

Estimation of step

Objectives: At the end of this exercise you shall be able to

- prepare the quantities of earthwork
- prepare the quantities of concrete
- prepare the quantities of brick work and finishing.

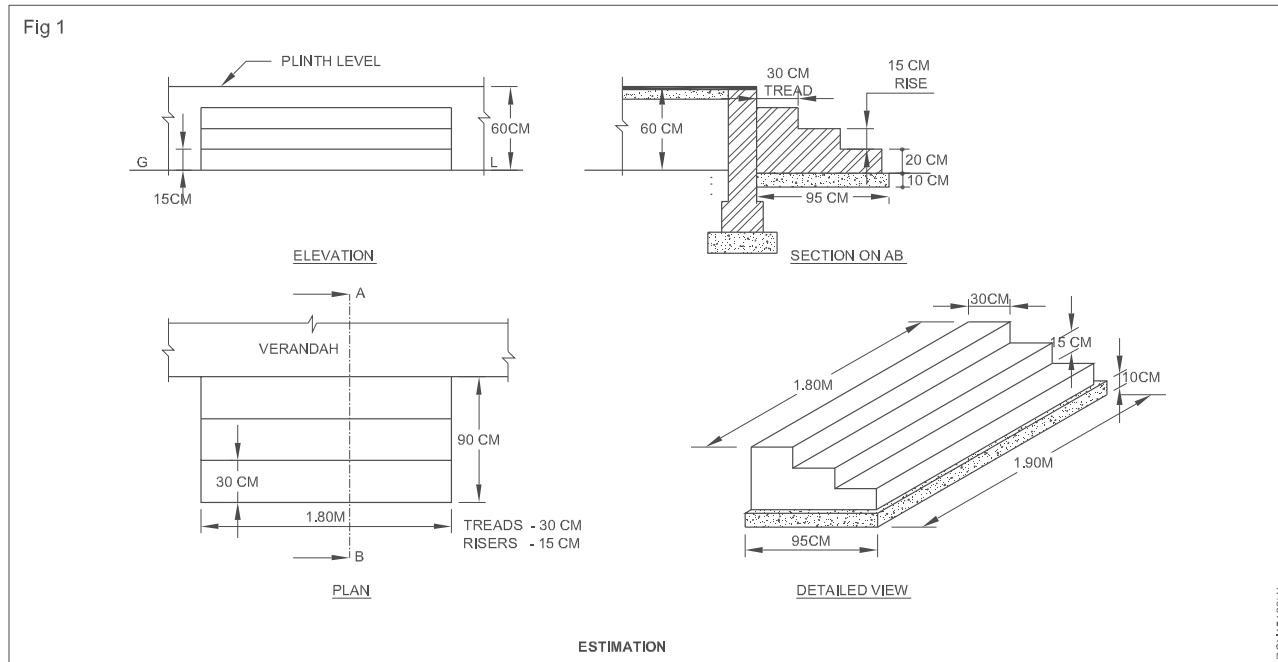
Requirements			
Data			
• No. of steps	: 3 Nos	• Rise	: 15cm
• Length of step	: 1.80m	• Tread	: 30cm

PROCEDURE

TASK 1: Estimate the quantities of earthwork, concrete, brickwork and finishing work of different of types of steps from given drawings

Steps are usually constructed when the construction of the building has progressed sufficiently and the earthwork in foundation for steps needs excavation a fresh. The earthwork in excavation for step is neglected.

- Estimate of simple step given in Fig 1
- Surface in steps 20mm plastered with 1:3 cement sand mortar finished neat cement rendering.



SI. No.	Description of items	Nos	Length	Breadth	Ht. or D.	Qty
			m	m	m	
1	Earthwork in excavation	1	1.90	0.95	0.10	0.18 cu m
2	Concrete in foundation	1	1.90	0.95	0.10	0.18 cu m
3	Brickwork - 1 st step	1	1.80	0.90	0.20	0.324 cu m
	2 nd step	1	1.80	0.60	0.15	0.162 cu m
	3 rd step	1	1.80	0.30	0.15	0.081 cu m
				Total		0.567 cu m
4	Finishing 20 mm cement plastered					
	Treads	3	1.80	0.30	-	1.62 sq.m
	Risers	4	1.80	-	0.15	1.08 sq.m
	Ends	2	0.90	-	0.15	0.27 sq.m
		2	0.60	-	0.15	0.18 sq.m
		2	0.30	-	0.15	0.09 sq.m
				Total		3.24 sq. m

In the above estimate of step

The quantities of brick work may also be calculated in short as

$$\text{Average sectional area} \times \text{length} = \left[\frac{0.90 + 0.30}{2} \times 0.45 \right] \times 1.80 = 0.486 \quad \} \quad = \text{Total} \quad 0.567 \text{ cu m}$$

$$\text{low ground level} = 1.80 \times 0.90 \times 0.05 = 0.081$$

The quantities of plastering may be calculated in short as

Risers and treads = Length x total of risers and treads

$$= 1.80 \times (4 \times 0.15 + 3 \times 0.30) = 2.70$$

$$\text{Ends} = 2 \times \text{Average breadth} \times \text{height} = 2 \times \left[\frac{0.90 + 0.30}{2} \right] \times 0.45 = 0.54 \quad \} \quad = \text{Total} \quad 3.24 \text{ sq m}$$

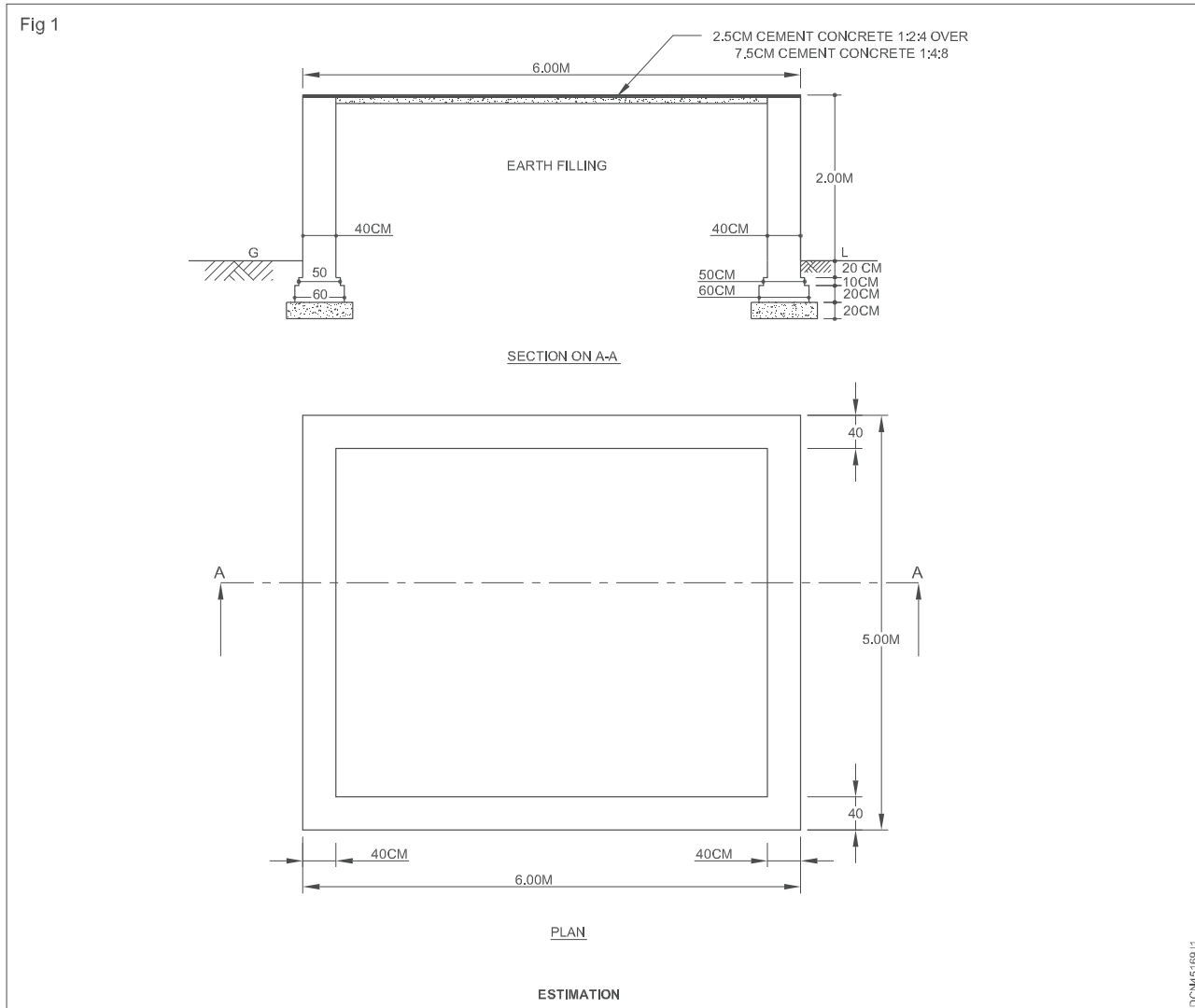
Estimate a masonry platform

Objectives: At the end of this exercise you shall be able to

- prepare the quantities of earth work
- prepare the quantities of concrete
- prepare the quantities of brickwork.

PROCEDURE

TASK 1 : Estimate the cost of a masonry platform 6 m x 5 m from the given drawing and specifications (Fig 1).



General specification

- 1 Foundation - Cement concrete 1:4:8
- 2 Masonry - 1st class brick work in cement mortar
- 3 Flooring - 2.5 cement concrete. 1:2:4 over 7.5 cm cement concrete 1:4:8
- 4 Wall finishing - Outside walls are 12 mm thick plastered with cement mortar 1:6

Rates - take local current rates

Centre to centre length

$$\begin{aligned} \text{Centre to centre length long wall} &= 6.00 - 2 \times \frac{0.40}{2} \\ &= 5.60 \text{ m} \\ \text{Centre to centre length short wall} &= 5.00 - 2 \times \frac{0.40}{2} \\ &= 4.60 \text{ m} \end{aligned}$$

Details of measurement and calculation of quantities

Item No.	Particulars of item of work	No.	L (m)	B (m)	HT or D. (m)	Quantity or contents	Total Quantity	Explanatory notes
1	Earthwork in excavation in foundation-							
	Long walls ...	2	6.40	0.80	0.70	7.17 m ³		L = 5.60 + 0.80 = 6.40 m
	Short walls ...	2	3.80	0.80	0.70	4.25 m ³		L = 4.60 - 0.80 = 3.80 m
					Total	11.42 Cu m		
2.	Earthwork in filling inside above G.L.	1	5.20	4.20	1.93	42.15 m ³	42.15 cu m	Ht. = 2.00 - 0.75 = 1.925 = 1.93 m
3.	Cement concrete in Foundation 1:4:8							
	Long wall ...	2	6.40	0.80	0.20	2.05 m ³		length same as for excavation
	Short wall ...	2	3.80	0.80	0.20	1.21 m ³		
					Total	3.26 cu. m		
4.	First class brick work in cement mortar -							
	Long walls							
	1 st footing ...	2	6.20	0.60	0.20	1.49 m ³		L = 5.60 + .60 = 6.20 m
	2 nd footing ...	2	6.10	0.50	0.10	0.61 m ³		L = 6.20 - .10 = 6.10 m (or) = 5.60 + .50 = 6.10
	Wall above footing	2	6.00	0.40	2.20	10.56 m ³		L = 6.10 - .10 = 6.00 m (or) = 5.60 + .40 = 6.00m
	Short walls -							
	1 st footing ...	2	4.00	0.60	0.20	0.96 m ³		L = 4.60 - .60 = 4.00 m L = 4.60 - .50 = 4.10m (or)
	2 nd footing	2	4.10	0.50	0.10	0.41 m ³		L = 4.00 + .10 = 4.10 m L = 4.60 - 0.40 = 4.20 (or)
Wall above footing	2	4.20	0.40	2.20	7.39 m ³		L = 4.10 + 0.10 = 4.20 m	
					Total	21.42 Cu m		

5	12 mm cement sand Plastering 1:6 in walls outside	Long walls ...	2	6.00	-	2.10	25.20 m ³	} Including 10 cm below G.L.
			2	5.00	-	2.10	21.00 m ²	
			Total				46.20 Sq m	
6	7.5 cm c.c. 1:4:8 floor	1	5.20	4.20	-	21.84 m ²	21.84 Sq m	
7	2.5 cm c.c. 1:2:4 on top of floor	1	6.00	5.00	-	30 m ²	30m ²	

Abstract of estimated cost

Item no.	Particulars of items of work	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
1	Earthwork in excavation in Foundation ...	11.42	cu m	Rates can be quoted from the prevailing schedule of rates	% cu m	
2	Earthwork in filling ...	42.15	cu m		% cu m	
3	Cement concrete in foundation ...	3.26	cu m		cu m	
4	1 st class brick work in lime mortar ...	21.42	cu m		cu m	
5	12 mm cement sand plastering 1:6 ...	46.20	sq. m		sq m	
6	7.5 cm cement concrete 1:4:8 for floor ...	21.84	sq m		sq m	
7	2.5 cm cement concrete 1:2:4 on the top of floor	30.00	sq m		sq m	
				Total	...	
Add 3% for contingencies		...				
Add 2% for Work charged Establishment		...				
Grand Total						

