6	5.52	
	Short wall inner face	2	4.2		0.47	3.95	
	Short wall top face	2	4.2	0.2		1.68	
	VERANDAH						
	Front wall outer face	1	8.4		0.4	3.36	
	Front wall inner face	1	8		0.27	2.16	
	Front wall top face	1	8.4	0.2		1.68	
	Side wall outer face	2	2.7		0.4	2.16	
	Side wall inner face	2	2.5		0.27	1.35	
	Side wall top face	2	2.5	0.2		1	
					Total =	151.86	sqm
	Deduction						
	window opening	8	1		1.5	12	
	CS window opening	12	1		0.5	6	
	Steps from plinth wall	1	27		0.7	1.89	
	Ends of verandah side wall and lintel above column level	2		0.2	0.6	0.24	
	Ends of verandah parapet wall from wall above verandah roof level	2		0.2	0.27	0.11	
					Total =	20.24	sqm
					Net total =	151.86 - 20.24 = 131.62	sqm
					Grand total inside & out side plastering =		
					=	153.64 + 131.62	
					=	285.26 sqm	

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
18	20 mm thick plaster 1:3 in step finished cement						
	1st riser	1	4.5		0.15	0.68	L = 2.7+0.9+0.9 = 4.5
	2nd risers	1	3.3		0.15	0.50	L = 2.1+0.6+0.6 = 3.3
	3rd risers	1	2.1		0.15	0.32	L = 1.5+0.3+0.3 = 2.1
	1st step tread	1	3.9		0.3	1.17	L = 2.7−0.3+0.9+0.9−0.3
	2nd step tread	1	2.7		0.3	0.81	L = 2.1−0.3+0.6+0.6−0.3
	3rd step tread	01	1.5		0.3	0.45	
	Plinth wall above 1st step	2	0.3		0.45	0.27	
	Plinth wall above 2nd step	2	0.3		0.3	0.18	
	Plinth wall above 3rd step	1	1.5		0.15	0.23	
				Total =		4.59 sqm	
19	2.5 cm thick cc 1:2:4 over and including 8 cm lime concrete floor						
	Room-1	1	4	3.5		14	
	Room-2	1	4	4		16	
	Verandah	1	8	2.5		20	
				Total =		50 sqm	
20	2.5 cm thick c c 1:2:4 floor in sills						
	Door sills	2	1.2			0.72	
	Sills over verandah opening front	1	8.5			2.13	
	Sills over verandah opening sides	2	2.5			1.25	
					Total =	4.10 sqm	
	Deduct pillars	4	$\frac{3.14}{4}$		x 0.15 x 0.15 =	0.07	
					Total =	0.07 sqm	
				Net total =	4.10 − 0.07 =	4.03 sqm	

Sl No	Particulars	N	L	B	H/D	quantity	Remarks
21	White washing 3 coats inside						
		Same as item no -17 = 153.64					
	walls						
	Celling of room-1	1	4	3.5		14	
	Celling of room-2	1	4	4		16	
	Celling of verandah	1	8	2.5		20	
					Total=	203.64 sqm	
22	Colour washing 2-coat over one coat white washing out side						
	wall	Same as for out side wall plastering item no-17				131.62	
	Chajja ver. front	1	9.3	0.96		8.93	B = 0.45 + 0.45 + 0.6 = 0.91
	Chajja ver side	2	2.7	0.96		5.18	
	Sunshade and sun breakers in windows						
	Top	4	2.5	0.95		9.50	B = 0.45 + 0.45 + 0.05
	Bottom	4	2.5	0.25		2.50	B = 0.1 + 0.1 + 0.05
	Side	16	1.5	0.325		7.80	
	Edges of sides	8	1.5	0.05		0.6	
	outer projection of roof slab	1	26	0.36		9.36	L = 8.4 + 8.4 + 4.6 + 4.6 B = 0.12 + 0.12 + 0.12
	Pillars	4	3.14 x 0.45	2.4		4.52	circumference of circle
					Total=	180.01	sqm
	Deduction -						
	Projection below GL	1	29.1		0.1	2.91	L = 2(8.5 + 7.4) = 29.1
					Total=	2.91 sqm	
				Net total = 180.01 - 2.91 = 177.10 sqm			
23	Painting doors and window 2 coats over one coats of priming						
	Doors panelled	2(1+½) x 2	1.2		2.1	11.34	2(1/4) = 9/4 time one surface for both side
	window Panelled	2(1/4) x 10	1		1.5	33.75	
	CS window	1x12	1		0.5	1.13	
	window Bars	10	0.84		1.34	11.26	
	CS window Bars	12	0.84		0.34	3.43	
					Total=	60.90	sqm

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
24	Solignum painting 2 coats in back of chowkhat.						
	Doors	2	5.46	0.12		1.31	
	windows	10	5	0.1		5.00	
	CS windows	12	3	0.08		2.88	
					Total	9.19 Sqm	
25	CI pipe 10cm diameter (Rain water pout complete with painting	4	1			4	
					Total =	4m	

ABSTRACT OF ESTIMATED CAST

Item No	Particulars	Quantity	Unit	Rate	Per	Amount
1	Earth work in excavation in foundation	31.34	cum	350	% cum	109.69
2	Earth work in filling	25.61	cum	275	% cum	70.42
3	Concrete in foundation	10.74	cum	220	per cum	2362.8
4	BW in foundation and plinth	22.33	cum	320	per cum	7145.6
5	DPC	10.52	sqm	18	per sqm	189.36
6	1st class BW in superstructure	30.10	cum	320	per cum	9632
7	RB work in lintels excluding steel and its bending but including centering and shutering and binding steel	1.79	cum	520	per cum	930.8
8	RCC work in verandah column excluding steel and its bending but including form work and binding steel complete fair finished	0.19	cum	590	Per cum	112.1
9	RCC work excluding steel and its bending but including centering and shutering and binding steel fair finished	8.460	cum	775	per cum	6556.5
10	Mild steel bars including bending in reinforcement @ 1% of RB and RCC works	8.19	Q.2	515	per Q	4217.85
11	10 cm lime concrete in roof terracing complete with surface finishing	53.6	Sqm	12	per Sqm	643.2

Item No	Particulars	Quantity	Unit	Rate (Rs)	Per	Amount
12	3cm thick insulation layer of sand clay	53.6	sqm	1.5	Per sqm	80.4
13	Sal wood work in chowkhat wrought framed and fixed	0.735	cum	4700	Per cum	3454.5
14	4cm thick Indian teek wood panelled door and window shutters including fittings	16.274	sqm	225	Per sqm	3661.65
15	4cm thick Indian teek wood glazed shutters including fittings	3.863	sqm	200	Per sqm	772.6
16	Iron work (mild steel) in hold fasts and window gratings	3.035	Q	700	Per Q	2124.5
17	12 cm thick plastering in walls 1:1:6 cement sand lime mortar	285.26	sqm	2.9	Per sqm	827.25
18	20 mm thick plaster 1:3 in step finished cement	4.59	sqm	16	Per sqm	73.44
19	2.5 cm thick CC 1:2:4 over and including 8cm Lime concrete floor	50	sqm	18.65	Per sqm	932.5
20	2.5 cm thick CC 1:2:4 floor in sills	4.03	sqm	18	Per sqm	72.54
21	White washing 3 coats inside	203.64	sqm	0.75	Per sqm	152.73
22	Colour washing 2 coats over the coat of white washing outside	177.10	sqm	0.82	Per sqm	145.22
23	Painting doors and window 2 coats of over one coat of priming	60.90	sqm	10.4	Per sqm	633.36
24	Solignum painting 2 coat in back of chowkhat	9.19	sqm	3.5	Per sqm	32.185
25	CI pipe 10cm diameter (rain water spout) complete with painting	4	m	27	per m	108
					Total =	45041.175

Add 3% for contingencies = $\frac{45041.175}{100} \times 3$

$= 450.41 \times 3$

$= 1351.23$

Add 2% for work charged establishment = $\frac{45041.175}{100} \times 2$

$= 450.41 \times 2$

$= 900.82$

Grand total = $45041.175 + 1351.23 + 900.82 = 47293.225$

Lead and lift :-

Normaly earth work is estimated for 50m lead for distance 1.5 m lift for height or depth and this distance of 50mm and height of 1.5m are known as normal lead and lift. The lead and lift will be different for every unit of 50mm lead and for every unit of 1.5 m lift.

Lead :-

It is the distance ~~for~~ from the material transport to the build up area.

Lift :-

It is the distance from pt to construction.