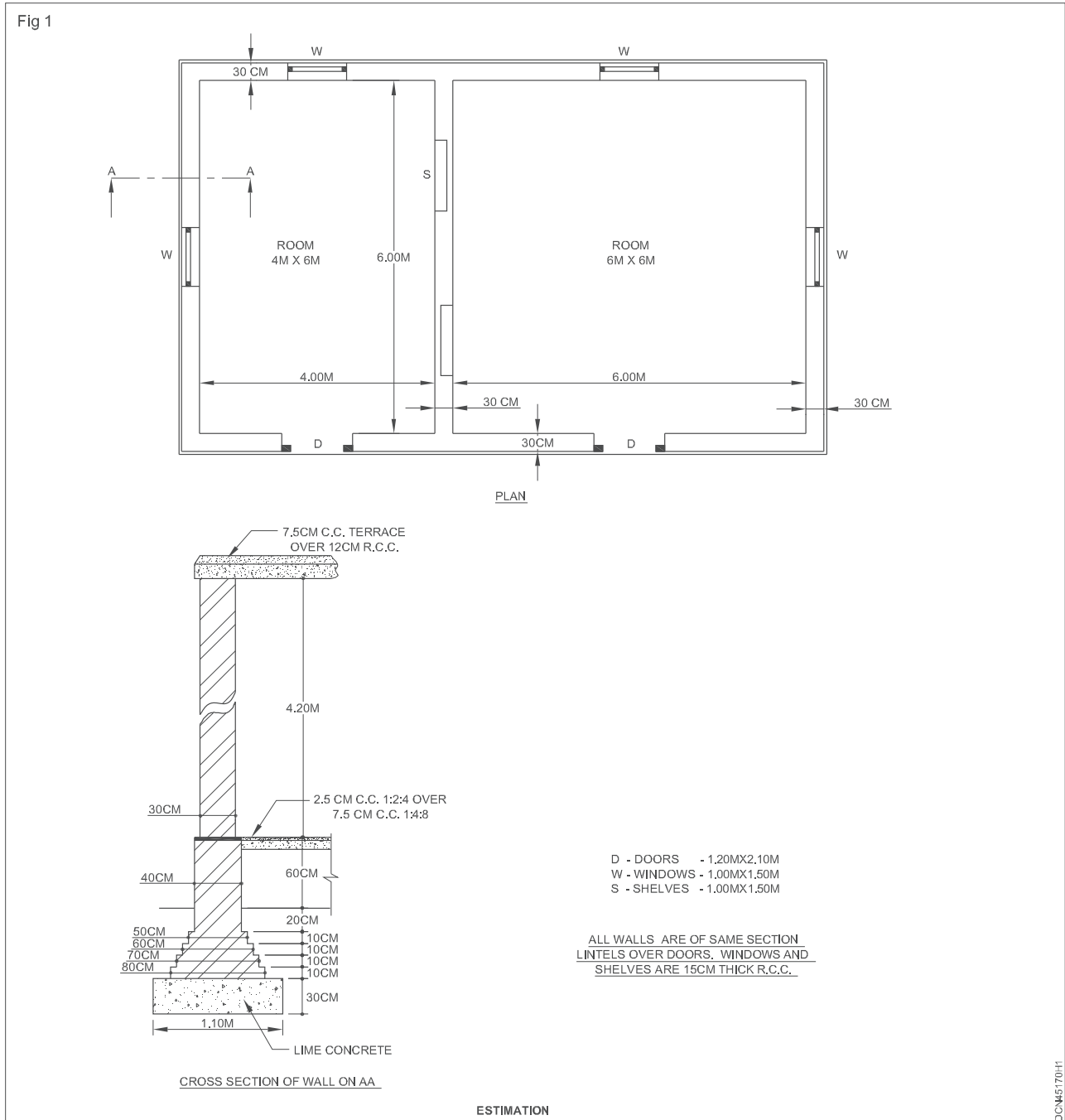
Estimate a small building

Objectives: At the end of this exercise you shall be able to

- prepare the quantities of items by long wall shortwall methods
- prepare the quantities of items by centre line method.

PROCEDURE

TASK 1: Estimate the quantities of the following items of a two roomed building from the given plan and section (Fig 1)



DATA

- Earthwork in excavation in foundations
- cement concrete in foundation
- 1st class brickwork in cement mortar 1:6 in foundation and plinth
- 2.5cm c.c. damp proof course, and
- 1st class brickwork in cement mortar in superstructure.

1 Seperate wall method

Details of measurement and calculation of quantities

Item No.	Particulars of items	No.	Length (m)	Breadth (m)	Height or Depth (m)	Qty	Explanatory note
1	Earthwork in excavation in foundation -						Long wall, c/c. length = $4 + 6 + 0.30 + 2 \times \frac{0.30}{2} = 10.60$ m
	Long walls ...	2	11.70	1.10	1.00	25.74 m ³	Short and Inner walls, c/c length = $6 + 2 \times \frac{0.30}{2} = 6.30$ m
	Short walls ...	3	5.20	1.10	1.00	17.16 m ³	L = 10.60 + 1.10 = 11.70 m L = 6.30 - 1.10 = 5.20 m
	Total					42.90 cu m	
2	Lime concrete in foundation -						
	Long walls ...	2	11.70	1.10	0.30	7.72 m ³	Length same for excavation
	Short walls ...	3	5.20	1.10	0.30	5.15 m ³	Quantity = 3/10 of excavation
	Total					12.87 cu m	
3	1 st class brick work in 1 : 6 cement mortar in foundation and plinth -						
	Long walls ...						
	1 st footing	2	11.40	0.80	0.20	3.65 m ³	L = 10.60 + 0.80 = 11.40 m
	2 nd footing	2	11.30	0.70	0.10	1.58 m ³	L = 10.60 + 0.70 = 11.30 m
	3 rd footing	2	11.20	0.60	0.10	1.34 m ³	L = 10.60 + 0.60 = 11.20 m
	4 th footing	2	11.10	0.50	0.10	1.11 m ³	L = 10.60 + 0.50 = 11.10 m
	Plinth wall above footing	2	11.00 m	0.40 m	0.80 m	7.04 m ³	L = 10.60 + 0.40 = 11.00 m

4	Short walls ...						
	1 st footing	3	5.50	0.80	0.20	2.64 m ³	L = 6.30 - 0.80 = 5.50 m
	2 nd footing	3	5.60	0.70	0.10	1.18 m ³	L = 6.30 - 0.70 = 5.60 m
	3 rd footing	3	5.70	0.60	0.10	1.03 m ³	L = 6.30 - 0.70 = 5.70 m
	4 th footing	3	5.80	0.50	0.10	0.87 m ³	L = 6.30 - 0.70 = 5.80 m
	Plinth wall above footing	2	5.90	0.40	0.80	5.66 m ³	L = 10.60 + 0.40 = 11.00 m
	Total					26.10 cu m	
	Damp proof course 2.5 cm thick c.c. -						
	Long walls ...	2	11.00	0.40	-	8.80 m ²	Lengths same as for plinth wall in item 3.
	Short walls ...	3	5.90 m	0.40 m	-	7.08 m ²	
Total					15.88 sq.m		
5	Deduction for :- Door sills	2	1.20	0.40	-	0.96 sq.m	
	Net Total					14.92 sq.m	
	1 st class brick work in cement mortar in super structure						
	Long walls ...	2	10.90	0.30	4.20	27.47 m ³	L = 10.60 + 0.30 = 10.90 m
	Short walls ...	3	6.00	0.30	4.20	22.68 m ³	L = 6.30 - 0.30 = 6.00 m
	Total					50.15 cu m	
	Deduct -						
	Door opening	2	1.20	0.30	2.10	1.51 m ³	
	Window openings	4	1.00	0.30	1.50	1.80 m ³	
	Shelves	2	1.00	0.20	1.50	0.60 m ³	Back of shelves 10 cm thick wall
Lintels over doors	2	1.50	0.30	0.15	0.14 m ³	Bearing 15 cm	
Lintels over windows	4	1.30	0.30	0.15	0.23 m ³	Bearing 15 cm	
Lintels over shelves	2	1.30	0.30	0.15	0.12 m ³	Bearing 15 cm	
Total of deduction					4.40 m ³		
Net Total					45.75 cu m		

2 Centre line method

In this problem there are two junctions of the inner wall with the main wall.

Total centre length = 2 x c. to c. of long wall + 3 x c. to c. of short wall

$$= 2 \times 10.60 + 3 \times 6.30 = 40.10 \text{ m}$$

Fig 2 represents the foundations trench plan.

If the total centre length is multiplied by the breadth and depth, at the junction the portions A and B shown by hatch lines fig. 2 come twice and we get the quantity in excess

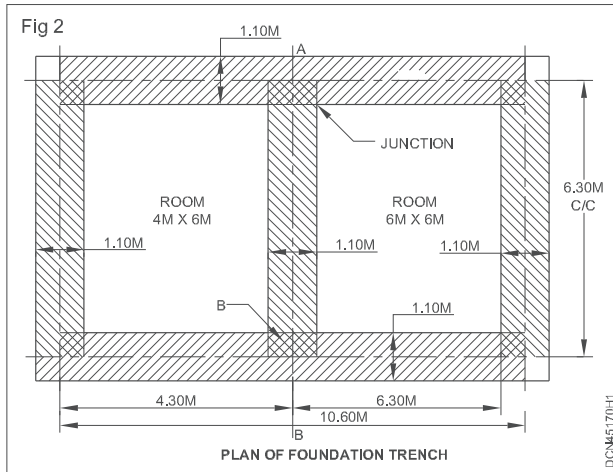
by the these portions, and these excess shall have to be deducted. The deduction may be effected reducing the centre length by half breadth for each junction.

Total centre length if foundation concrete

$$= \frac{\text{Total C/L length of} - n \times \text{breadth of foundation concrete}}{2}$$

(Where n= Number of functions)

$$= 40.10 - 2 \times \frac{1.10}{2} = 39.00 \text{ m}$$



Similarly

C/L length of first footing = Total C/L - n x B/2

$$= 40.10 - 2 \times \frac{0.80}{2} = 39.30 \text{ m}$$

$$\text{C/L length of II}^{\text{nd}} \text{ footing} = 40.10 - 2 \times \frac{0.70}{2} = 39.40 \text{ m}$$

$$\text{C/L length of III}^{\text{rd}} \text{ footing} = 40.10 - 2 \times \frac{0.60}{2} = 39.50 \text{ m}$$

$$\text{C/L length of IV}^{\text{th}} \text{ footing} = 40.10 - 2 \times \frac{0.50}{2} = 39.60 \text{ m}$$

$$\text{C/L length of plinth} = 40.10 - 2 \times \frac{0.40}{2} = 39.70 \text{ m}$$

$$\text{C/L length of wall} = 40.10 - 2 \times \frac{0.30}{2} = 39.80 \text{ m}$$

Item No.	Particulars of Items	No. (m)	Length (m)	Breadth	Height or Depth (m)	Qty	Explanatory notes
1	Earthwork in excavation in foundation ...	1	39.00	1.10	1.00	42.90 cu m	Total centre length = 40.10 m $L = 40.10 - 2 \times \frac{0.10}{2} = 39.00 \text{ m}$
2	Cement concrete in foundation ...	1	39.00	1.10	0.30	12.87 cu m	$L = 40.10 - 2 \times \frac{0.10}{2} = 39.00 \text{ m}$
3	1 st class brick-work in 1:6 cement mortar in foundation and plinth -						
	1 st footing	1	39.30	0.80	0.20	6.29 m ³	$L = 40.10 - 2 \times \frac{0.80}{2} = 39.30 \text{ m}$
	2 nd footing ...	1	39.40	0.70	0.10	2.76 m ³	$L = 40.10 - 2 \times \frac{0.70}{2} = 39.40 \text{ m}$
	3 rd footing ...	1	39.50	0.60	0.10	2.37 m ³	$L = 40.10 - 2 \times \frac{0.60}{2} = 39.50 \text{ m}$
	4 th footing ...	1	39.60	0.50	0.10	1.98 m ³	$L = 40.10 - 2 \times \frac{0.50}{2} = 39.60 \text{ m}$
	Plinth wall above footing ...	1	39.70	0.40	0.80	12.70 m ³	$L = 40.10 - 2 \times \frac{0.40}{2} = 39.70 \text{ m}$
						Total	26.10 m ³

4	Damp proof course 2.5						
	cm c.c ...	1	39.70	0.40	-	15.88 m ²	$L = 40.10 - 2 \times \frac{0.40}{2} = 39.70 \text{ m}$
	Deduct door sill ...	1	1.20	0.40	-	0.96 m ²	
				Net	14.92 Sq. m		
5	1 st class brick-work In cement mortar in						
	superstructure ...	1	39.80	0.30	4.20	50.15 m ³	$L = 40.10 - 2 \times \frac{0.30}{2} = 39.80 \text{ m}$
	Deduct door, window, shelves openings and lintels ...	1	same as per detail in Separate wall method			4.40 m ³	Deduction to be made as usual
					Net	45.75 Cu m	