Royalty	Materials
cement	Manufactured
Sand	Natural
clip	Natural
Bricks	Manufactured
Metal	Natural
Rod	Manufactured
Lime	Manufactured
Wood	Natural

E.g :- If $1m^3$ sand rate is- 200 than ₹ 40. is royalty charged royalty is a free collected by government on natural resourcess.

The rate of particular items of work depends upon the following :-

i) Specification of work and materials, equality of materials properstion of mortar method of constructional operation etc.

ii) Quantity of materials and their rates, no-of different types of labour and their rates.

iii) Location of site of work and it's distances from the sources of materials and the rate of transport availability of water.

iv) Profit and miscellaneous and over head expenses of contractor.

Over load cords:-

It included general office expenses rent, finance, supervision and other cords which are indired expences and not productive expencess on the job.

The miscellaneous -expencess may be under the following load site-

A) General overheads:-

i) Establishment (office staff)
ii) Stationary, printing, postages etc.
iii) Travelling expencess
iv) Rent and taxes

B) Job overhead:-

i) Superversion (Salary of Engineers, ovarseers, superversion etc)
ii) Handling of materials.
iii) Repaing, carrialge and development of T&P & ①.
iv) Ammeriats of labour.
v) Workmans co-operation insurances etc.
vi) ~~Inte~~ Intrest on inversstment
vii) Losses on advances.

T&P:-

For big work or project a % are of 1% to 1½% of the estimated cost is provided in the estimate for the % of T&P which will be required for the execution of the work.

Centage ~~or~~ charges or developmental charges:-

With the Engineering department takes of the work of other department a % are of 10% to 15% of the estimated cost is charged to mast the expencess of percentage charg. is known as centage charges.

Electrification similarly and water supply work:-

⇒ For sanitory and water supply work → 8% of the estimate cost building
⇒ For electrification → 8% of the estimate cost building
⇒ For electrification → " " " " " "

⇒ To the attention of his AE in charge for any irregularity of contract, specification of storage departmental materials or any other difficulties misbehaviour for efficient execution tirually completion of the work.

⇒ Outline the duties and responsibility for maintanence of stock and store when you are assigned with the charged. The JE entiveccy responsible for all stock and store in his charge. He is to maintan the accurate of stone and tools plant correctly upto date.

He has to submit all returns of stock and stored to the authorised. He looks after the materials and articles are properties stocked and stored in such a way that time is no possibility of any damage or loss. He is maintan the proper and equal securities of the store and stock. There should be varification according to the rate of regular interval and take neccesary action and all storage and supply of the stored detected as a result of check. Any twist or detected should be reported to the AE or EE for guidance and to police ctic. He is to enscore that there is no dangerious in the floor and there is no leackage in the roof of the store or godown.

Duties and responsibility of assistant Engineer :-

Each division is devided into numbers of sub division, each under charges of SDO or AE. AE is are directly incharges work facing under their charges and have to execute supervisor the manager, the work and have to maintan the quality and progress of work. There may be more AE in a subdivision, if the work is heavey. who are directly responsible to the execulation execution engineer with respect to the work. The SDO has the power of disbursement (payment) and has to maintan mitial accurate and has to submit accurate monthly to the DO. The work load of SDO or AE is 10 to 15 lakh. Before preparing a bill the JE must satisfy himself,

that the work has accurately been execute in accordances with the detailed measurement recorded and personally inspant all works of any magnitude before recomending final payment. The AE take measurement of the all important works and we must satisfy himself about the correctness of all the measurement recorded.

Duty and responsibility of a Jonior Engineer in respect of quality control :-

⇒ To surprise day to day progress of work under his control, to check up weather the materials, propesition of mix details of items workmainship etc ... are provided as per specification and drawishing for the work. The first shape of the responsibility for quality of works, lies on time.

⇒ To take detailed measurement of work during progress and enter the same in the measurement book and preparation of timelly bills for payment.

⇒ To maintain accounts to materials, tools and plant is sud for the work and to make timely recovery of the same from the bills ~~for payment~~ of the contractor. To maintain account of labours for coorkdone through muster ~~roll~~ roll.

Contingencies :-

It indicates incidental expences of miscellance characters which cant be classified under any direct item sub-head.

A certain are in the form of contigencess of 3% - 5% of estimated cost is provided for contigencies.

Workcharged Establishment :-

It is the establishment which is charged to work direct During the construction of a building a project, a certain no of work supervisors, chaudirass, mates, etc are required to be employed and ther salaries are paid from the am of work charged establishment for this a percent of 1½ to 2% of the ~~establish~~ estimated cost and is included.

Sundries :-

~~It is the establishment which is charged~~

It is the item of work which can't be measured but it is required in the work and site. A lumpsum amount is kept as provison to meet sundary expenditure, such as during work period anything unhappen things held.

E.g → Breaking of handle of any tools purchase of medicine for use of Labour etc.

Department :-

1) Water resources → Govt. organization
2) Minor irrigation → OPSC, S.S.C
3) Public work department → Housing boat org.
4) RWSS → PWD, Irr. dept, NIEPC, R&D
5) PHED (Public heaety Engineering Department) → Public sector org.
6) Rural work → Public sector org.
7) Permanent work and inspector → Group - II → Indian Oil
8) Inspector of work - Group - III → JINDAL, TATA, ONGC
9) OPWD → OPTCL, NALCO, SAIL
10) Block JE → HAL, ETC
11) Hindusthan cons. corp. →

Item	Particulars	N	L	B	H/D	Quantity	Remarks
01	GCI sheet roof in verandah						
	Front	1	$\frac{9.85+6.7}{2}$	3.37		27.80	Total = 49.62 sqm
	Side	1	$\frac{8.05+4.9}{2}$			21.82	
02	Sall wood work						
	Main rafter	7	3.47	0.1	0.15	0.36	
	Hip rafter	1	4.73	0.1	0.15	0.07	
	Tack rafter	2	2.85	0.1	0.15	0.08	
	Purlin front	4	$\frac{9.5+6.7}{2}$	0.05	0.15	0.52	Total = 1.37 cum
	Purlin side	4	$\frac{8.05+4.9}{2}$	0.05	0.08	0.10	
	Bressumer front	1	9.3	0.01	0.08	0.13	
	Bressumer side	1	7.5	0.1	0.15	0.11	
03	16mm diameter H.D boits from 40cm long	10			10		Total = 10 pic
04	GI - Ridge	01	4.08			4.08	Total = 4.08m
05	Painting two coats of wood work over one coat of						
	Main rafter	7	3.47	0.5		12.14	
	Hip rafter	1	4.73	0.5		2.36	
	Tack rafter	2	2.85	0.5		2.85	
	Purlin front	4	$\frac{9.5+6.7}{2}$	0.26		8.60	
	Purlin side	4	$\frac{8.05+4.9}{2}$	0.28		6.72	
	Bressumer front	1	9.3	0.5		4.65	
	Bressumer side	1	7.5	0.5		3.5	

Total = 40.82 sqm

ABSTRACT FORM

Item	Particulars	Quantity	Unit	Rate	Per	Amount
01	GCI sheet roof in verandah	49.62	sqm	24	sqm	1190.88
02	Sall wood work	1.37	cum	4700	cum	6439
03	16mm diameter boats from 40cm long	10	each	3	each	30
04	GI Ridge	4.08	m	13.85	m	55.08
05	Painting	40.82	sqm	10.4	sqm	424.52

Total = 8139.48

Total amount = 8139.48

Add 5% of contingencies and worked charged establishment = $\frac{8139.48}{100} \times 5 = 406.947$

= 407.

Grand total = 8,139.48 + 407

= 8546.48

Calculation of dry materials for different items of work.

1) Cement concrete:-

Sum - total quantity of determining the quantity of materials for 10cum concrete is to devided 15.2 by the sum of numerals of the proportion of the materials which gives the quantity of cement in cum.

Add 5% of handling and transportation charges (losses)

1) E.g:- Calculate the dry materials required for 10 cum cement concrete of ratio 1:4:8.

Sol^n

For 10cum cement concrete take 15.2 cum dry volume

Now,

Quantity of cement = $\frac{15.2}{1+4+8} = \frac{15.2}{13} = 1.17$ cum

1 bag cement = 50 kg = 0.034 cum

Number of bags of cement = $\frac{1.17}{0.034} = 34.41 = 35$ bags

Quantity of fine aggregate (sand) = 4 x 1.17 = 4.68 cu

Quantity of coarse aggregates = 8 x 1.17 = 9.36 cum

2) Ex:- Calculate the dry materials required for 10cum cement concrete of ratio 1:3:6.

soln

For 10 cum cement concrete take 15.2 cum dry volume

Now,

Quantity of cement = $\frac{15.2}{1+3+6} = \frac{15.2}{10} = 1.52$ cum

1 bag cement = 50 kg = 0.034 cum

No of bags of cement = $\frac{1.52}{0.034} = 44.70 = 45$ bags

Quantity of fine aggregates = $3 \times 1.52 = 4.56$ cum

Quantity of coarse aggregate = $6 \times 1.52 = 9.12$ cum

2) Brick work:-

a- Ex = Consider a wall 1(1/2) bricks thick 30 cm nominal thickness of 20m length and height is 5m.

soln

Nominal volume = $20 \times 5 \times 0.3 = 30$ cum

Here 1cm mortar joint is there so actual thickness is 29 cm

Hence actual volume = $20 \times 5 \times 0.29 = 29$ cum

Number of standard bricks of 20cm x 10cm x 10cm (nominal size)

$= \frac{29}{0.2 \times 0.1 \times 0.1} = 14500$ Nos

Therefore number of bricks required for per cum (nominal)

$= \frac{14500}{30} = 484$ nos

Considering 5% of breakages wastages etc, the numbers may be taken as 500 Nos. of bricks.

For 10cum BW no of bricks required = $500 \times 10 = 5000$ Nos

Mortar :-

Mortar requirement = Total vol. of BW − Net volume of BW

Mortar requirement = $29 - (0.19 \times 0.09 \times 0.09 \times 14500)$

$= 29 - 22.315$

$= 6.685$ cum

Now for frog filling, for use of cut bricks for for uniform joints, wastage, etc .. 15% extra mortar may be required.

∴ Volume of mortar will be = $1.15 \times 6.685 = 7.688$ cum

For dry volume increase more 25%.

∴ Dry volume of mortar will be = $1.25 \times 7.688 = 9.61$ cu

For 10 cum of BW, dry volume of mortar = $9.61 \times (10/30)$

$= 3.2$ cum

* In practice for BW in cement mortar we take ~~3cum~~ 3cum as dry volume mortar and for lime water mortar, we take 3.5 as dry volume of mortar.

E.g :- 1:3 so for 10 cum BW what is the quantity of cement and sand?

Soln

We know for 10 cum BW. of dry material for mortar is 3 cum.

Quantity of cement = $\frac{3}{1+3} = \frac{3}{4} = 0.75$ cum

No of bags of cement = $\frac{0.75}{0.034} = 22.19 = 23$ bags

Quantity of sand = $3 \times 0.75 = 2.25$ cum

BW with traditional bricks = $29.9 \times 11.4 \times 7.6$ (9" × 4.5"

As volume of almost same, therefore the same quantity of bricks and mortar will be used, as for standard bricks.

3) Plastering :-

Area x thickness gives the quantity of mortar for uniform thickness.

Add 30% of to fill the joints and to make up the uniform surface, This will gives the wet volume of mortar.

To get the total dry volume of mortar, the wet volume is further increased by 25%.

Materials for 12mm thick plastering in wall for 100sqm.

wet mortar for uniform layer = $0.012 \times 100 = 1.2$ cum

Add 30% = $1.3 \times 1.2 = 1.56$ cum

Increase it by 25% = $1.25 \times 1.56 = 1.95$ cum

So take 2 cum for dry volume of 12mm thick plastering for 100 sqm.

* 100mm thick plastering for 100sqm → 3 cum
* 12mm thick plastering for 100sqm → 2 cum

LABOUR REQUIREMENT FOR DIFFERENT ITEMS OF WORK

UP PWD 2006 rates :-

1) 1st class BW for 10 cum -

Labour	Nos	Rates
Mistri	0.5	150
Mason	3	125
Mazdoor	12	60
Boy or woman (coolie)	20	50
Bhisti (curing)	06	50
Sundries T&P	Lumpsum	Rs-45
Add 1.5 % of water charge		
Add 10% of contractor profit		

2) 20 cm thick plastering for 100sqm -

Labour	Nos	Rates
Mistri (Head Mason)	0.33	150
Mason	12	125
Mazdoor	15	60
Bhisti (curing)	1	50
Sundries (T&P)	Lumpsum	Rs-70
Add 1% of water charge		
Add 10% of contractor profit		

3) Cement concrete using 20mm aggregates -

Labour	Nos	Rates
Mistri (Head Mason)	0.5	150
Mason	3	125
Mazdoor	12	60
Boy or woman (coolie)	20	50
Bhisti (curing)	06	50
Sundries (T&P)	Lumpsum	Rs-45/-
Add 1.5% of water charge		
Add 10% of contractor profit		

4) Cement concrete using 40mm aggregates for 10 cum.—

Labour	Nos	Rates
Mistri (Head mason)	0.5	150
Mason	1.5	125
Mazdoor	12	60
coolie (boy or woman)	18	50
Bhisti (curing)	4	50
Sundries (T&P)	Lumpsum	Rs-40/-
Add 1.5% of water charge		
Add 10% of contractor profit		

5) 12mm thick plastering for 100sqm

Labour	No	Rate
Mistri (Head Mason)	0.33	150
Mason	10	125
Mazdoor	15	60
Bhisti (curing)	0.75	50
Sundries (T&P)	Lumpsum	Rs 70/-
Add 1.5 % of water charge		
Add 10% of contractor profit		

Question

1) Find the unit rate of 12mm thick cement plastering (1:6) on new BW per sqm as per up PWD code assuming market rate.

Ans

Finding dry material required for 100 sqm.

Dry material for 12mm thick plastering for 100sqm is 2 cum

Quantity of cement = $\frac{2}{1+6}$ = 0.286 cum

No of bags of cement = $\frac{0.286}{0.034}$ = 9 bags

Quantity of sand = 0.286 × 6 = 1.716 cum

Sl. No	Particulars	Quantity	Unit	Rate	cost
1	Material				
	cement	9	Bags	180	1620
	sand	1.716	cub	120	205.92
				Total =	1825.92 [A]
2	Labour				
	Mistri	0.33	Nos	150	49.50
	Mason	10	Nos	125	1250
	Mazdoor	15	Nos	60	900

	Bhisti (curing)	0.75	Nos	50	37.50
	Sundries (T&P)	Lumpsum	15		70

Total = 2307 [B]

Total (A+B) = 1825.92 + 2307

= 4132.92 [C]

Add 1% of water charge of A+B = $\frac{4132.92}{100} \times 1$ = 41.33 [C]

Total = (A+B+C) = 4132.92 + 41.33 = 4174.25

Add 10% of contractor profit of (A+B+C) = $\frac{4174.25}{100} \times 10$

= 417.42 [D]

Grand total (A+B+C+D) = 4174.25 + 417.42

= 4591.67

For 12mm thick plastering of 100 sqm cost = 4591.67

For 12mm thick plastering of 1 sqm cost = 45.91

Dry material calculation:-

1) 10 cum cement concrete 1:5:10

Soln

For 10 cum cement concrete 15.2 cum volume

Quantity of cement = $\frac{15.2}{1+5+10} = \frac{15.2}{16} = 0.95$ cum

One bag cement = 50 kg = 0.034 cum

Number of bags of cement = $\frac{0.95}{0.034} = 27.95 = 28$ bags

Quantity of fine aggregate = $5 \times 0.95 = 4.75$ cum

Quantity of coarse aggregate = $0.95 \times 10 = 9.5$ cum

Sl No	Material Particulars	Unit	Quantity	Rate	cost
1	cement	bags	28	350	9800
2	Sand	cum	4.75	175	831.25
3	Aggregate	cum	9.5	485	4607.5
				Total	15238.75

2) Calculate the dry material for 12 cum cement concrete 1:4:8

Soln

For 10 cum cement concrete 15.2 cum volume

Quantity of cement = $\frac{15.2}{1+4+8} = \frac{15.2}{13} = 1.17$ cum

For 1 cum cement concrete, Quantity of cement = $\frac{1.17}{10} = 0.117$ cum

For 12 cum cement concrete, quantity of cement = $12 \times 0.117 = 1.404$ cum

1 bag cement = 50 kg = 0.034 cum

No of bags of cement = $\frac{1.404}{0.034} = 41.29 = 42$ bags

Quantity of fine aggregate = $1.404 \times 4 = 5.616$ cum

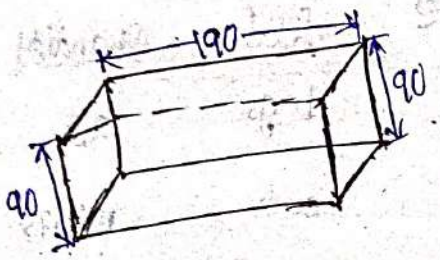
Quantity of coarse aggregate = $1.404 \times 8 = 11.232$ cum