Estimate of a single storey building

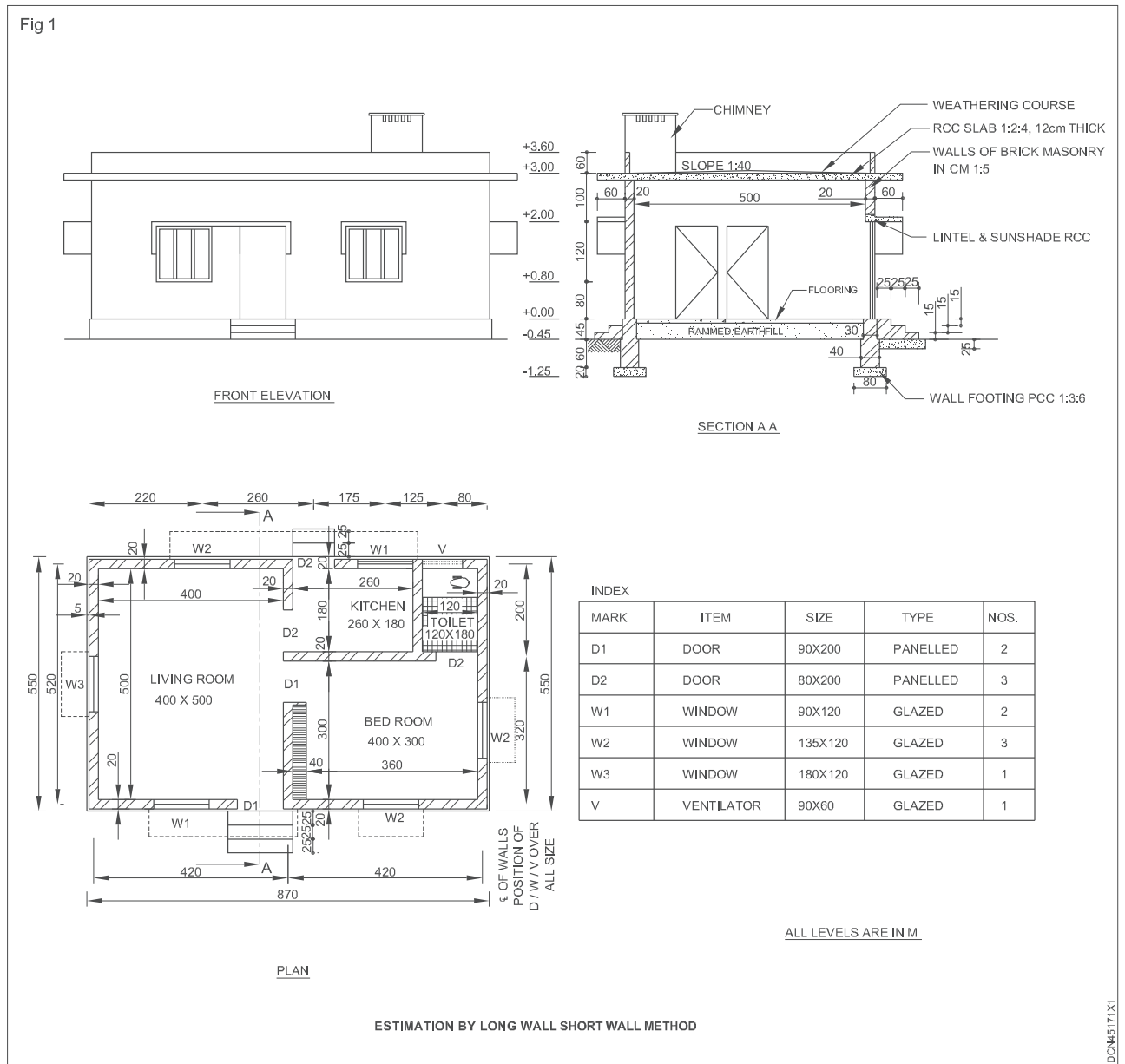
Objectives: At the end of this exercise you shall be able to

- prepare the estimate of the given building by long wall short wall method
- prepare the estimate of the given building by centre line method
- prepare the abstract of the estimate.

PROCEDURE

TASK 1: Prepare the estimate by longwall shortwall method (Fig 1)

DATA: Given drawing



Long wall short wall method

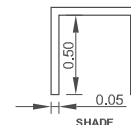
Item No.	Description	No.	Length (M)	Breadth (M)	Height (M)	Qty	Explanatory notes
1	Site clearing and levelling					L.S	
2	Earthwork excavation in all classes of soil (except in hard rock and medium rock requiring blasting) and depositing on bank with initial lead upto 30 m and lift upto 1.5 m including block filling breaking clots watering ramming and sectioning of spoil bank etc. complete for foundation.						
	Long wall	2	9.20	0.80	0.80	11.776 m ³	$L = 8.40 + 2 \times \frac{0.80}{2}$ = 9.20 m
	Wall between kitchen & bedroom	1	5.00	0.80	0.80	3.2 m ³	$L = 4.20 + 2 \times \frac{0.80}{2}$ = 5.00 m
	Short wall Side of living	1	4.40	0.80	0.80	2.81 m ³	$L = 5.20 - 2 \times \frac{0.80}{2}$ = 4.40 m
	Side of bedroom	2	2.40	0.80	0.80	3.072 m ³	$L = 3.20 - 2 \times \frac{0.80}{2}$ = 2.40 m
	Side of kitchen & Toilet	3	1.20	0.80	0.80	2.304 m ³	$L = 2.00 - 2 \times \frac{0.80}{2}$ = 1.20 m
	Step front	1	1.70	0.90	0.20	0.306 m ³	$L = 1.30 + 2 \times 0.20$ = 1.70 m
	Step back	1	1.70	0.65	0.20	0.221 m ³	$L = 1.30 + 2 \times 0.20$ = 1.70 m
						Total	23.675 m ³
3	Plain cement concrete 1:4:8 (1 part cement 4 part sand, 8 parts of						

4	broken stone, 40 mm nominal size) including cost and conveyance for all materials to site and all labour charges for consolidation, watering, curing etc. complete.						
	Long wall	2	9.20	0.80	0.20	2.94 m ³	} L is same as item no 2
	Wall between kitchen & bedroom	1	5.00	0.80	0.20	0.8 m ³	
	Short wall :- Side of living	1	4.40	0.80	0.20	0.70 m ³	
	Side of bedroom	2	2.40	0.80	0.20	0.76 m ³	
	Side of kitchen & Toilet	3	1.20	0.80	0.20	0.57 m ³	
	Step front	1	1.70	0.90	0.20	0.30 m ³	
	Step back	1	1.70	0.65	0.20	0.221 m ³	
						Total	6.03 m ³
	RR Masonry in cement mortar 1:6 (1 part cement and 6 part sand) including cost and conveyance of all materials to site and all labour charges, watering curing etc. complete for foundation and plinth						
	i) Foundation						
	a) Long wall	2	8.80	0.40	0.60	4.224 m ³	$L = 8.4 + 2 \times \frac{0.40}{2}$ = 8.80 m
	Wall between bedroom and kitchen	1	4.60	0.40	0.60	1.104 m ³	$L = 4.204 + 2 \times \frac{0.40}{2}$ = 4.60 m
	b) Short wall						
Side of living	1	4.80	0.40	0.60	1.152 m ³	$L = 5.2 - 2 \times \frac{0.40}{2}$ = 4.80 m	
Side of bedroom	2	2.80	0.40	0.60	1.314 m ³	$L = 3.2 - 2 \times \frac{0.40}{2}$ = 2.80 m	

5	Side of kitchen and toilet	3	4.80	0.40	0.60	1.152 m ³	$L = 2.00 - 2 \times \frac{0.40}{2}$ = 1.60 m
	ii) Plinth						
	a) Long wall	2	8.70	0.30	0.45	2.349 m ³	$L = 8.40 + 2 \times \frac{0.30}{2}$ = 8.70 m
	Wall between kitchen and bedroom	1	4.50	0.30	0.45	0.607 m ³	$L = 4.20 + 2 \times \frac{0.30}{2}$ = 4.50 m
	Side of living	1	4.90	0.30	0.45	0.661 m ³	$L = 5.20 - 2 \times \frac{0.30}{2}$ = 4.90 m
	Side of bedroom	2	2.90	0.30	0.45	0.783 m ³	$L = 3.20 - 2 \times \frac{0.30}{2}$ = 2.90 m
	Side of kitchen and toilet	3	1.70	0.30	0.45	0.688 m ³	$L = 2.00 - 2 \times \frac{0.30}{2}$ = 1.70 m
						Total	14.06 m ³
	Damp proof course 2.5 cm thick cement mortar 1:3						
	i) Long wall	2	8.70	0.30	-	5.33 m ²	} Length as same as item 4(ii)
Wall between kitchen and bedroom	1	4.50	0.30	-	1.35 m ²		
ii) Short wall side of living	1	4.90	0.30	-	1.47 m ²		
Side of bedroom	2	2.90	0.30	-	1.74 m ²		
Side of kitchen and toilet	3	1.70	0.30	-	1.53 m ²		
						11.31 m ²	
Deduction							
Door - D1	2	0.90	0.30	-	0.54 m ²		
Door - D2	3	0.80	0.30	-	0.72 m ²		
Total deduction						1.26 m ²	
Net quantity						10.05 sq.m	
6	Brick masonry in cement mortar 1:6(one part cement 6 part sand) of size (19x9x9) cm for walls						

	including cost and conveyance of all materials to site, scaffolding charges and all other labour charges, watering, curing, etc. complete						
i) Long wall		2	8.60	0.20	3.00	10.32 m ²	$L = 8.40 + 2 \times \frac{0.20}{2}$ = 8.60 m
Wall between kitchen & bedroom		1	4.40	0.20	3.00	2.64 m ²	$L = 4.2 + 2 \times \frac{0.20}{2}$ = 4.40 m
ii) Short wall							
Side of living		1	5.00	0.20	3.00	3.00 m ³	$L = 5.2 - 2 \times \frac{0.20}{2}$ = 5.00 m
Side of bedroom		2	3.00	0.20	3.00	3.60 m ³	$L = 3.2 - 2 \times \frac{0.20}{2}$ = 3.00 m
Side of kitchen & toilet		3	1.80	0.20	3.00	3.24 m ³	$L = 2.00 - 2 \times \frac{0.20}{2}$ = 1.80 m
Side of shelf		1	0.40	0.20	0.50	0.24 m ³	
Parapet wall :							
Long wall		2	8.60	0.20	0.50	1.72 m ³	
Short wall		2	5.00	0.20	0.50	1.00 m ³	
Step:- Front							
1 st step		1	1.30	0.75	0.15	0.14 m ³	
2 nd step		1	1.30	0.50	0.15	0.09 m ³	
3 rd step		1	1.30	0.25	0.15	0.04 m ³	
Step back :							
1 st step		1	1.30	0.50	0.15	0.09 m ³	
2 nd step		1	1.30	0.25	0.15	0.04 m ³	
				Total quantity		26.19 m ³	
Deduction:							
Doors D1		2	0.90	0.20	2.00	0.72 m ³	
D2		3	0.80	0.20	2.00	0.96 m ³	
Window:							
W1		2	0.90	0.20	1.20	0.43 m ³	
W2		3	1.35	0.20	1.20	0.97 m ³	

7	W3	1	1.80	0.20	1.20	0.43 m ³	Net qty = Total qty - Total deduction
	Ventilator	1	0.90	0.20	0.60	0.10 m ³	
	Lintels for						
	Door D1	2	1.20	0.20	0.15	0.07 m ³	
	Door D2	3	1.10	0.20	0.15	0.09 m ³	
	Windows						
	W1	2	1.20	0.20	0.15	0.07 m ³	
	W2	3	1.65	0.20	0.15	0.14 m ³	
	W3	1	2.10	0.20	0.15	0.06 m ³	
	Ventilator	1	1.20	0.20	0.15	0.03 m ³	
	Total deduction					4.11 m ³	
	Net quantity					22.08 m ³	
	Reinforced cement concrete 1:2:4 (1 part cement 2 parts sand 4 parts broken stone of 20mm size) including cost and conveyance of all materials to site all labour charges for form work, mixing, laying, vibrating, watering, curing etc. complete but excluding cost of steel reinforcement and its bending.						
	Roof slabs	1	9.80	6.60	0.12	7.76 m ³	
	Lintels for						
	Door D1	2	1.20	0.20	0.15	0.07 m ³	
	D2	3	1.10	0.20	0.15	0.09 m ³	
	Windows						
	W1	2	1.20	0.20	0.15	0.07 m ³	
	W2	3	1.65	0.20	0.15	0.14 m ³	
	W3	1	2.1	0.20	0.15	0.06 m ³	
	Ventilator	1	1.20	0.20	0.15	0.03 m ³	
Shade for door D1 - top member	1	1.00	0.60	$\frac{0.10+0.05}{2}$	0.045 m ³		
Vertical member	2	0.05	0.60	0.50	0.03 m ³		
Door - D2	1	0.90	0.60	0.075	0.04 m ³		
Vertical member	2	0.05	0.60	0.50	0.03 m ³		
Windows - W1							
Top member	2x1	1.00	0.60	0.075	0.09 m ³		
Vertical member	2x2	0.05	0.60	0.50	0.06 m ³		



	Windows - W2						
	Top members	3x1	1.95	0.60	0.075	0.19 m ³	
	Vertical member	3x2	0.05	0.60	0.50	0.09 m ³	
	Windows - W3						
	Top members	1x1	1.90	0.60	0.075	0.085 m ³	
	Vertical member	1x2	0.05	0.60	0.50	0.03 m ³	
	Kitchen slab	1	2.00	0.70	0.10	0.14 m ³	
	Shelf slab	1x4	2.10	0.50	0.05	0.21 m ³	
					Total	9.25 m ³	
8	Providing steel reinforcement for RCC works including labour charges for bending tying and placing in position etc. complete.		9.25 m ³ @0.8% m ³				Sp. wt. of steel is 7850 kg/m ³
			$9.25 \times \frac{0.80}{100} = 0.074 \text{ m}^3$ $= 0.074 \times 7850$ $= 580.9 \text{ kg}$				
9	Supplying and fixing sal wood frames for doors, windows and ventilations					5.809 qtl	
	Doors D1 (Front door) vertical member	1x2	2.00	0.12	0.09	0.043 m ³	
	Horizontal member D1 (inside)	1x2	1.10	0.12	0.09	0.023 m ³	
	Vertical members	1x2	2.05	0.12	0.09	0.044 m ³	
	Horizontal members	1x1	1.1	0.12	0.09	0.0118 m ³	
	Door - D2 :						
	D2 (Back door)						
	Vertical members	1x2	2.00	0.12	0.090	0.0432 m ³	Take horn projection = 10cm and extra 5cm for vertical member which is inserted in the floor.
	Horizontal member	1x2	1.00	0.12	0.09	0.0211 m ³	
	D2 - (inside door)						
	Vertical member	2x2	2.05	0.12	0.09	0.0885 m ³	
	Horizontal member	2x1	1.00	0.12	0.09	0.0216 m ³	
	Windows :						
	W1 - Vertical member	2x3	1.20	0.10	0.07	0.0504 m ³	
	- Horizontal member	2x2	1.10	0.10	0.07	0.0308 m ³	
	W2 - Vertical member	3x4	1.20	0.10	0.07	0.1008 m ³	
	- Horizontal member	3x2	1.55	0.10	0.07	0.0651 m ³	
	W3 - Vertical member	1x5	1.20	0.10	0.07	0.042 m ³	
	- Horizontal member	1x2	2.00	0.10	0.07	0.028 m ³	
	Ventilator - Vertical	1x3	0.60	0.10	0.07	0.0126 m ³	
	- Horizontal	1x2	1.10	0.10	0.07	0.0154 m ³	
				Total		0.6412 m ³	