Sl.No	Material	Unit	Quantity	Rate	cost
1	cement	bags	42	350	14700
2	sand	cum	5.616	175	982.8
3	Aggregate	cum	11.232	485	5447.52

Total = 21130.32

⇒ Standard size of brick = 190mm x 90mm x 90mm = (19 x 9 x 9) cm

⇒ Nominal size of brick = 200mm x 100mm x 100mm = (20 x 10 x 10) cm



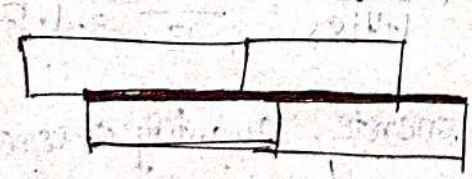
⇒ Volume of standard bricks = 190 x 90 x 90 = 1539000 mm^3

$0.19 \times 0.9 \times 0.9 = 0.1539\ m^3$

⇒ Volume of nominal brick = $200 \times 100 \times 100 = 2000000\ mm^3$

$= 0.2 \times 0.1 \times 0.1 = 2 \times 10^{-3}\ m^3$

Brick work:-



∴ No of bricks = $\frac{1m^3}{2000000\ mm^3}$

$= \frac{1m^3}{2 \times 10^{-3} m^3}$

$= \frac{1}{1/500}$

⇒ No of bricks = 500 Nos

$1m^3$ = Brick (m^3) + Mortar (m^3)

= 500 × 0.19 × 0.09 × 0.09 + Mortar

= 0.7695 m^3 + Mortar

⇒ Volume of mortar = 1 − 0.7695

= 0.2305 m^3

Imp

1) Earth work in excavation, 2) PCC, 3) Plastering, 4) Super structure
5) Brick work in foundation, 6) Brick work in super structure
7) RCC in slab or beam, 8) Colouring

Classification of works according to their nature:-

Classified in 2 types

1) Original work

2) Repair work

Original work:-

The original work may be of following types

a- New construction of building, bridge, road.

b- Addition and alteration, existing works will increase the value of the property. Addition of rooms, conversion of verandah into room, deviding of big room into two small rooms.

Repair works:-

The repair work may be of following types -

a- The repairs required to maintain the work in proper condition.

b- Minor additions and alterations which will not increase the value of property. Opening of doors, providing of sun sets.

c- Special repair, monsoon damage repair etc.

Valuation :-

Valuation is the technique of estimating or determining the hair, price all value of a property. such as a building, a factory, other engineering structures, land etc.

Cost :- Cost is original cost of construction or purchase.

Scrap value :-

Cost is the value of dismantled material for a building, when the life is over at the end of it's utility period the ~~dimen~~ dismantled materials are in still, bricks timber etc will fetch a certain amount which is the scrap value of the building.

Salvage value :-

It is the value at the end of the ability period with out being dismantled.

Market value :-

The market value of a property is the amount which can be obtained at any particular time from the open market if the property is put for shell.

Book value :-

Book value is the amount shown in the amount book after allowing necessary deficiation.

Obsolescence :-

The value of property or structure becomes less by it's becoming out of date in stye, in structure, in design, etc and this is termed as obsolescence.

Sinking fund :-

The fund which is gradually accumulated by wave of annual depasite for the replacement of the building at the

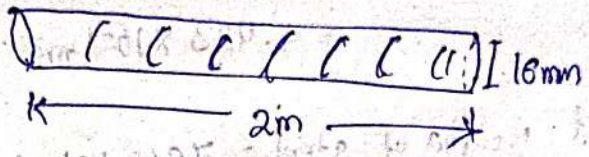
end of it's useful life, is termed as sinking fund.

Deficiation :—

Deficiation is the gradual exhausation of the usefullness of a property. It may be defined as the decrease or loss in the value of a property due to structural deterioration use life well and tear, decay and obsolescence.

Q) Calculate the standard weight in kg of a 16mm diameter Bar having 2m length.

Soln



Crossectional area of the bar = $\frac{\pi}{4} d^2$

$= \frac{\pi}{4} \times (0.016)^2$

$= 2.010 \times 10^{-4} m^2$

Volume of the bar = A × L

$= 2.010 \times 10^{-4} \times 2$

$= 4.021 \times 10^{-4} m^3$

Unit weight of steel = 7850 kg/m3

weight of 2m bar = $7850 \times 4.021 \times 10^{-4}$

$= 3.156$ kg

∴ The weight of 2m bar is 3.156 kg.

Q) Calculate the standard weight of 20mm diameter bar having 3m length.

Sol^n

Crossectional area of bar = $\frac{\pi}{4} \times (0.020)^2$

$= 3.141 \times 10^{-4} m^2$

Volume of bar = A × L

$= 3.141 \times 10^{-4} \times 3$

$= 9.423 \times 10^{-4} m^3$

Unit weight of steel = 7850 kg/m3

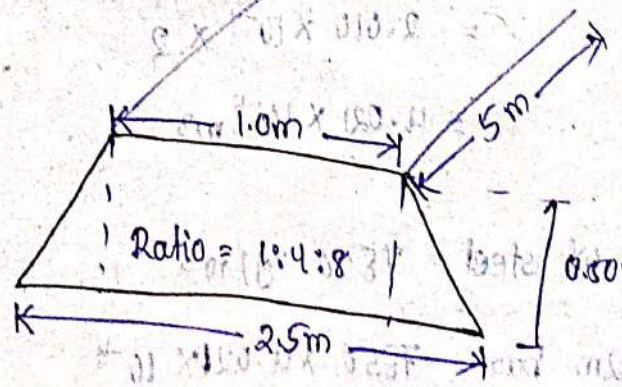
weight of 3m bar = $7850 \times 9.423 \times 10^{-4}$

$= 7.398$ kg

∴ The weight of 3m steel bar is 7.398 kg.

* Standard unit weight of steel = 7850 kg/m3

Q)



Calculate the dry material required cement concrete for given trapism.

Soln

Length of work is 5m

Area of trapism = $\frac{\text{Top area} + \text{Bottom area}}{2}$

Area of rectangle shape = $1 \times 0.5 = 0.5\ m^2$

Area of triangle shape = $\frac{1}{2} \times b \times h$

$= \frac{1}{2} \times 0.75 \times 0.5$ $\left[\because \frac{2.5-1}{2} = 0.75\right]$

$= 0.187\ m^2$

Area of two triangle shape = $0.187 \times 2 = 0.374\ m^2$

Total area of trapism = $0.5 + 0.374 = 0.875$

Volume of trapism = $0.875 \times 5 = 4.375\ m^3$

~~1:2~~ $1 m^3 = 1.52$

Dry material required for $4.375\ m^3 = 4.375 \times 1.5 = 6.65\ m^3$

Quantity of cement = $\frac{6.65}{1+4+8} = \frac{6.65}{13} = 0.511\ m^3$

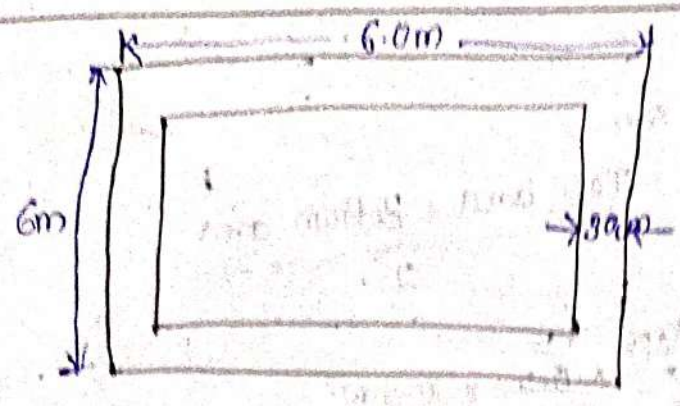
1 bag of cement = 0.034 cum.

No of bags of cement = $\frac{0.511}{0.034} = 15.02 \approx 16$ bags

Quantity of sand = $4 \times 0.511 = 2.044\ m^3$

Quantity of aggregate = $8 \times 0.511 = 4.088\ m^3$

Q)



Calculate the earth work in excavation.