10	Supplying and fixing teak wood fully panelled shutters to suite the door frames already fixed inclusive of labour charges for fixing all fittings but exclusive of cost of fittings etc. complete						
	Door D1 (front)	1	0.75	-	1.85	1.387 m ²	L = 0.90 - 2 x frame thickness + 2 rebate
	Door D1 (inside)	1	0.75	-	1.915	1.936 m ²	L = 0.90 - (2 x 0.09) + (2 x 0.015) = 0.75 m
	D2 (backside)	1	0.65	-	1.85	1.202 m ²	H = 2.00 - (1 x 0.09) + (1 x 0.015) - (1 x 0.01) = 1.915 m
	D2 (inside)	2	0.65	-	1.915	2.489 m ²	H = 2.00 - (2 x 0.09) + (2 x 0.015)
				Total		6.515 sq.m	= 1.85 m
11	Supplying and fixing teak wood fully grazed shutter to suite the frames of window and ventilations already fixed inclusive of labour charges for fixing all fittings but exclusive of cost of fitting etc. complete						Frame of window (10 x 7) cm Rebate 1.5 cm
	Window w1	2x1	0.75	-	1.09	1.635 m ²	L = 0.90 - (3 x 0.07) + (4 x 0.015) = 0.750m
	w2	3x1	1.16	-	1.09	3.793 m ²	h = 1.20 - (2 x 0.07) + (2 x 0.015) = 1.09 m
	w3	1x1	1.57	-	1.09	1.711 m ²	L = 1.35 - (4 x 0.07) + (6 x 0.015) = 1.16 m
	Ventilator	1x1	0.75	-	0.49	0.368 m ²	L = 1.80 - (5 x 0.07) + (8 x 0.015) = 1.57 m
				Total		7.507 m ²	h = 0.60 + (2 x 0.07) + (2 x 0.015) = 0.49 m
12	Plastering with cement mortar 1:3, 12 mm thick one coat						
	Ceiling :						
	i Living room	1	4.00	5.00	-	20 m ²	
	ii Bedroom	1	4.00	3.00	-	12 m ²	
	iii Kitchen	1	2.60	1.80	-	4.68 m ²	
iv Toilet	1	1.20	1.80	-	2.16 m ²		

	Roof projection:-						
	i Front and back	2	9.80	1.32	-	25.87 m ²	L = 8.60 + (2 x 0.60) = 9.80 m b = (2 x 0.6) + 0.12 = 1.32 m
	ii sides	2	5.40	1.32	-	14.25 m ²	
	Sunshades :						
	Door - D1						
	Horizontal	1	1.00	1.25	-	1.25 m ²	
	Vertical	2	0.50	1.25	-	1.25 m ²	
	D2						
	Horizontal	1	0.90	1.25	-	1.125 m ²	
	Vertical	2	0.50	1.25	-	1.25 m ²	
	Windows - W1						
	Horizontal	2x1	1.00	1.25	-	2.5 m ²	
	Vertical	2x2	0.50	1.25	-	2.5 m ²	
	W2						
	Horizontal	3x1	1.45	1.25	-	5.437 m ²	
	Vertical	3x2	0.50	1.25	-	3.75 m ²	
	W3						
	Horizontal	1x1	1.90	1.25	-	2.375 m ²	
	Vertical	1x2	0.50	1.25	-	1.25 m ²	
	Kitchen slab	1	1.80	1.30	-	2.34 m ²	
	Shelf slab	4	1.90	0.85	-	6.46 m ²	
					Total	110.43 m ²	
13	Plastering with cement mortar 1:4, 12 mm thick 1 coat to inside and outside walls floated hard and trowelled smooth including watering curing. cost and conveyance of all materials to sight and labour charges etc. complete.						
	i) Inside						
	Living room	1	18.00	-	3.00	54 m ²	L = Perimeter of room
	Bedroom	1	14.00	-	3.00	42 m ²	
	Kitchen	1	8.80	-	3.00	26.4 m ²	
	Toilet	1	6.00	-	3.00	18.00 m ²	L = 0.4 + 0.1 + 0.4 = 0.9 m
	Sides of shelf	1	0.90	-	3.00	2.7 m ²	
					Total	143.1 m ²	Inside plastering

	ii) Outside	1	28.00		3.00	84.00 m ²	L = (8.6x2) + (5.4x2) = 28.00 m
	Parapet :						
	Front & back wall	2	8.60	-	1.20	20.64 m ²	
	Side wall	2	5.00	-	1.20	12.00 m ²	
	Step (Front) :						
	Front portion	1	1.30	-	0.45	0.580 m ²	
	Side						
	1 st step	2	0.75	-	0.15	0.225 m ²	
	2 nd step	2	0.50	-	0.15	0.15 m ²	
	3 rd step	2	0.25	-	0.15	0.075 m ²	
	Step back						
	Front portion	1	1.30	-	0.45	0.583 m ²	
	Side						
	1 st step	2	0.50	-	0.15	0.15 m ²	
	2 nd step	2	0.25	-	0.15	0.075 m ²	
					Total	118.485 m ²	Outside plastering
	Grand total (inside and outside plastering)					261.28 m ²	
	Deduction						
	Door - D1	2	0.90	-	2.00	3.6 m ²	Deduct only one face
	D2	3	0.80	-	2.00	4.8 m ²	
	Window - w1	2	0.90	-	1.20	2.16 m ²	
	w2	3	1.35	-	1.20	4.86 m ²	
	w3	1	1.80	-	1.20	2.16 m ²	
	Ventilator - V	1	0.90	-	0.60	0.54 m ²	
	Total deduction					18.12 m ²	
	Net quantity					243.16 m ²	
14	Pointing random rubble masonry with cement mortar 1:3						
	Basement	1	28.40	-	0.45	12.87 m ²	
	Deduction steps	2	1.30	-	0.45	1.17 m ²	L = (8.70x2)+(5.50x2) = 28.40 m
	Net quantity					11.70 m ²	
15	Flooring with cement concrete 1:4:8 (1 part cement, 4 parts sand 8 parts broken stone 40 mm nominal size) 10 cm thick including watering, curing, cost & conveyance of all material to site all labour charges etc. complete						

16	Living room :	1	3.90	4.90	-	19.11 m ²	Plinth offset 5 cm L= 4.00-(2x0.05)=3.90 m L= 5.00-(2x0.05)=4.90 m L= 2.60-(2x0.05)=2.50 m L= 3.00-(2x0.05)=2.90 m L= 1.80-(2x0.05)=1.70 m	
	Bedroom	1	3.90	2.90	-	11.31 m ²		
	Kitchen	1	2.50	1.70	-	4.25 m ²		
	Toilet	1	1.10	1.70	-	1.87 m ²		
	Total					36.54 m ²		
	Flooring with vitrified tiles (60x60) cm size of approved quality including pointing, skirting, cost and conveyance of all materials to site and all labour charges etc. complete							
	i Living room:							
	Floor	1	4.00	5.00	-	20.00 m ²		
	Skirting	1	18.00	-	0.10	1.80 m ²		
	ii Bedroom:							
Floor	1	4.00	3.00	-	12.00 m ²			
Skirting	1	14.00	-	0.10	1.40 m ²			
Total						35.20 m ²		
17	Flooring with ceramic tiles of approved quality with size 30 x 30 cm including pointing, skirting, cost and conveyance of all material to site, all labours charges etc. complete.							
	Kitchen							
	Floor	1	2.60	1.80	-	4.68 m ²		
	skirting	1	8.80	-	0.10	0.88 m ²		
Total						5.56 m ²		
18	Dado in the walls of toilet with white glazed tiles over 12 mm thick cement mortar 1:3 including pointing cost and conveyance of all materials to site all labour charges etc. complete							
	Toilet							
	Floor	1	1.20	1.80	-	2.16 m ²	(1.80+1.20)2 - (1x0.80) + (2x0.2)=5.60m	
	Wall	1	5.60	-	1.50	8.40 m ²		
Total						10.56 m ²		

19	White cement washing 2 coats to the surface of slab, shade, walls, etc. adding necessary adhes- ives, cleaning the surface including cost and conveyance of all material to site, all labour charges etc. complete						
	Ceiling					110.43 m ²	
	Walls					243.16 m ²	
					Total	344.59 sq.m	
20	Painting walls with emulsion paint two coats over coat of primer and & two coats of putty after rubbing with sand paper and cleaning the surface including cost and conveyance of all materials to site all labour charges etc. complete.					243.16 m ²	
21	Painting on new wood work 2 coats over one coat of priming						
	Door - D1	2x2.25	0.90	-	2.00	8.10 m ²	2.25 times one surface for both sides.
	D2	3x2.25	0.80	-	2.00	10.80 m ²	
	Windows - w1	2x1	0.90	-	1.20	2.16 m ²	One surface for both sides.
	w2	3x1	1.35	-	1.20	4.86 m ²	
	w3	1x1	1.80	-	1.20	2.16 m ²	
	Ventilator	1x1	0.90	-	0.60	0.54 m ²	
	Iron bars for windows						
	Window - w1	2x1	0.69	-	1.06	1.46 m ²	Excluding frame, one flat area for overall
	w2	3x1	1.07	-	1.06	3.40 m ²	
	w3	1x1	1.45	-	1.06	1.53 m ²	
Ventilator	1x1	0.69	-	0.46	0.31 m ²		
					Total	35.32 m ²	
22	Iron work (mild steel) in hold fast and window gratings.						

Hold fast in door in windows	5x6				30 nos
	6x4				24 nos
			54 nos @ 1 kg/each		54 nos
Windows bars 16 mm dia @ 1.58 kg/m					54 kg
w1 - window	2x10	0.90	-	-	118 m
w2 - window	3x10	1.35	-	-	40.5 m
w3 - window	1x10	1.80	-	-	18 m
Ventilator	1x4	0.90	-	-	3.6 m
Total	80.1 m @ 1.58 kg/m				80.1 m
			= 126.588 kg		126.586 kg
Grand total					180.588 m
					1.80 qt

TASK 2 : Prepare the estimate of given building by centre line method

Centre line method

Actual centre line length = total centre line length-

Where n = No. of functions

b = Breadth of that work

Total centre line length =

$$(0.10+4+0.20+4+3.6+0.10)2+(0.10+5.10)3+4.2+2$$

$$= 38.6 \text{ m}$$

Actual C/L Length for earthwork excavation =

$$38.6 - 6 \times \frac{0.80}{2} = 36.2 \text{ m}$$

$$\text{Actual C/L Length for pcc} = 38.6 - 6 \times \frac{0.80}{2} = 36.2 \text{ m}$$

$$\text{Actual C/L Length for foundation} = 38.6 - 6 \times \frac{0.40}{2} = 37.4 \text{ m}$$

$$\text{Actual C/L length for Plinth} = 38.6 - 6 \times \frac{0.30}{2} = 37.7 \text{ m}$$

$$\text{Actual C/L Length for DPC} = 38.60 - 3 \times \frac{0.30}{2} = 37.7 \text{ m}$$

$$\text{Actual C/L Length for Brick Masonry} = 38.60 - 6 \times \frac{0.20}{2}$$

$$= 38 \text{ m}$$

$$\text{Actual C/L Length for parapet wall} = 27.2 \times 6 \times \frac{0.20}{2}$$

$$= 27.2 \text{ m}$$

Item	Description of item	No.	Length	Breadth	Height	Quantity
1	Site of clearing and leveling					L.S
2	Earth work excavation in all class of soil (except in hard rock and medium rock requiring blasting) and depositing on bank with initial lead upto 30m and lift upto 1.5m including back filling breaking clots watering, ramming sectioning of spoil bank etc. complete for foundation.					
	Foundation	1	36.20	0.80	0.80	23.16 m ³
	Step	1	1.70	0.90	0.20	0.306 m ³
	Step back	1	1.70	0.65	0.20	0.221 m ³
					Total	23.69 m ³
3	Plain cement concrete 1:4:8 (1 part cement, 4 part sand, 8 part of broken stone 40mm nominal size) including cost and conveyance of all materials to site and all labour charges consolidation watering curing consideration etc. complete					
	Foundation	1	36.20	0.80	0.20	5.792 m ³
	Step	1	1.70	0.90	0.20	0.30 m ³
	Step back	1	1.70	0.65	0.20	0.221 m ³
					Total	6.31 m ³
4	RR masonry in cement mortar 1:6 (1 part cement and 6 part sand) including cost and conveyance of all labour charges watering curing etc. Complete for foundation and plinth.					
	Foundation	1	37.40	0.40	0.60	8.976 m ³
	Plinth	1	37.70	0.30	0.45	5.089 m ³
					Total	14.065 m ³
5	DPC 2.5 cm thick cm 1:3	1	37.70	0.3	-	11.31 m ²
	Deduction					
	Door - D1	2	0.90	0.30	-	0.54 m ²
	Door - D2	3	0.80	0.30	-	0.72 m ²
	Total deduction					1.26 m ²
	Net quantity					10.05 m ²
6	Brick masonry in cm 1:6 (1 part cement, 6 part sand) of size (20x10x10) cm for wall including cost and conveyance of all materials to site scaffolding charges and all other labour charges, watering, curing etc. complete.					
		1	38.00	0.20	3.00	22.80 m ³
	Side shelf	1	0.40	0.20	3.00	0.24 m ³
	Parapet wall	1	27.20	0.20	0.50	2.72 m ³
	Step - Front					
	1 st step	1	1.3	0.75	0.15	0.14 m ³
	2 nd step	1	1.3	0.50	0.15	0.09 m ³

3 rd step	1	1.3	0.25	0.15	0.04 m ³
Step - Back					
1 st step	1	1.3	0.50	0.15	0.09 m ³
2 nd step	1	1.3	0.25	0.15	0.04 m ³
				Total	26.16 m ³
Deduction					
Door - D1	2	0.90	0.20	2.00	0.72 m ³
D2	3	0.80	0.20	2.00	0.96 m ³
Window - w1	2	0.90	0.20	1.20	0.43 m ³
Window - w2	3	1.35	0.20	1.20	0.97 m ³
Window - w3	1	1.80	0.20	1.20	0.43 m ³
Ventilator - v	1	0.90	0.20	0.60	0.108 m ³
Lintel					
Door - D1	2	1.20	0.20	0.15	0.072 m ³
Door - D2	3	1.10	0.20	0.15	0.099 m ³
Window - w1	2	1.20	0.20	0.15	0.072 m ³
Window - w2	3	1.65	0.20	0.15	0.148 m ³
Window - w3	1	2.10	0.20	0.15	0.063 m ³
Ventilator - v	1	1.20	0.20	0.15	0.036 m ³
Total deduction					4.07 m ³
Net quantity					22.09 m ³
Item no : 7 to item no 21 as same as TASK 1					

Estimation of double storied building

Objectives: At the end of this exercise you shall be able to

- prepare detailed estimate of a double storied building
 - prepare the abstract of the same building using CPWD rates.
-

DATA

- Given ground floor plan
- Given first floor plan
- Given sectional elevation
- Given specification

Task 1: Prepare the detailed estimate of double storied residential building consisting two quarters in each storey from the given drawing and general specification. Prepare the estimate of ground and first floor.