Soln

Centre to centre length of one wall = $6.0 - \frac{0.3}{2} - \frac{0.3}{2} = 5.7$ m

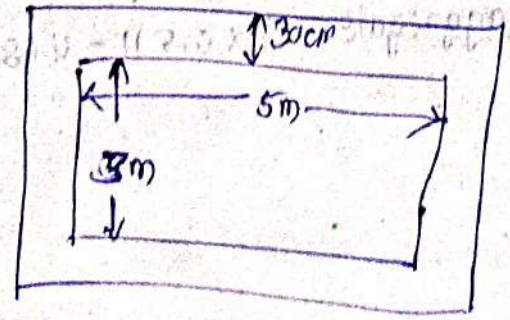
Total c/to/c of wall = $4 \times 5.7 = 22.8$ m

Sl.No	Particulars	N	L	B	H/D	Quantity	Remarks
c/to/c ⇒	Earth work in excavation	1	22.8	0.8	0.6	10.94 m³	
	OR						
L&S ⇒	EW in excavation						
	Long wall →	2	6.5	0.8	0.6	6.24	5.7+0.4+0.4 = 6.5
	Short wall →	2	4.9	0.8	0.6	4.70	5.7−0.4−0.4 = 4.9
					Total =	10.94 m³	

Q) In a room size 5.0m x 3.0m, wall thick. 30cm. Calculate the length of long wall, short wall & centre to centre length.

(inner to inner)

Soln



Length of long wall = ~~0.3 + 0.3~~ 5 + 0.3 + 0.3 = 5.6m
2 2

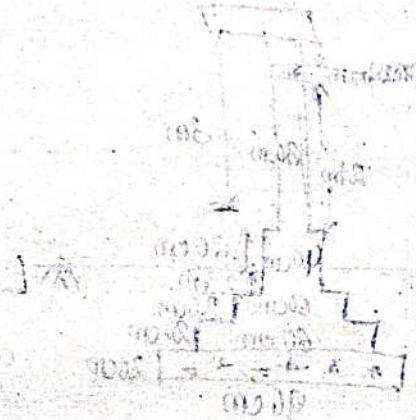
Length of short wall = 3m

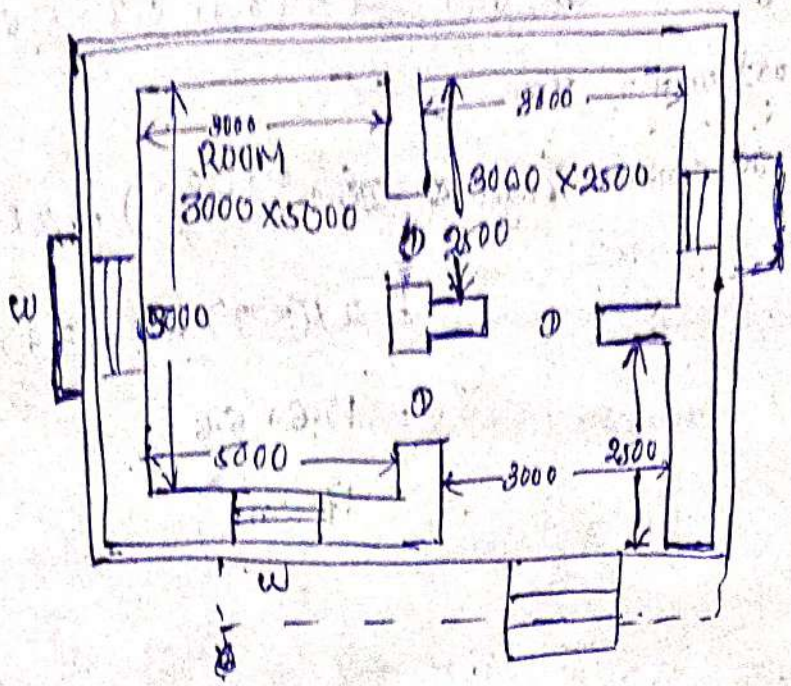
~~Length~~ centre to centre length = $2(5 + \frac{0.3}{2} + \frac{0.3}{2}) + 2\times(3 + \frac{0.3}{2} + \frac{0.3}{2})$

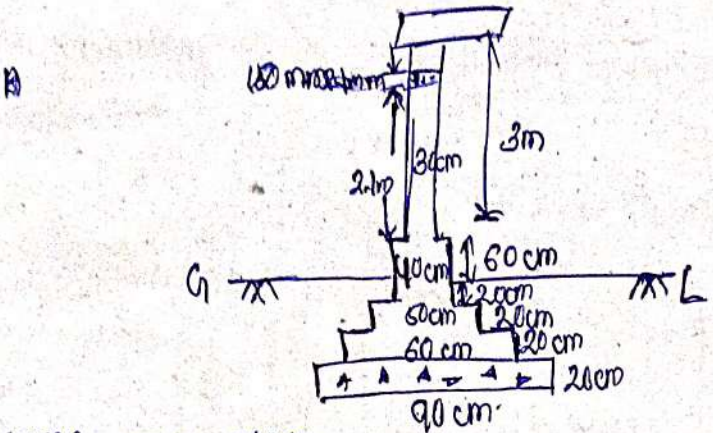
$= 2\times(5.3) + 2\times(3.3)$

$= 10.6 + 6.6$

$= 17.2m$







Assume D = ~~2100~~ 1200 x 2100 mm

W = 1000 x 1200 mm

width of chajja = 450 mm

Calculate the following items of work

i) EW in excavation in foundation

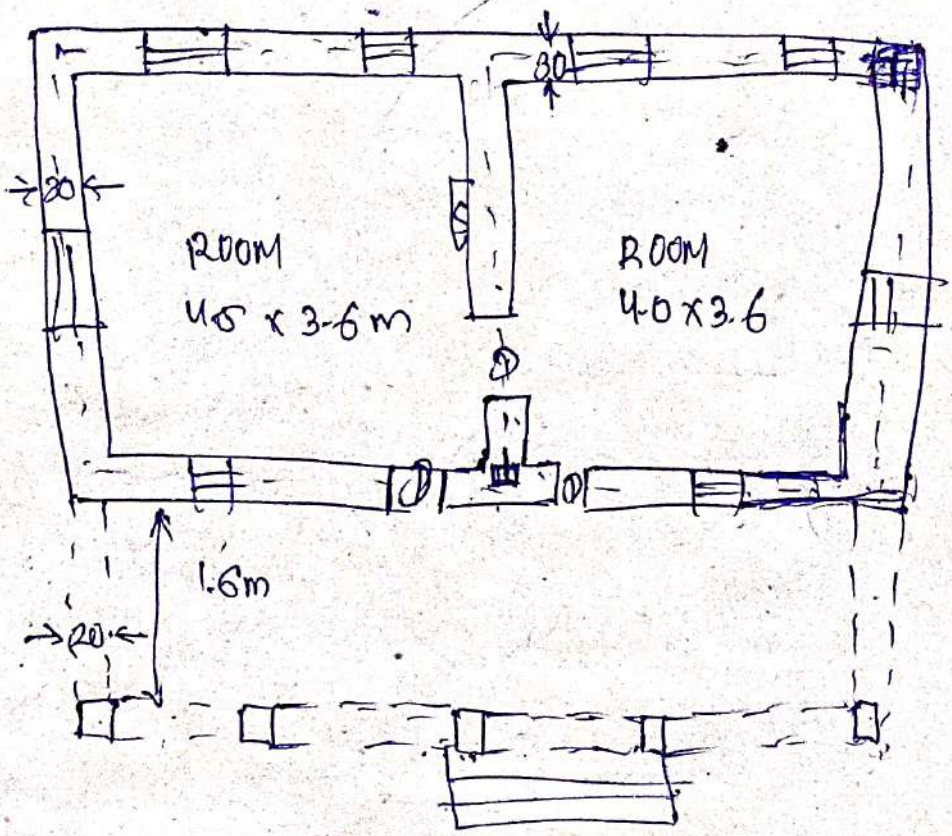
ii) Cement concrete in foundation (1:2:4)

iii) BW in foundation & plinth

iv) BW in super structure

v) Inside Plastering (1:4) 12 mm thick.