Double storeyed building**Example 1**

Prepare a detailed estimate of double storeyed residential building consisting four two-roomed quarters (two quarters in each storey) from the given drawings figs. 1 and 2 and general specifications. The estimate of ground floor and first floor should be prepared separately. The estimate of the Mumty room (staircase room in the 2nd floor) should be included in the estimate of the first floor. Assume suitable rates. Workout also plinth area rates of the building.

General specifications

Foundation and Plinth: Foundation concrete shall be of lime concrete with over burnt brick ballast. Foundation and plinth masonry shall be of first class brickwork in lime mortar.

Damp of Proof Course-D.P.C shall be provided at the plinth level with 2.5 cm thick layer of C.C of cement coarse sand

and stone chips in the production of $1:1\frac{1}{2}:3$ mixed with standard water proofing compound.

Superstructure: 30cm thick walls of the main rooms in ground floor shall be of first class brick work in lime mortar. All 20cm thick walls in ground floor and first floor shall be first class brickwork with 1:6 cement local sand mortar. 10cm partition walls shall be first class brickwork with 1:3 cement coarse sand mortar with hoop iron or equivalent reinforcement every fourth layer.

Roof and Floor: Floor of ground floor shall be of 2.5cm C.C.1:2:4 over 7.5cm lime concrete. Floor of first floor shall be 2.5cm C.C.1:2:4 over R.C.C. slab. Roof of first

floor shall be 7.5cm lime concrete terracing over R.C.C. slab. All R.C.C. slab be of C.C.1:2:4 of cement, coarse sand, stone chips, reinforced with 1% reinforcement.

Door and Window: Door and window chowkhats shall be of sal wood of 10cmx7.5cm in section. All door and window shutters shall be 3cm thick pannelled of Deodar wood. Mumty room window shall be fully glazed with 3cm thick Deodar wood. 4cm R.C.C. Jalli shall be provided over bath and W.C. doors over Mumty room glazed windows for ventilation. All windows shall be provided with 20mm dia bars. Iron hold fasts shall be provided for fixing doors and windows chowkhats.

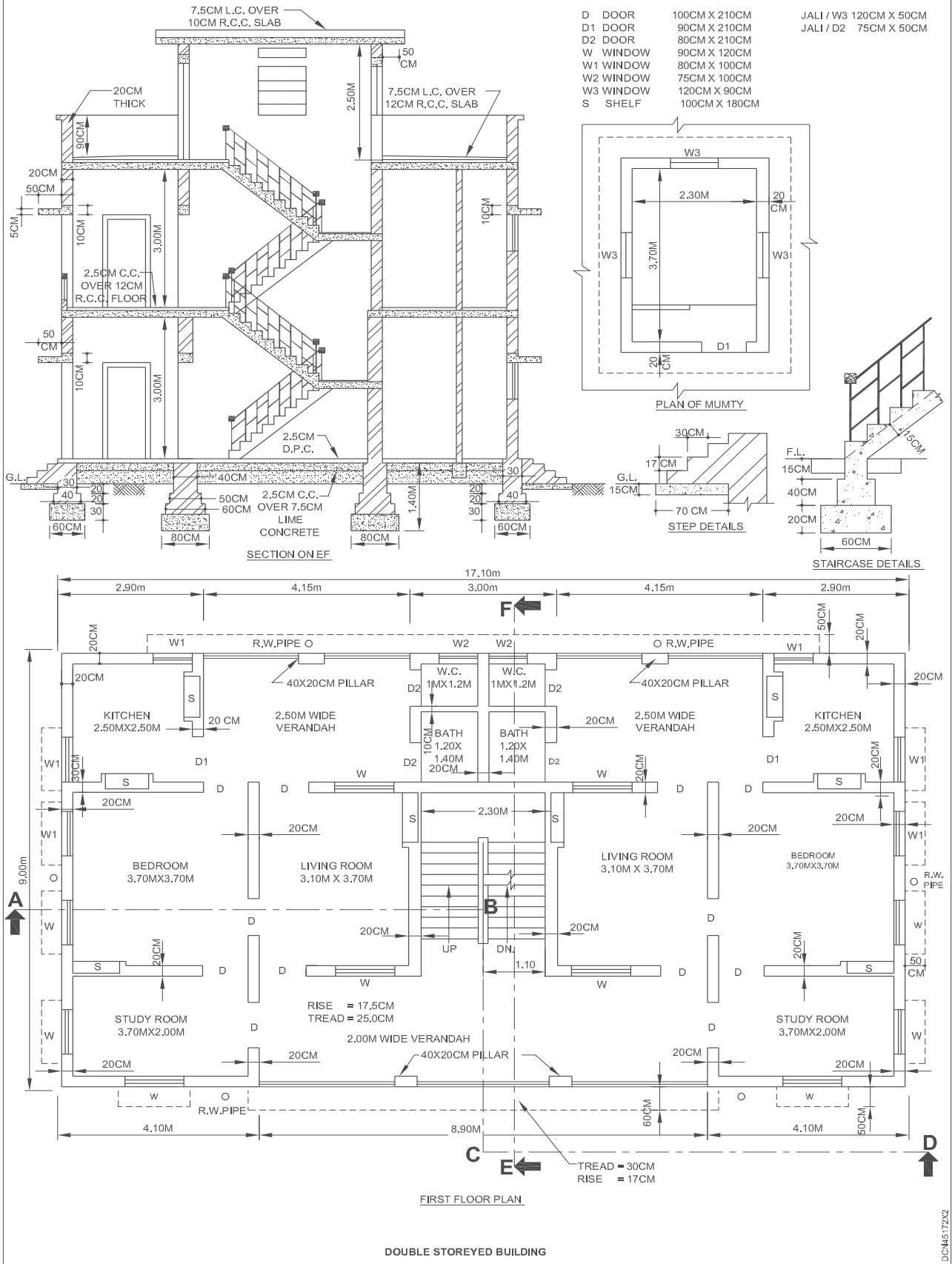
Plastering: All walls shall be plastered with 12mm thick 1:6 cement local sand mortar. Ceiling and underside of R.C.C. work shall be finished with 6mm thick 1:3 cement and medium sand mortar. All inside wall shall be provided with 20cm high skirting with 12mm thick 1:3 cement coarse sand mortar, neat cement finished. Dado of 12mm thick cement coarse sand 1:3 mortar neat cement finished shall be provided in kitchen and W.C. up to 50 cm height and in bathroom upto 100 cm height. Steps shall be provided with 20mm thick plaster with 1:3 cement coarse sand mortar neat cement finished.

Painting, white washing and colour washing: All doors and windows shall be painted two coats over one coat of priming. Back of chowkhats shall be painted with two coats of coaltar. Inside walls, ceiling, undersides of sunshades shall be white washed three coats. Outside shall be colour washed two coats over one coat of white washing.

Rain water pipes: 6 numbers 100mm dia. A.C. rain water down pipes shall be provided.

Electrification, water supply and sanitary works: Provision for internal electrification, water supply and sanitary works shall be provided on percentage basis.

Fig 2



DCN4572X2

Ground floor centre to centre length of walls

Main rooms

Back long walls of all rooms including stair case room C to C length

$$= 2(3.50 + 3.00) + 2.30 + 4 \times 30 + 30/2 + .30/2 = 16.80\text{m}$$

Front long wall of bed and living room on one side of stair case room C to C length

$$= 3.50 + 3.00 + 30 + .30/2 + .30/2 = 7.10\text{m}$$

Cross or short wall C. to C length

$$= 3.50 + 0.30/2 + 0.30/2 = 3.80\text{m}$$

Front Verandah

Study room, front long wall C to C length

$$= 3.70 + 0.20/2 + 0.20/2 = 3.90\text{m}$$

Study room cross or short wall C to C length

$$= 2.00 + 0.30/2 + 0.20/2 = 2.25\text{m}$$

Verandah wall in between study rooms C to C length

$$= 8.90 + 0.20/2 + 0.20/2 = 9.10\text{m}$$

Back Verandah

Kitchen, back wall C to C length

$$= 2.50 + 0.20/0.20/2 = 2.70\text{m}$$

Kitchen, cross or short wall C to C length

$$= 2.50 + .30/2 + 0.20/2 = 2.75\text{m}$$

Bath and W.C. two sets combined, back long wall C to C length

$$= 2 \times 1.20 + 0.20 + 2 \times 0.20/2 = 2.80\text{m}$$

Bath and W.C cross or short wall C to C length

$$= 1.40 + 1.00 + 10 + 0.30/2 + 0.20/2 = 2.75\text{m}$$

Verandah wall in between kitchen and W.C. C to C length

$$= 4.15 + 0.10 + 0.10 + 0.10 = 4.45\text{m}$$

First floor centre to centre length of walls

Main Rooms

Back long wall of all rooms including stair case room C to C length

$$= (3.70 + 3.10) \times 2 + 2.30 + (4 \times 20) + .20/2 + 0.20/2 = 16.90\text{m}$$

Front long wall of bed and living room on one side of staircase room C to C length

$$= (3.70 + 3.10) + 0.20 + 2 \times 0.20/2 = 7.20\text{m}$$

Cross or short walls C to C length

$$= 3.70 + 2 \times 0.20/2 = 3.90\text{m}$$

Front Verandah

Study room - Front long wall C to C length

$$= 3.70 + 2 \times 0.20/2 = 3.90\text{m}$$

Study room - Cross or short wall C to C length

$$= 2.00 + 2 \times 0.20/2 = 2.20\text{m}$$

Verandah wall in between study rooms C to C length

$$= 3.10 + 2.30 + 3.10 + 2 \times 0.20 + 2 \times 0.20/2 = 9.10\text{m}$$

Back Verandah

Kitchen - Back wall C to C length

$$= 2.50 + 2 \times 0.20/2 = 2.70\text{m}$$

Kitchen - Cross or short wall C to C length

$$= 2.50 + 2 \times 0.20/2 = 2.70\text{m}$$

Bath and W.C. - Two sets combined, back wall C to C length

$$= 1.20 + 1.20 + 0.20 + 2 \times 0.20/2 = 2.80\text{m}$$

Bath and W.C. cross walls C to C length

$$= 1.40 + 1.00 + 0.10 + 2 \times 0.20/2 = 2.70\text{m}$$

Verandah wall in between kitchen and W.C.C to C length

$$= 4.15 + 2 \times 0.20/2 = 4.35\text{m}$$

The estimate has been prepared sub-head wise storey by storey, first the ground floor and then the first floor.

Ground floor

Details of measurement and Calculation of quantities

Item No.	Particulars and items of works	No.	Length m	Breadth m	Height or depth m	Quantity	Explanatory notes
1	I. Earthwork Site clearance and setting out	1	-	-	-	1 Job	
2	Earthwork in excavation in foundation Main rooms back long wall full length, length end to end, Front long walls of bed and living rooms	1	17.60	0.80	0.90	12.67m ³	L = 16.80+0.80=17.60 m
	Cross or short walls	2	7.90	0.80	0.90	11.38m ³	L = 7.10+0.80=7.90 m
	Study rooms - Front walls (long)	6	3.00	0.80	0.90	12.96m ³	L = 3.80-0.80=3.00 m
	Cross walls (short)	2	4.50	0.60	0.60	3.24m ³	L=3.90+0.60=4.50 m
	Kitchen - Back walls (long)	4	1.55	0.60	0.60	2.23m ³	L=2.25-0.60/2 - 0.80/2 = 1.55m
	Cross walls (short).	2	3.30	0.60	0.60	2.38m ³	L= 2.70 + 0.60=3.30 m
	Bath and W.C - Back wall (long)	4	2.05	0.60	0.60	2.95m ³	L= 2.75 - 0.60/2 - 0.80/2 = 2.05 m
	Cross wall (Short)	1	3.40	0.60	0.60	1.22m ³	L = 2.80 + 0.60 = 3.40 m
	Verandah pillars	3	2.05	0.60	0.60	2.21m ³	L = 2.75 - 0.60/2 - 0.80/2 = 2.05 m
	Front ver, pillars dwarf wall sum total length }	4	0.80	0.60	0.60	1.15m ³	Foundation 80x60 m
	Back verandah plinth dwarf walls	1	6.90	0.40	0.40	1.10m ³	L=9.10-2 x 0.60/2 - two pillars = 9.10 - 0.60 2 x 0.80 = 6.90 m
	Staircase base	2	2.95	0.40	0.40	0.94m ³	L=4.35-2x.60/2- one pillar = 4.35-.60-.80= 2.95 m
	Step front	1	1.10	0.60	0.70	0.46m ³	
	Step back	1	2.50	0.70	0.25	0.44m ³	L=2.30+.10+.10=2.50 m
		2	1.20	0.70	0.25	0.42m ³	L= 1.00 +.10+.10=1.20 m
					Total	55.75m ³	
	Earthwork in filling in plinth bedrooms	2	3.40	3.40	0.425	9.82m ³	Ht.=50-7.5=42.5 cm = 0.425 m
	Living rooms	2	2.90	3.40	0.425	8.38m ³	
	Study rooms	2	3.60	1.90	0.425	5.81m ³	
	Kitchen	2	2.40	2.40	0.425	4.90m ³	
	Bath and W.C	2	1.10	2.40	0.425	2.24m ³	
	Verandah front	1	8.80	1.90	0.425	7.11m ³	
	Verandah back	2	4.05	2.40	.425	8.26m ³	
					Total	46.52 cu.m	

4	II. Concrete - Lime concrete in foundation						
	Main rooms - Back long wall full length end to end	1	17.60	0.80	0.30	4.22m ³	L. Same as excavation
	Front long walls of bed and living rooms	2	7.90	0.80	0.30	3.79m ³	L. Same as excavation
	Cross short walls	6	3.00	0.80	0.30	4.32m ³	L. Same as excavation
	Study rooms						
	Front long walls	2	4.50	0.60	0.20	1.08m ³	L. Same as excavation
	Cross short walls	4	1.65	0.60	0.20	0.79m ³	L = 2.25-.60/2-.60/2= 1.65 m
	Kitchens						
	Back walls (long)	2	3.30	0.60	0.20	0.79m ³	L. Same as excavation
	Cross walls (short)	4	2.15	0.60	0.20	1.03m ³	L.2.75-.60/2-.60/2=2.15 m
	Bath and W.Cs.						
	Back walls (long)	1	3.40	0.60	0.20	0.41m ³	L. Same as excavation
	Cross walls (short)	3	2.15	0.60	0.20	0.77m ³	L=2.75-.60/2-.60/2=2.15 m
	Verandah pillars	4	0.80	0.60	0.20	0.38m ³	
	Font verandah Plinth dwarf wall	1	7.50	0.40	0.20	0.60m ³	L=9.10-2x.40/2-2x0.60 =7.50 m
	Back verandah plinth dwarf wall	2	3.35	0.40	0.20	0.54m ³	L=4.35-2x.40/2-1x.60 =3.35 m
	Staircase base	1	1.10	0.60	0.20	0.13m ³	
Step front	1	2.50	0.70	0.15	0.26m ³		
Step back	2	1.20	0.70	0.15	0.25m ³		
				Total	19.36 cu.m		
5	R.C.C work 1:2:4 excluding steel reinforcement bars and its bending including centering and shuttering and binding steel						
	R.C.C slab Bed and living rooms	2	7.40	3.80	0.12	6.749m ³	Bearing - ends full wall (30 cm), sides half wall (15 cm).
	Front verandah including study rooms	1	17.10	2.35	0.10	4.019m ³	Bearing - outer full wall (20 cm), inner half wall (15 cm)
	Back verandah including kitchen, bath and W.C rooms	1	17.10	2.85	0.10	4.874m ³	Total of slab = 15.642 cu.m
	Lintels - Over doors main room	8	1.30	0.30	0.10	0.312m ³	(a) 15 cm bearing
	Over windows W main rooms	8	1.20	0.30	0.10	0.288m ³	(a)
	Over shelves S in 30 cm wall	6	1.30	0.30	0.10	0.234m ³	(a)

	Over entrance of stair case	1	2.70	0.30	0.20	0.162m ³	
	Over doors D study room	2	1.30	0.20	0.10	0.052m ³	(b)
	Over doors D ₁ kitchen	2	1.20	0.20	0.10	0.048m ³	(b)
	Over doors D ₂ bath and W.C	4	1.05	0.20	0.10	0.084m ³	(b)
	Over windows W study room	4	1.20	0.20	0.10	0.096m ³	(b)
	Over windows W ₁ kitchen	2	1.10	0.20	0.10	0.044m ³	(b) Side windows
	S kitchen	2	1.30	0.20	0.10	0.052m ³	(b)
	Over R.C.C. Jalli over door D ₂ of Bath and W.C	4	1.05	0.20	0.10	0.084m ³	Total of (a)s = 0.834 cu.m (b) Total of (b)s = 0.460 cu.m
	Over front verandah 20 cm thick	1	9.20	0.20	0.20	0.368m ³	Continuous over pillars
	Over back verandah continuous including window W ₁ , W ₂ Sunshades Over window W, 4 in main rooms and 4 in study rooms	1	13.60	0.20	0.15	0.408m ³	15 cm thick
	Over window W ₁ of kitchen	2	1.10	0.50	0.05	0.055m ³	Average 5 cm thick Two side windows
	Over front verandah	1	9.20	0.60	0.05	0.276m ³	
	Over back verandah continuous including back windows W ₁ & W ₂ Slabs of shelves 25 cm wide 4 cm thick	1	13.60	0.50	0.05	0.340m ³	Length same as for lintel Bearing 5 cm.
		8x3	1.10	0.25	0.04	0.264m ³	Total of sunshades and shelf slabs = 1.175 cu.m
	Staircase -						
	Inclined slabs....	2	2.54	1.10	0.15	0.838m ³	$L = \sqrt{2^2 + 1.575^2} = 2.54$ m
	Above wall at base	1	1.10	0.50	0.15	0.083m ³	
	Landing slab middle	1	2.60	1.05	0.15	0.410m ³	
	Landing slab 1st floor level	1	2.60	0.75	0.15	0.293m ³	B = .60+.15=.75 m
	Steps without reinforcement	8 x 2x	1.10 x 1/2	(.25x.175)		0.385m ³	Triangular section
					Total	21.058	Total of staircase slabs (excluding base) = 1.541 cu.m
						cu.m	
6	2.5 cm C.C 1:2:4 nosing in steps						
	Staircase steps	9x2	1.10	-	-	19.80m	
	Front steps	3	2.30	-	-	6.90m	
	Back steps	3x2	1.00	-	-	6.00m	
					Total	32.70 m	
7	R.C. 1:2:4 Newal post 10 cm x 10 cm, 1 m high including reinforcement complete work	2	-	-	-	2 Nos	
8	R.C.C 1:2:4 Hand rail in staircase including reinforcement complete work	2	2.74	-	-	5.48 m	L = 2.54+.20=2.74 m

9	4 cm thick R.C.C Jalli including reinforcement complete work	4	0.75	-	0.50	1.50 sq.m	Over door D ₂
10	2.5 cm Damp proof course C.C. 1:1 1/2:3 with water proofing compound- Main Rooms						
	Back long wall	1	17.20	0.40	-	6.88m ²	L=16.80+.40=17.20 m
	Front long walls	2	7.50	0.40	-	6.00m ²	L = 7.10+.40=7.50 m
	Cross short walls	6	3.40	0.40	-	8.16m ²	L=3.80-.40=3.40 m
	Study rooms -						
	Front walls (long)	2	4.20	0.30	-	2.52m ²	L=3.90+.30=4.20 m
	Cross walls (short)	4	1.90	0.30	-	2.28m ²	L=2.25-.40/2-.30/2=1.90 m
	Kitchen						
	Back walls (long)	2	3.00	0.30	-	1.80m ²	L=2.70+.30=3.00 m
	Cross walls (short)	4	2.40	0.30	-	2.88m ²	L=2.75-.40/2-.30/2=2.40 m
	Bath and W.C						
	Back walls (long)	1	3.10	0.30	-	0.93m ²	L=2.80+.30=3.10 m
	Cross walls (short)	3	2.40	0.30	-	2.16m ²	L=2.75-.40/2-.30/2=2.40 m
	Verandah pillars	4	0.50	0.30	-	0.60m ²	
					Total	34.21m ²	
	Deduct						
	Door sills main rooms D	8	1.00	0.40	-	3.20m ²	
	Door sills study room D	2	1.00	0.30	-	0.60m ²	
	Door sills kitchen D ₁	2	0.90	0.30	-	0.54m ²	
	Door sills Bath &	4	0.75	0.30	-	0.90m ²	
	W.C. D ₂		Total of deduction		5.24m ²		
				Net	Total	28.97 sq.m	
11	III. Brick work						
	First class brick work in lime mortar in foundation and plinth main rooms back wall full length						
	1 st Footing	1	17.40	0.60	0.20	2.09m ³	L = 16.80 + 0.60 = 17.40 m
	2 nd footing	1	17.30	0.50	0.20	1.73m ³	L = 17.40 - 0.10 = 17.30 m
	Plinth wall	1	17.20	0.40	0.70	4.82m ³	L = 17.30 - 0.10 = 17.20 m
	Front long walls						
	1 st footing	2	7.70	0.60	0.20	1.85m ³	L = 7.10+ 0.60 = 7.70 m
	2 nd footing	2	7.60	0.50	0.20	1.52m ³	L = 7.70 - 0.10 = 7.60 m
	Plinth wall	2	7.50	0.40	0.70	4.20m ³	L = 7.60 - 0.10 = 7.50 m
	Cross walls						
	1 st footing	6	3.20	0.60	0.20	2.30m ³	L = 3.80 - 0.060 = 3.20 m
	2 nd footing	6	3.30	0.50	0.20	1.98m ³	L = 3.20 - 0.10 = 3.30 m
	Plinth wall	6	3.40	0.40	0.70	5.71m ³	L = 3.30 - 0.10 = 3.40 m
	Study rooms						
	Front walls						
	Footing	2	4.30	0.4	0.20	0.69m ³	L = 3.90 + 0.40 = 4.30 m
	Plinth walls	2	4.20	0.30	0.70	1.76m ³	L = 4.30 - 0.10 = 4.20 m
	Cross walls						
	Footing	4	1.80	0.40	0.20	0.58m ³	L = 2.25 - 0.50/2 - 0.40/2 = 1.80 m

12	Plinth wall Kitchen	4	1.90	0.30	0.70	1.60m ³	L = 1.80 + 0.10 = 1.90 m
	Back walls						
	Footing	2	3.10	0.40	0.20	0.50m ³	L = 2.70 + 0.40 = 3.10m
	Plinth wall	2	3.00	0.30	0.70	1.26m ³	L = 3.10 + 0.10 = 3.00m
	Cross walls footing	4	2.30	0.40	0.20	0.74m ³	L = 2.75 - . 50/2 - 0.40/2 = 2.30 m
	Plinth wall	4	2.40	0.30	0.70	2.02m ³	L = 2.30 + 0.10 = 2.40 m
	Bath and W.C						
	Back walls						
	Footing	1	3.20	0.40	0.20	0.26m ³	L = 2.80 + 0.40 = 3.20 m
	Plinth wall	1	3.10	0.30	0.70	0.65m ³	L = 3.20 - 0.10 = 3.10 m
	Cross walls						
	Footing	3	2.30	0.40	0.20	0.55m ³	L = 2.75 - 0. 50/2 0.40/2 = 2.30m
	Plinth wall	3	2.40	0.30	0.70	1.51m ³	L = 2.30 + 0.10 = 2.40m
	Verandah pillars						
	Footing	4	0.60	0.40	0.20	0.19m ³	
	Plinth wall	4	0.50	0.30	0.70	0.42m ³	
	Front verandah plinth dwarf wall sum total length	1	7.80	0.20	0.70	1.09m ³	L = 9.10 - 2 x 0.30/2 - 2 x 0.50 = 7.80 m
	Back verandah plinth dwarf wall	2	3.55	0.20	0.70	0.99m ³	L = 4.35 - 2 x 0.30/2 - 1 x 0.50 = 3.55m
	Staircase base	1	1.10	0.50	0.40	0.22m ³	
	Stair front 1 st	1	2.30	0.60	0.20	0.28m ³	
	Step front 2 nd	1	2.30	0.30	0.15	0.10m ³	
	Step back 1 st	2	1.00	0.60	0.20	0.24m ³	
	Step back 2 nd	2	1.00	0.30	0.15	0.09m ³	
					Total	41.94 cu.m	
	First class brick work in lime mortar in superstructure in 30 cm walls of main rooms						
	Back wall full length	1	17.10	0.30	3.00	15.39m ³	L = 16.80 + 0.30 = 17.10 m
	Front long walls	2	7.40	0.30	3.00	13.32m ³	L = 7.10 + 0.30 = 7.40 m
	Cross walls	6	3.50	0.30	3.00	18.90m ³	L = 3.80 - 0.30 = 3.50 m
	Staircase room front wall	1	2.30	0.30	0.60	0.42m ³	Above lintel
					Total	48.03 cu.m	
	Deduct						
	Door openings D	10	1.00	0.30	2.10	6.30m ³	4 in main rooms and 2 in kitchen
Window opening W	8	0.90	0.30	1.20	2.59m ³		
Shelves opening	6	1.00	0.20	1.80	2.16m ³		
Lintels (30 cm wall)		Same as marked in item 5			0.834m ³		
				Total of deduction	11.884		
				Net Total	36.15 cu.m		