Ex-2



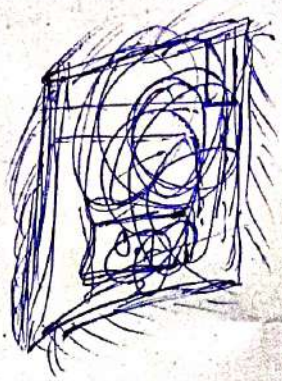
9.1 + 3.9 + 1.85 + 9.2 + 1.85 + 3.9 = 29.8

~~Verandah~~

Room

L.W = 9.1

3.9



~~0.2 + 4.5 + 0.3 + 4.0 + 0.2 / 2 =~~

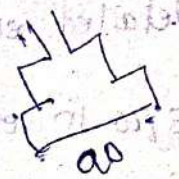
~~= 0.1 + 4.5 + 0.3 + 4.0 + 0.1 = 9m~~

Verandah

L.W = 9.4 − 0.2/2 − 0.2/2 = 9.2m

S.W = 0.3/2 + [illegible] · 1.6 + 0.2/2 =

= 0.15 + 1.6 + 0.1 = 1.85 m



30cm

L.W = (9.1 × 2) [illegible] = 18.2

S.W = (3.9 × 3) = 11.7

Total = 11.7 + 18.2 = 29.9 m²

= ~~29.9~~ − (2 × 0.9/2) = 29.0

20cm

total = 9.2 + (1.85 × 2) =

= 9.2 + 3.7 = 12.9m

Total = 42.8

= 12.9 − 2 × $\frac{0.9}{2}$

= 12.0

S.No	Particulars	N	L	B	H/D	Quantity	Remarks
1	Ew in excavation in foundation						
	(a) Long wall & Short wall combine						
	Long wall	2	10	0.9	0.9	16.2	$9.1 + \frac{0.9}{2} + \frac{0.9}{2} = 10$
	Short wall	3	3	0.9	0.9	7.29	
						23.49 m3	
	Verandah						
	Long wall	1	9.9	0.7	0.9	6.24	9.2 + 0.7 =
	Short wall	2	1.85	0.7	0.9	1.32 / 7.56 m3	$1.85 - \frac{0.7}{2} - \frac{0.9}{2}$ = 1.
					Total =	31.05 m3	
	(b) CtoC method						
	Rom 1&2	1	29.9	0.9	0.9	23.49	29.9 − 2 × 0.45
	Verandah	1	12.9	0.7	0.9	7.56	12.9 − 2 × 0.45
						31.05 m3	
2	Concrete in foundation						
	a) L&S method						
	Two room combine						
	LW →	2	10	0.9	0.3	5.4	
	SW →	3	3	0.9	0.3	2.43	
						7.83	

Sl No	Particulars	N	L	B	H/D	Quantity	Remarks
	Verandah						
	LW →	1	9.9	0.7	0.3	2.08	
	SW →	2	1.05	0.7	0.3	0.44	
						2.52	
						10.35 cum	
	b) C to C method						
	From 1 & 2 combine →	1	29	0.9	0.3	7.83	
	Verandah →	1	12	0.7	0.3	2.52	
						10.35 cum	
3	Bw in foundation and plinth						
	Two room combine						
	a) Long wall & short wall method :						
	First footing.						
	LW →	2	9.7	0.6	0.2	2.33	9.1 + 0.3 + 0.3 = 9.7
	SW →	3	3.3	0.6	0.2	1.19	3.9 - 0.3 - 0.3 = 3.3
	second footing :						
	LW →	2	9.6	0.5	0.2	1.92	9.1 + 0.25 + 0.25 = 9.6
	SW →	3	3.4	0.5	0.2	1.02	3.9 - 0.25 - 0.25 = 3.4
	Plinth :-						
	LW →	2	9.5	0.4	0.8	6.08	9.1 + 0.2 + 0.2 = 9.5
	SW →	3	3.5	0.4	0.8	3.36	3.9 - 0.2 - 0.2 = 3.5
						15.9 cum	

Sl No	Particulars	N	L	B	H/D	Quanty	Remarks
	~~b) Centre line method~~ First						
	Verandah						
	First footing						
	LW →	1	9.6	0.4	0.2	0.77	9.2+0.2+0.2 = 9.6
	SW →	2	1.35	0.4	0.2	0.22	1.85 − 0.2 − 0.3 = 1.35
	second footing						
	LW →	1					
	SW →						
	Plinth :-						
	LW →	1	9.5	0.3	1.0	2.85	9.2 + 0.15 + 0.15 = 9.5
	SW → Lower →	2	1.45	0.3	0.2	0.17	1.85 − 0.15 − 0.15 = 1.55
	Upper →	2	1.5	0.3	0.8	0.72	1.85 − 0.2 − 0.15 = 1.5
						4.73	
						20.63	cum
	b) Centre line method						
	Two room combine						
	First footing	1	29.3	0.6	0.2	3.52	29.9 − 2 × 0.6/2 = 29.3
	2nd footing → LW	1	29.4	0.5	0.2	2.94	29.9 − 0.25 − 2 × 0.5/2 = 29.4
	SW						
	Plinth →	1	29.5	0.4	0.8	9.44	29.9 − 2 × 0.4/2 = 29.5
	Verandah						
	First footing	1	12.3	0.4	0.2	0.98	12.9 − 0.2 − 0.3 = 12.4
	Plinth Lower →	1	12.4	0.3	0.2	0.75	12.9 − 0.25 − 0.25 = 12.4
	Upper →	1	12.5	0.3	0.8	3.00	12.9 − 0.2 − 0.2 = 12.5
						20.63	

Sl	Particulars	N	L	B	H/D	Quantity	Remarks
4	DPC						
	Long wall & Short wall method						
	Two room combine						
	Long wall →	2	9.4	0.3	–	5.64	9.1 + 0.15 + 0.15 = 9.4
	Short wall → (verandah)	3	3.6	0.3	–	3.24	3.9 − 0.15 − 0.15 = 3.6
	Pillars →	5	0.2	0.2	–	0.2	
						9.08 sqm	
	centre line method						
	Two room →						
	→	1	29.6	0.3	–	8.88	29.9 − 2 × 0.3/2
	Pillars →	5	0.2	0.2	–	0.2	= 29.6
						9.08 sqm	
	Deduction →						
	Doors →	3	1.2	0.3	–	1.08	
	Net total = 9.08 − 1.08 = 8 sqm						
5	BW in superstructure						
	Long wall short wall method						
	Two room combine						
	LW →	2	9.4	0.3	3.6	20.30	9.1 + 0.15 + 0.15 = 9.4
	SW →	3	3.6	0.3	3.6	11.67	3.9 − 0.15 − 0.15 = 3.6

Sl	Particulars	N	L	B	H/D	Quantity	R
	Verandah over lintel						
	Lw →	1	9.4	0.2	0.9	1.69	9.2 + 0.1 + 0.1 = 9.4
	sw →	3	1.6	0.2	0.9	0.58	$1.85 - \frac{0.3}{2} - \frac{0.2}{2}$
	Pillars →	5	0.2	0.2	2.7	0.54	
						34.78 cum	= 1.6
	centreline method						
	Two room combine →	1	29.6	0.3	3.6	31.97	
	Above the pillar →	1	12.6	0.2	0.9	2.27	$29.9 - 2 \times \frac{0.3}{2}$ = 29.6
	Pillar →	5	0.2	0.2	2.7	0.54	$12.9 - 2 \times \frac{0.3}{2} = 12.6$
						34.78 cum	
	Deduction						
	Door opening →	3	1.2	0.3	2.1	2.27	
	window →	8	1.1	0.3	1.5	3.96	
	lintel for						
	mainwall →	1	29.6	0.3	0.15	1.33	
	verandah →	1	12.6	0.2	0.15	0.38	
	Shelves opn →	1	1.1	0.2	0.15	0.03	
						7.97 cum	
	Net total any method					= 34.78 − 7.97 = 26.81 cum	
6)	Plastering						
	Inside						
	Two room combine						
	Long side →	2	4.5		3.6	32.4	
	→	2	4.0		3.6	28.8	
	Short sides →	4	3.6		3.6	51.84	

Sl	Particulars	N	L	B	H/D	Quanty	Rem
	Jambs, sills & soffits of shelf	1	5.2	0.2		1.04	
	(v) Verandah						
	Room side up to verandah opening →	1	9.4		2.7	25.38	
	Room side above opng →	1	9.0		0.9	8.10	
	verandah front above opening	1	9.0		0.9	8.10	
	Verandu sides above openings	2	1.6		0.9	2.88	
	(vi) Pillars	5x4	0.2		2.7	10.80	
	Top portion of openings						
	Front →	1	8.4	0.2		1.68	
	sides →	2	1.6	0.2		0.64	
						171.66	SQM
	Deduction						
	Doors	1x3	1.2		2.1	7.56	
	windows	1x2	1.1		1.5	3.3	
					Net total =	160.8 (A)	
	Out side						
	Entire back	1	9.4		3.7	34.78	
	sides of room	2	4.2		3.7	31.08	
	verandah front	1	9.4		1.0	9.4	
	verandah sides	2	1.8		1.0	3.6	

Parapet outsides –					
Back & front →	2	9.4		0.7	13.16
side →	2	6.0		0.7	8.4
Parapet inside →					
Back & front sides	2	9.2		0.6	11.04
	2	5.8		0.6	6.96
Top back & front –	2	9.4		0.1	1.88
& sides –	2	5.8		0.1	1.16
					121.46 sqm
Deduction					
Out side window	6	1.1		1.5	9.9
					Net total = 111.56 sqm
	Net total (A+B) = 272.36 sqm.				

7 BW in parapet

~~Long wall & short wall method~~

Over Two rooms combine

LW →	2	9.4	0.3	0.6	9.1 + 0.3 = 9.4
SW →	3	3.6	0.3	0.6	3.9 − 0.3 = 3.6

Over verandah

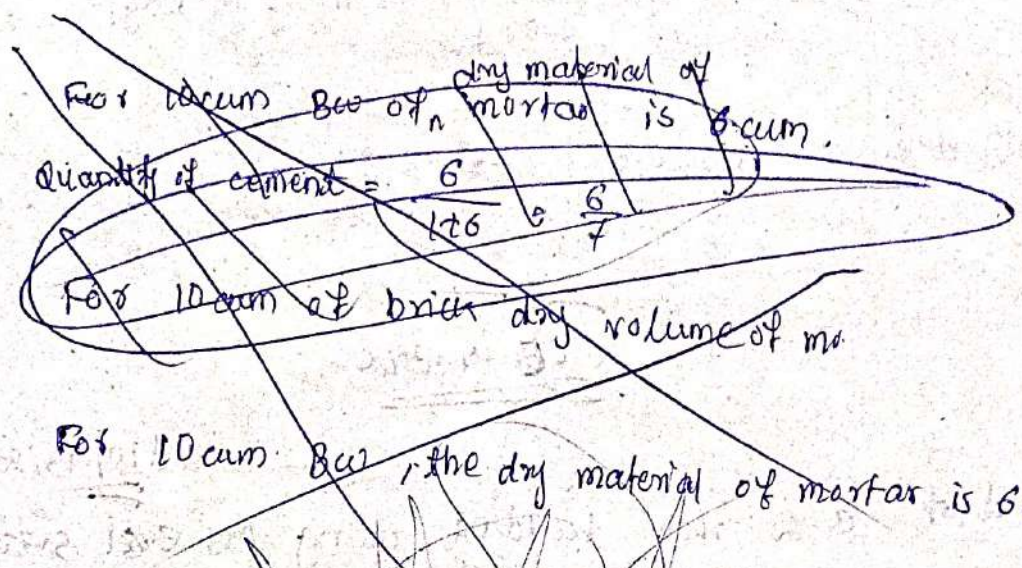
LW →

	1	29.8	0.1	0.6	1.79 cum 1.7

Test 1 SWP D.t-10/03/2021

Q) Calculate the dry material required for 15 cum of brick work using cement mortar (1:6).

Sol)



For 10 cum Bw, the dry material of mortar is 6 cum

For 10 cum Bw dry material of mortar is 3.2 cum

For 1 cum dry volume of mortar = $\frac{3.2}{10}$ = 0.32 cum

For 15 cum dry volume of mortar = 15 × 0.32 = 4.8

Quantity of cement = $\frac{4.8}{1+6} = \frac{4.8}{7}$ = 0.68

We know for 1 cum of Bw = 500 bricks and 0.3 cum mortar

1 cum of brick required = 500 bricks

15 " " " = 15 × 500 = 7500 Nos

For 10 cum Bw dry material mortar is 3 cum

For 1 cum " " " " 0.3 cum

For 15 " " " " " 0.3 × 15 = 4.5

Quantity of cement = $\frac{4.5}{7}$ = 0.64

1 bag of cement = 0.034 cum

No of bags of cement = $\frac{0.64}{0.034}$ = 18.8 = 19 bags

Quantity of sand = 6 × 0.64 = 3.84 cum

—o—

ECE Pratice

Expt-3.

D.t 20/03/2021

Q) Detailed of a 2 room building using Ms Excel software

i) Cw in excavation

ii) Lime concrete in foundation

iii) First class Bw in foundation & Plinth

iv) 25 cm thick DPC

v) First class Bw in super structure

Abstract of estimate :-

—o—

c to c length of long wall = 6.60 − 0.1 − 0.1 = 6.40

c to c length of short wall = 4.4 − 0.01 − 0.1 = 4.20

Centre to centre length = (2 × 6.40) + (3 × 4.20)

= 12.8 + 12.6

= 25.4

Sl.No	Particulars	N	L	B	H/D	Quantity	Remarks
1)	BW in excavation						
	~~Long~~ LW →	2	7.1	0.7	0.9	8.95	6.4+0.7=7.1
	SW →	3	3.5	0.7	0.9	6.62	4.2-0.7
						15.56 cum	
2)	Lime concrete in foundation						
	LW →	2	7.1	0.7	0.2	1.99	6.4+0.7=7.1
	SW →	3	3.5	0.7	0.2	1.47	4.2-0.7=3.5
						3.46 cum	
3)	1st class BW in foundation and plinth						
	1st footing						
	LW →	2	6.9	0.5	0.2	1.38	6.4+0.5=6.9
	SW →	3	3.7	0.5	0.2	1.11	4.2-0.5=3.7
						2.49 cum	
	2nd footing						
	LW →	2	6.8	0.4	0.2	1.09	6.4+0.4=6.8
	SW →	3	3.8	0.4	0.2	0.91	4.2-0.4=3.8
						2.0	
	Plinth						
	LW →	2	6.7	0.3	0.5	2.01	6.4+0.3=6.7
	SW →	3	3.9	0.3	0.5	1.76	4.2-0.3=3.9
						3.77 cum	
						8.26 cum	
4)	2.5 cm thick DPC						
	LW →	2	6.2	0.2		2.48	6.4+0.2=6.7
	SW →	3	3.9	0.2		2.4	4.2-0.2=3.9

Sl	Particulars	N	L	B	H/D	Quantity	Remarks
4	2.5cm Thick DPC						
	LW →	2	6.6	0.2		2.64	6.4 + 0.2 = 6.6
	SW →	3	4	0.2		2.04	4.2 - 0.2 = 4
						5.04	
5)	Deduction →						
	Door opening →	2	1.2	0.2		0.48	
						4.56 sqm	
5)	1st class Bw in super structure →						
	LW →	2	6.6	0.2	3.3	8.71	6.4 + 0.2 = 6.6
	SW →	3	4	0.2	3.3	7.92	4.2 - 0.2 = 4
						16.63 cum.	
	Deduction for						
	opening → Door →	2	1.2	0.2	2.1	1.01	
	window →	4	1.0	0.2	1.2	0.96	
	Lintle over door →	2	1.2	0.2	0.15	0.07	
	Lintel in window →	4	1.0	0.2	0.15	0.12	
						2.16	
						Net total = 16.63 - 2.16	
						= 14.47	

smp

VJP

1) Detailed estimate of building → 80, fig - 3.4 → BN. Datta

2) Page - 94 fig - 3.5 & 3.6 → B.N Datta

3) Pag - 135 fig - 3.14 & 3.15 → B.N. Datta

4) Page - 112 fig - 3.7 → BN Datta

5) Page - 92, fig - 4.25 → M. Chakrabartee

6) Page - 110; fig - 5.2 → M. Chakrabartee

7) Page - 121, fig - 5.3 → M. Chakrabartee

a) Earth work in excavation

b) PCC in foundation

c) Bw in foundation & Plinth

d) DPC

e) Bw in super structure

f) RCC in super structure

g) Bw in parapet

h) 12mm thick plastering inside & outside wall

SVP

Q) Calculate the quantity of dry material required for

i) 16 cum Bw with cement mortar 1:6

ii) 8 cum cement concrete 1:1.5:3

iii) on 75.52m plastering of 12mm thick cement mortar (1:3)

iv) 405.2m plastering of 20mm thick cement mortar (1:3)

JNP

Revised & supplementary estimate

i) For 10 cum BW = 5000 bricks and 3 cum mortar required

1 cum Brick required = 500

16 cum brick required = 16 × 500 = 8000

For 10 cum BW dry material required 3 cum

" 1 cum " " " " " 0.3 cum

For 16 cum " " " " " 0.3 × 16 = 4.8 cum

Quantity of cement = $\frac{4.8}{7}$ = 0.68

1 bag cement = 0.034 cum

No of bags of cement = $\frac{0.68}{0.034}$ = 20 bags

Quantity of sand = 6 × 0.68 = 4.08 cum

ii) 12mm thick Plastering for 100 sqm mortar required - 2cum

~~For 1 sqm = mortar required~~ =

~~Volume of = 75 × 0.012 = 0.9 cum~~

12mm thick for 1 sqm mortar required, 0.02

" For 75 sqm " " " = 75 × 0.02 = 1.5 cum

~~Ratio~~ ~~1~~

* ~~Ratio~~ 1 bag

Quantity of cement = $\frac{1.5}{4}$ = 0.37 cum

No of bags of cement = $\frac{0.37}{0.034}$ = 10.88 ≈ 11 bag

Quantity of sand = 0.37 x 3 = 1.11 cum

Sample paper – 2019

No2

d)

For 10 cum cement concrete take 15.2 cum.