13	First class brickwork in 1:6 cement local sand mortar in superstructure in 20 cm walls						
	Study rooms front walls	2	4.10	0.20	3.00	4.92m ³	L=3.90+.20=4.10 m
	Study rooms cross walls	4	2.00	0.20	3.00	4.80m ³	L=2.25-.30/2-.20/2=2.00 m
	Kitchen back walls	2	2.90	0.20	3.00	3.48m ³	L=2.70+.20=2.90 m
	Kitchen cross walls	4	2.50	0.20	3.00	6.00m ³	L=2.75-.30/2-.20/2=2.50m
	Bath and W.C back wall	1	3.00	0.20	3.00	1.80m ³	L=2.80+.20=3.00 m
	Bath & W.C cross wall	3	2.50	0.20	3.00	4.50m ³	L=2.75-.30/2-.20/2=2.50 m
	Verandah pillars	4	0.40	0.20	2.20	0.70m ³	
	Front verandah wall above lintel	1	8.90	0.20	0.60	1.07m ³	Ht.above lintel 60 cm.
	Back verandah walls above lintel	2	4.15	0.20	0.65	1.08m ³	Ht. above lintel 65 cm
					Total	28.35m ³	
	Deduct						
	Door openings D	2	1.00	0.20	2.10	0.84m ³	Study room doors.
	Door openings D ₁	2	0.90	0.20	2.10	0.756m ³	Kitchen doors
	Door openings D ₂	4	0.75	0.20	2.10	1.26m ³	Bath and W.C doors
	Window openings W	4	0.90	0.20	1.20	0.86m ³	Study room windows.
	Window openings W ₁	4	0.80	0.20	1.00	0.64m ³	Kitchen windows
	Window openings W ₂	2	0.75	0.20	1.00	0.30m ³	W.C. room windows
	R.C. Jalli over doors D ₁	4	0.75	0.20	0.50	0.30m ³	
	Shelves opening kitchen Lintel (20 cm wall)	2	1.00	0.10	1.80	0.36m ³	Back of shelves 10 cm
Lintel over back wall of W.Cs	1	3.00	0.20	0.15	0.09m ³		
Lintel over windows W ₁ on back walls of kitchen	2	1.15	0.20	0.15	0.07m ³		
				Total of deduction	5.936m ³		
				Net total	22.414 cu.m		
14	10 cm thick first class brick work in partition wall in 1:3 cement, coarse sand mortar with hoop iron or 6 mm dia. steel reinforcement every fourth layer	2	1.20	-	3.00	7.20 sq.m	
15	IV Wood work - Door and window						
	Sal wood work in chaukhats in doors and windows						
	Door D(10 cm x 7.5 cm section)	12	5.30	0.10	0.075	0.477m ³	5 cm in insertion into floor
	Door D ₁	2	5.20	0.10	0.075	0.078m ³	

16	Door D ₂	4	5.10	0.10	0.075	0.153m ³	h = (2.10-0.075)+.015 = 2.04m 15 mm rebate 15 mm rebate 15 mm rebate 15 mm rebate 15 mm rebate 15 mm rebate	
	Window W	12	4.20	0.10	0.075	0.378m ³		
	Window W ₁	4	3.60	0.10	0.075	0.108m ³		
	Window W ₂	2	3.50	0.10	0.075	0.053m ³		
	Total					1.247 cu.m		
	Door D	12	0.88	-	2.04	21.524m ²		
	Door D ₁	2	0.78	-	2.04	3.182m ²		
	Door D ₂	4	0.63	-	2.04	5.141m ²		
	Window W	12	0.78	-	1.08	10.109m ²		
	Window W ₁	4	0.68	-	0.88	2.394m ²		
Window W ₂	2	0.63	-	0.88	1.109m ²			
Total					43.459 sq.m			
17	Doors and windows fittings of oxydized iron	Same as in item (16)			43.459 sq.m		May also be taken per no. of different fittings	
V.Steel and Iron work								
18	Steel reinforcement bars including bending in							
	R.C.C work	-2 x $\left(\frac{0.90 + 0.30}{2}\right) \times 0.45 = 0.54$			16.226 q		@ 1% of R.C.C work in item	
19	Iron work in hold fasts and window bars -							
	Hold fasts in doors	18 x	6@1kg	each	=	108 kg	6 Nos in each door	
	Hold fasts in windows	18 x	4@1kg	each	=	72 kg	4 Nos in each window	
	20 mm dia. window bars @ 2.47 kg per m - 12 windows 90 x 120c m (W)	12 x	8x1.20	=	115.20m		8 bars 1.20 m each	
	4 Windows 80x100 cm (W ₁)	4x	7x1.00	=	28.00m		7 bars 1.00 m each	
	2 windows 75x 100 cm (W ₂)	2x	6x1.00	=	12.00m		6 bars 1.00 m each	
Total					155.20 m			
@ 2.47 kg per m =					383.34 kg			
Total =					563.34 kg			
20	Iron grill work in stair case railing two flights (80 cm high)	1	5.38		0.80	4.304 sq.m	L=2x2.54+.30=5.38 m	

21	VI.Plastering and Pointing						
	12 mm plastering with 1 :6 cement local sand mortar in walls						Excluding skirting and dado at bottom
	Inside Plastering						
	Bed Rooms	2	14.00	-	2.80	78.40m ²	L=Inner perimeter = 14.00 m
	Living rooms	2	13.00	-	2.80	72.80m ²	L=Inner perimeter = 13.00 m
	Staircase room	1	11.60	-	2.80	32.48m ²	L=Inner perimeter = 11.60 m
	30 cm face of wall below stair case entrance lintel	2	0.30	-	2.00	1.20m ²	
	Shelves - Jambs, sills and soffits	6	5.60	0.20	-	6.72m ²	L=(1.0+1.8)x2=5.60 m
	Shelves - Jambs, sills and soffits	2	5.60	0.10	-	1.12m ²	L=(1.0+1.8)x2=5.60 m
	Study rooms	2	11.40	-	2.80	63.84m ²	L=Inner perimeter = 11.40 m
	Kitchens	2	10.00	-	2.50	50.00m ²	L=Inner perimeter =10.00m
	Bathrooms	2	5.20	-	2.00	20.80m ²	L=(1.4+1.2)x2=5.20 m
	W.C	2	4.40	-	2.50	22.00m ²	L=(1.0+1.2)x2=4.40 m
	Front verandah						
	Long wall inner	1	8.90	-	2.80	24.92m ²	Openings to be deducted
	Long wall outer above pillar	1	8.90	-	0.80	7.12m ²	
	Side walls	2	2.00	-	2.80	11.20m ²	
	Back verandah - Long walls inner	2	4.15	-	2.80	23.24m ²	
	Long wall outer above pillar	2	4.15	-	0.80	6.64m ²	
	Side walls	4	2.50	-	2.80	28.00m ²	
	Pillars 3 faces	4	0.80	-	2.00	6.40m ²	L = 40 + 20+ 20 = 80 cm
	20 cm face of wall below verandah lintel	6	0.20	-	2.00	2.40m ²	Total of Study, Kitchen, Bath and W.C rooms, Verandahs, etc, of 20 cm wall = 268.80 sq.m, above skirting and Dado
					Total	459.28 m²	
	Deduct						
	Door openings D	12	1.00	-	2.10	25.20m ²	One face only
	Door openings D ₁	2	0.90	-	2.10	3.78m ²	One face only
	Door openings D ₂	4	0.75	-	2.10	6.30m ²	One face only
Window openings	4	0.90	-	1.20	4.32m ²	One face only	
R.C.C Jalli	-	-	-	-	-	No deduction being small	
Staircase entrance openings	2	2.30	-	2.00	9.20m ²		
				Total of deuction	48.8sq.m		
				Net total of inside plaster	410.48m²		
Outside plastering							
Outer side (including plinth and 10 cm below G.L)	1	52.00	-	3.77	196.79m ²	L = Outer perimeter = 2 (17.10 + 9.00) = 52.20 m Ht.= 3.0 + 0.50+0 .05 + 0.10 + 0.12 = 3.77 m	
Deduct							
Window openings W	8	0.90	-	1.20	8.64m ²	One face.	
Window openings W ₁	4	0.80	-	1.00	3.20m ²		
Window openings W ₂	2	0.75	-	1.00	1.50m ²		
Front verandah openings	1	8.10	-	2.20	17.82m ²	L = 8.90 - 2 x 0.40 = 8.10m	

22	Back verandah openings	2	3.75	-	2.20	16.50m ²	L=4.15-.40=3.75 m Ht.=.50+.05+.10=.65 m	
	Step front	1	2.30	-	0.65	1.50m ²		
	Step back	2	1.00	-	0.65	1.30m ²		
					Total of deductions	50.46 m ²		
					Net Total of outside plastering	146.33 m ²		
					Grand Total of inside and outside plastering = 556.81 sq.m			
	6 mm plastering with 1 :3 cement, medium sand mortar in ceilings							
	Bedrooms	2	3.50	3.50	-	24.50m ²		
	Living rooms	2	3.00	3.50	-	21.00m ²		
	Study rooms	2	3.70	2.00	-	14.80m ²		
Kitchens	2	2.50	2.50	-	12.50m ²			
Baths	2	1.20	1.40	-	3.36m ²			
W.Cs	2	1.20	1.00	-	2.40m ²			
Front verandah	1	8.90	2.00	-	17.80m ²	L = 8.90 - 2 x 0 .40= 8.10 m		
Back verandahs	2	4.15	2.50	-	20.75m ²			
Soffits of front verandah	1	8.10	0.20	-	1.62m ²			
Lintels								
Soffits of back verandah								
lintels	2	3.75	0.20	-	1.50m ²	L = 4.15 - 0.40 = 3.75 m		
Staircase								
Inclined slab	2	2.54	1.10	-	5.59m ²			
Landing slab middle	1	2.30	0.90	-	2.07m ²			
Landing slab (1st Floor level)	1	2.30	1.10	-	2.53m ²			
Soffit of lintel at entrance	1	2.30	0.30	-	0.69m ²			
Under sides of sunshades								
Sunshades W	8	1.20	0.50	-	4.80m ²	Total of sun shade = 18.22 sq.m*		
Sunshades W ₁ kitchen side	2	1.10	0.50	-	1.10m ²			
Front verandah sunshade	1	9.20	0.60	-	5.52m ²	Total excluding bed rooms and living rooms=103.83 sqm		
Back verandah sunshade continous	1	13.60	0.50	-	6.80m ²			
				Total	149.33m ²			
23	Skirting 20 cm high with 12 mm thick 1:3 cement coarse sand mortar neat cement finished -							
	Bedrooms	2	14.00	-	-	28.00m	Lengths inner perimeter	
	Living rooms	2	13.00	-	-	26.00m		
	Jambs of main rooms doors D	10	0.30	-	-	3.00m		
	Staircase room	1	9.90	-	-	9.90m		
	Jambs at entrance	2	0.30	-	-	0.60m		
	Study rooms	2	11.40	-	-	22.80m		
	Front verandah long wall	1	8.90	-	-	8.90m		
	Front verandah side walls	2	2.20	-	-	4.40m		
	Back verandah long walls	2	4.15	-	-	8.30m		
	Back verandah side walls	4	2.70	-	-	100.80m		
	Pillars 3 faces	4	0.80	-	-	3.20m		
	Jambs study rooms door D	2	0.20	-	-	0.40m		
					Total	126.30m		Total of study room, verandah etc= 69.30 m
	Deduct door opening D	12	1.00	-	-	12.00m		
				Net Total		114.30 m		

24	Dado 12 mm thick 1:3 cement coarse sand mortar neat cement finished (in kitchen, bath and W.C)							
	Kitchen 50 cm high	2	10.00	-	0.50	10.00m ²	Lengths inner perimeter	
	W.C 50 cm high	2	4.40	-	0.50	4.40m ²		
	Bathroom 1 m high	2	5.20	-	1.00	10.40m ²		
	Jambs of kitchen door D ₁	2	0.20	-	0.50	0.20m ²		
	Jambs of W.C door D ₂	2	0.20	-	0.50	0.20m ²		
	Jambs of bath door D ₂	2	0.20	-	1.00	0.40m ²		
	Total							25.60m ²
	Deduct-							
	Kitchen door D ₁	2	0.90	-	0.50	0.90m ²		
W.C door D ₂	2	0.75	-	0.50	0.75m ²			
Bath door D ₂	2	0.75	-	1.00	1.50m ²			
Total of deduction						3.15m ²		
Net Total						22.45m ²		
25	20 mm plastering with 1:3 cement coarse sand mortar neat cement finished in steps							
	Front steps tread and riser	1	2.30	1.21	-	2.78m ²	B = 2 x 0.30 + 3 x 0.17 + 0.10 = 1.21 m	
	Back steps, tread and riser	2	1.00	1.21	-	2.42m ²		
	Sides of front and back steps	3 x 2	-	0.60	0.27	0.97m ²		
		3 x 2	-	0.30	0.17	0.31m ²		
	Stair case steps, tread and riser	2 x 8	1.10	0.425	-	7.48m ²	B = 25 + 17.5 = 42.5 cm = 0.425 m	
	Total						13.96 m ²	
26	VII. Flooring							
	2.5 cm C.C 1:2:4 floor over and including 7.5 cm lime concrete							
	Bedrooms	2	3.50	3.50	-	24.50m ²		
	Living rooms	2	3.00	3.50	-	21.00m ²		
	Staircase room	1	2.30	3.50	-	8.05m ²		
	Sill of entrance	1	2.30	0.30	-	0.69m ²		
	Study rooms	2	3.70	2.00	-	14.80m ²		
	Kitchens	2	2.50	2.50	-	12.50m ²		
	Bathrooms	2	1.20	1.40	-	3.36m ²		
	W.Cs	2	1.20	1.00	-	2.40m ²		
	Front verandah	1	8.90	2.00	-	17.80m ²		
	Back verandahs	2	4.15	2.50	-	20.75m ²		
	Total						125.85m ²	
27	2.5 cm C.C. 1:2:4 floor (without lime concrete)							
	Sills of door D	10	1.00	0.30	-	3.00m ²		
	Sills of door D (study room)	2	1.00	0.20	-	0.40m ²		
	Sills of door D ₁	2	0.90	0.20	-	0.36m ²		
	Sills of door D ₂	4	0.75	0.20	-	0.60m ²		