For 1 cum cement concrete $\frac{15.2}{10} = 1.52$ cum.

Quantity of cement $= \frac{1.52}{1+2+4} = \frac{1.52}{7} = 0.217$ cum

No of bags of cement $= \frac{0.217}{0.034} = 6.38 = 7$ bags

Quantity of sand $= 0.217 \times 2 = 0.434$ cum

Quantity of coarse aggregate $= 0.217 \times 4 = 0.868$ cum.

Kshoumadhu Meher "MANTU MEHER

3RD SEM/ CIVIL / 2020(W)NEW

Th4 Estimation & Cost Evaluation- I

Full Marks: 80 Time- 3 Hrs

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. Answer **All** questions 2 x 10

a. Define Depreciation and Obsolescence.
b. Write down the volume and weight of one bag of cement.
c. Write down the unit of following items.
(i) Earthwork in filling (ii) lime concrete terracing
d. Define floor area of a building.
e. What do you mean by lead and lift?
f. Calculate the standard weight of 20mm diameter bar of 1 meter length.
g. What do you mean by sinking fund?
h. What do you mean by AR estimate?
i. Draw the details of measurement form used in estimate.
j. Classify the labours as per OPWD and also mention their rates.

2. Answer **Any Six** Questions 6 x 5

a. Write the duties of Junior Engineer.
b. Calculate the dry materials required for 500m^2 of cement plaster (1:6) of 12mm thickness.
c. Describe briefly about different types of values of a structure.
d. Calculate the cost of construction of 8 m^3 of brickwork (1:4) using standard bricks of size 19c.m×9c.m×9c.m .Use latest OPWD rates
e. Differentiate between Plinth area estimate and cube rate estimate.
f. Calculate the quantity of woodwork in frames of 2 doors and 3 windows having following specifications
Size of door = 1.2m ×2m , size of window = 1×1.5m
Size of chowkath = 10 c.m×8 c.m.
g. What do you mean by analysis of rate? Write the purpose of analysis of rates.

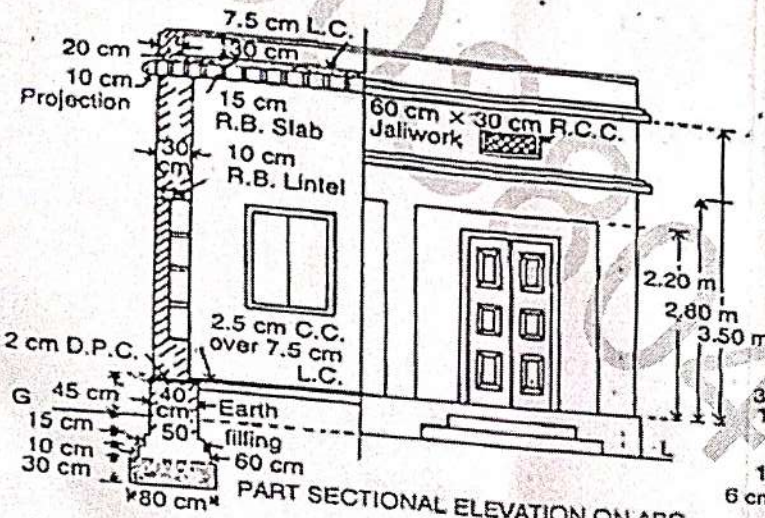
3. Prepare the quantity estimate for the following items from the given drawing in Fig-1.
(a)Earthwork in excavation in foundation 5
(b)1st class brickwork in foundation and plinth(1:3) . 5

4. Prepare the quantity estimate for the following items from the given drawing in Fig-1.
(a)First class brickwork in superstructure (1:3) 7
(b) 2.5 c.m dpc work (1:2:4) 3

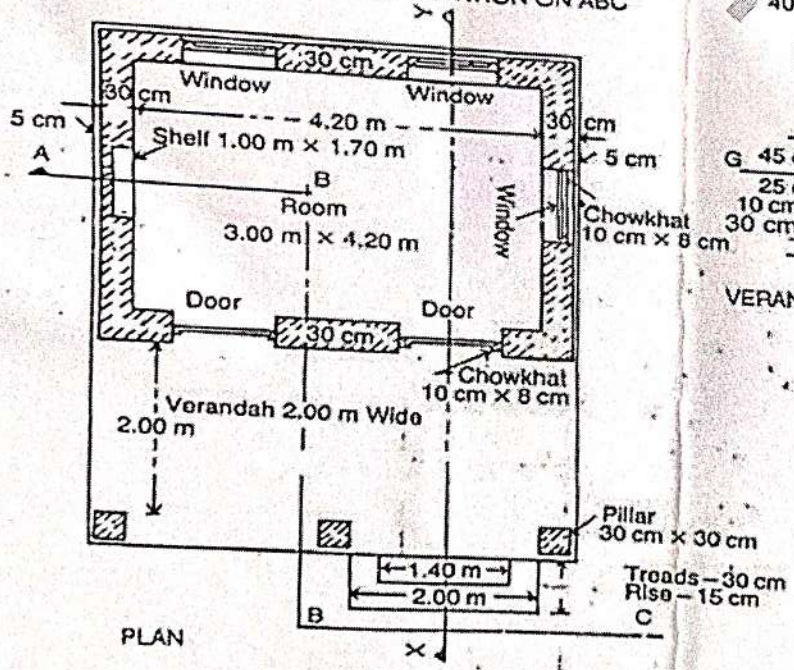
5. (a) Calculate the dry materials required for the quantity of items calculated for Q 4(b). 5
(b) Analyse the rate of materials and labours as per OPWD for Q .4 (a). 5

6. Write the role of following persons.
(a)Divisional accountant 5
(b) Executive engineer 5

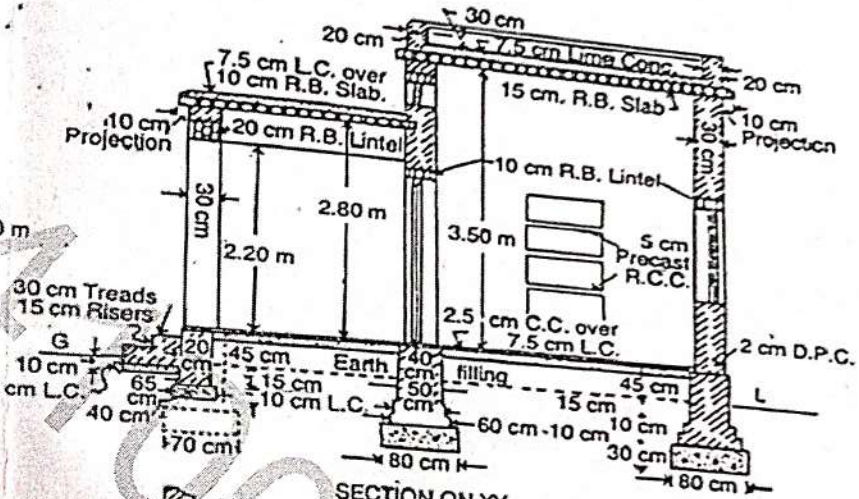
7. Describe briefly about different types of estimates. 10



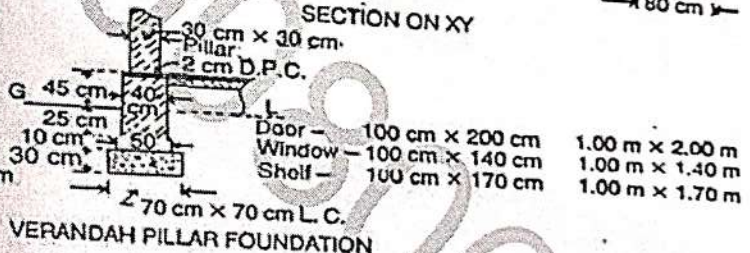
PART SECTIONAL ELEVATION ON ABC



PLAN



SECTION ON XY



VERANDAH PILLAR FOUNDATION

Fig. 1