28	Sills of verandah opening over plinth dwarf wall							
	Front verandah	1	8.10	0.20	-	1.62m ²	L=8.90-2x.40=8.10 m	
	Back verandah	2	3.75	0.20	-	1.50m ²	L=4.15-.40=3.75 m	
	Staircase landing	1	2.30	0.90	-	2.07m ²	Over R.C.C landing slab	
	VIII Painting							
	Painting two coats over one coat of priming							
	Panelled door D	12 x 2 1/4	1.00	-	2.10	56.70m ²	1 1/8 for one face	
	Panelled door D ₁	2 x 2 1/4	0.90	-	2.10	8.51m ²	1 1/8 for one face	
	Panelled door D ₂	4 x 2 1/4	0.75	-	2.10	14.18m ²	1 1/8 for one face	
	Panelled Window W	12 x 2 1/4	0.90	-	1.20	29.16m ²	1 1/8 for one face	
	Panelled Window W ₁	4 x 2 1/4	0.80	-	1.00	7.20m ²	1 1/8 for one face	
	Panelled Window W ₂	2 x 2 1/4	0.75	-	1.00	3.38m ²	1 1/8 for one face	
	Painting window bars W	12	0.75	-	1.05	9.45m ²	One clear flat area in between chaukhat	
	Painting Window bars W ₁	4	0.65	-	0.85	2.21m ²		
	Painting Window bars W ₂	2	0.60	-	0.85	1.02m ²		
Iron grill in staircase railing	1	5.38	-	0.80	4.30m ²			
				Total	136.11m²			
29	Coaltar painting two coats on back of chaukhats							
	Door D	12	5.10	0.10	-	6.12m ²	Lengths same as for chaukhats in item 15	
	Door D ₁	2	4.60	0.10	-	0.92m ²		
	Door D ₂	4	4.45	0.10	-	1.78m ²		
	Window W	12	4.20	0.10	-	5.04m ²		
	Window W ₁	4	3.60	0.10	-	1.44m ²		
	Window W ₂	2	3.50	0.10	-	0.70m ²		
					Total	16.00 m²		
30	IX. White washing and colour washing							
	White washing 3 coats - Walls (inside)			Same as for inside				
	Ceiling, under side of sunshades etc.			Same as for ceiling plastering in item (22)				
				plasting in item (21)		410.48m ²		
				Total	559.81m²			

31	Colour washing two coats over one coat of white washing (outside) walls (outside)	1	47.90	-	-	-	Same as for outside wall plastgering in item (21)	146.33m ²	Portion below G.L to be deducted	
							Upper surface of sunshades	18.22m ²	Under surface same as lower surface.	
							Deduct 10 cm portion below G.L.	0.10	4.79	L - Outer perimeter - steps
							X. Misc. Items	Total	159.76	= (2 x 17.10 + 2 x 9.00)
				Net				sq.m	- (2.30 + 2 x 1.00) = 47.90m	
32	10 mm dia. A.C rain water pipes (6 Nos)....	6	3.60	-	-	-	21.60 m	L = 3.00 + 0.12 + 0.50 = 3.62 = 3.60 m		

First Floor							
Details of Measurement and Calculation of quantities							
Item No.	Particulars items and of works	No.	Length m	Breadth m	Height or depth m	Quantity	Explanatory notes
1	II. Concrete						
	Lime concret in roof terracing 7.5 cm thick complete with surface finishing						
	Roof of 1st floor in between parapet	1	16.70	8.60	-	143.62m ²	Mumty room to be deducted.
	Roof of stair case room (mumty room) including chujja projection	1	3.70	5.10	-	18.87m ²	L=2.30+2x.20+2x.50=3.70 m B= 3.70+2x.20+2x.50=5.10m
	Deduct mumty room at 1st floor level	1	2.70	4.10	-	11.07	
					Net Total	151.42m ²	
2	R.C.C work 1:2:4 excluding steel reinforcement and its bending but including centering and shuttering and binding steel						
	Roof slab	same as in item (5) of G.F			15.642		Slab of all rooms and verandahs
	Lintels						
	Over main room doors D	8	1.30	0.20	0.10	0.208m ³	Bearing 15 cm
	Over main room window W	8	1.20	0.20	0.10	0.192m ³	
	Over main room shelves	4	1.30	0.20	0.10	0.104m ³	
	Over entrance of staircase	1	2.70	0.20	0.20	0.108m ³	
	Over doors D study room	2	1.30	0.20	0.10	0.052m ³	
	Over doors D ₁ kitchen	2	1.20	0.20	0.10	0.048m ³	
	Over doors D ₂ Bath and W.C	4	1.05	0.20	0.10	0.084m ³	
	Over window W study room	4	1.20	0.20	0.10	0.096m ³	
	Over window W ₁ kitchen	2	1.10	0.20	0.10	0.044m ³	Side windows
	Over shelves kitchen	4	1.30	0.20	0.10	0.104m ³	
	Over R.C.C Jalli over door D ₂ of bath and W.C	4	1.05	0.20	0.10	0.084m ³	
	Over front verandah	1	9.20	0.20	0.20	0.368m ³	20 cm thick
	Over back verandah including window W ₁ W ₂	1	13.60	0.20	0.15	0.408m ³	15 cm thick
	Sun shades, shelf slab	Same as in item (5) of G.F				1.175m ³	
	Stair case inclined slab and landings	Same as in item (5) of G.F				1.541m ³	
	Steps (without reinforcement)			8 x 21.10 1/2 (0.25x 0.175)		0.385m ³	
	Mumty room - Roof slab including chujja projections	1	3.70	5.10	0.10	1.887m ³	
	Lintel over door	1	1.20	0.20	0.10	0.024m ³	
	Lintel over windows	3	1.50	0.20	0.10	0.090m ³	Bearing 15 cm
					Total	22.644m ³	

Item No.	Particulars items and of works	No.	Length (m)	Breadth (m)	Height or depth (m)	Quantity	Explanatory notes
3	2.5 cm c.c 1 : 2 : 4 nosing in steps of stair case neat cement finished	9 x 2	1.10	-	-	19.80 m	
4	R.C.C 1:2: 4 newal post in stair case 10 cm x 10 cm 1 m high including reinforcement complete work	3	-	-	-	3 Nos	One at first floor one at middle and one at mumty floor
5	R.C.C 1:2:4 handrail over grill including reinforcement complete work - Stair Case inclined	1	5.38	-	-	5.38m	
	Upper landing	1	1.30	-	-	1.30m	
	Front verandah	1	8.10	-	-	8.10m	L=8.90-2x.40=8.10 m
	Back verandah	2	3.75	-	-	7.50m	L=4.15-.40=3.75 m
						Total	22.28 m
6	4 cm thick R.C.C Jalli including reinforcement complete work - Over doors of Bath and W.Cs	4	0.75	-	0.50	1.50m ²	
	Over windows of mumty room	3	1.20	-	0.50	1.80m ²	
						Total	3.30m ²
7	III Brick work First class brickwork in 1:6 cement local sand mortar in superstructure						
	Main rooms-	1	17.10	0.20	3.00	10.26	L = 16.90 + 0.20 = 17.10 m
	Front long walls	2	7.40	0.20	3.00	8.88	L = 7.20 + 0.20 = 7.40 m
	Cross walls	6	3.70	0.20	3.00	13.32	L = 3.90 - 0.20 = 3.70 m
	Stair case room front wall	1	2.30	0.20	0.60	0.28	Above lintel
						Total	32.74
	Deduct						
	Door opening D	10	1.00	0.20	2.10	4.20m ³	
	Window opening W	8	0.90	0.20	1.20	1.73m ³	
	Shelve opening	4	1.00	0.10	1.80	0.72m ³	Back of shelf 10 cm
	Lintels over door	10	1.30	0.20	0.10	0.26m ³	
	Lintels over window W	8	1.20	0.20	0.10	0.20m ³	
	Lintels over shelves	4	1.30	0.20	0.10	0.10m ³	
			Total of deduction			7.21m ³	
			Net Total for main rooms			25.53 m ³ (i)	
	Study room, kitchen, Bath and W.Cs front and back verandahs	Same as for item (13) GF					
			22.414 (ii)				

Item No.	Particulars items and of works	No.	Length (m)	Breadth (m)	Height or depth (m)	Quantity	Explanatory notes	
8	Mumty room all 4 walls	1	12.80	0.20	2.50	6.40m ³	Total centre line length = 12.80 m = 1.388 cu m	
	Deduct door D1	1	0.90	0.20	2.10	0.378m ³		
	Deduct Window W2	3	1.20	0.20	0.90	0.65m ³		
	Deduct Jalli above W3	3	1.20	0.20	0.50	0.36m ³		
			Total of Mumty room			5.012m ³ (iii)		
	Parapet long wall	2	17.10	0.20	0.975	6.67m ³		
	Parapet short wall	2	8.60	0.20	0.975	3.35m ³		
			Total of para pet			10.02 m ³ (iv)		
		Grand total of (i), (ii), (iii) and (iv)				62.976 m ³		
8	10 cm thick first class brickwork in partition wall with 1:3 cement coarse sand motar with hoop iron of 6 mm dia. steel reinforcement every fourth layer	2	1.20	-	3.00	7.20m ²		
9	10 cm brick band at top of parapet	1	52.20	-	-	52.20 m	L=2(17.10+9.00) = 52.20 m	
10	IV. Wood work-doors and windows Sal wood work in chaukhats in doors and windows - first floor doors and windows			Same as in item (15) of G.F		1.247m ³		
	Mumty room door D ₁	1	5.20	0.10	0.075	0.039m ³		
	Mumty room window W ₂	3	4.20	0.10	0.075	0.095m ³		
					Total	1.381m ³		
11	3 cm thick panelled shutters of deodar wood in doors and windows-first floor doors & windows			Same as in item (16) of G.F		43.459m ²		
	Mumty room door D ₁	1	0.78	-	2.04	1.591m ²		
					Total	45.05m ²		
12	3 cm thick fully glazed shutters of deodar wood							
	Mumty room windows W	3	1.68	-	0.78	3.931m ²		
13	Door and window fittings of oxidized iron			Same as in items (11) and (12) above				
					= 45.05 + 3.931	= 48.981 m ²		

Item No.	Particulars items and of works	No.	Length m	Breadth m	Height or depth m	Quantity	Explanatory notes
14	V Steel and iron work Steel reinforcement bars including bending		$22.349 \times \frac{1}{100}$	$\times 78.5$	$= 17.544q$		@ 1% of R.C.C work in item (2) excluding stair case steps $= 1/100 \times (22.734 - 0.385) = 1/100 \times 22.349 m^3$
15	Iron work in hold fasts and windows bars - doors and windows of first floor Mumty room - Hold fast in door D ₁ Hold fast in windows W ₂ 20 mm dia window bars in windows W ₂ of mumty room @ 2.47 kg per m			Same as in item (19) of G.F.		563.34 kg	
		6	@ 1 kg	each	-	6 kg	
		3 x 4	@ 1 kg	each	-	12 kg	
		3 x 9	x 0.90	x 2.47	=	60.02 kg	6 bars 0.90 m each
					Total	641.36 kg = 6.414 q	
16	Iron grill work in railings - Staircase railing two flights	1	5.38	-	0.80	4.31m ²	
	Upper landing	1	1.20	-	0.80	0.96m ²	
	Front verandah railing	1	8.10	-	0.80	6.48m ²	L = 8.90 - 2 x .40 = 8.10 m
	Back verandah railing	2	3.75	-	0.80	6.00m ²	L = 4.15 - .40 = 3.75 m
					Total	17.75m ²	
17	VI. Plastering and Pointing 12 mm plastering with 1:6 cement local sand mortar in walls Inside plastering Main rooms Bed rooms Living rooms Staircase room Face of wall below stair case entrance lintel 20 cm wide Shelves - Jambs, sills and soffits Study room, kitchens, Bath and W.Cs., Verandahs, etc (of 30 cm wall) Mumty room						Excluding skirting and Dado at bottom L = Inner perimeter = 14.80 L = Inner perimeter = 13.60 L = Inner perimeter = 12.00
		2	14.80	-	2.80	82.88m ²	
		2	13.60	-	2.80	76.16m ²	
		1	12.00	-	3.00	36.00m ²	
		2	0.20	-	2.00	0.80m ²	
		4	5.60	0.10	-	2.24m ²	
			Same as for item (21) in G.F			268.80m ²	
		1	12.00		2.50	30.00m ²	
					Total	496.88m ²	

Item No.	Particulars items and of works	No.	Length m	Breadth m	Height or depth m	Quantity	Explanatory notes
18	Deduct door and window openings		Same as for item (21) in G.F			48.80m ²	
			Net total of inside plastering			448.08m ²	
	Outside plastering Outside of first floor	1	52.20	-	3.00	156.00m ²	L=Outer perimeter= 2(17.10+9.00) = 52.20 m
	Deduct						
	Window opening W	8	0.90	-	1.20	8.64m ²	One face
	Window opening W ₁	4	0.80	-	1.00	3.20m ²	
	Window openings W ₂	2	0.75	-	1.00	1.50m ²	
	Front verandah openings	1	8.10	-	2.20	17.82m ²	L=8.90-2x.40 = 8.10m
	Back verandah openigns	2	3.75	-	2.20	16.50m ²	L=4.15-.40=3.75 m
			Total of deduction			47.66m ²	
			Net Total of outside plastering 1st floor			108.94 (i) sq.m	
	Parapet wall (outer top and inner)	1	51.20	-	2.00	102.40m ²	(ii) L=Total length of 4 walls = 51.20 m Ht. = 2 x .90 + .20=2.00 m
	Mumty room - Outer side of walls	1	13.60	-	2.50	34.00m ²	L=Outer perimeter =13.60 m
	Deduct door openings D ₁	1	0.90	-	2.10	1.89m ²	
	Deduct window openings W ₃	3	1.20	-	0.90	3.24m ²	
	Deduct R.C.C Jalli	3	1.20	-	0.50	1.80m ²	
			Net total of mumty			27.07m ² (ii)	
			Total of outside plastering (i), (ii) and (iii) =			238.41m ²	
			Grand total of inside and outside plastering			686.49m ²	
	6 mm plastering with 1 :3 cement medium sand mortar in ceiling						
	Bed rooms	2	3.70	3.70	-	27.38m ²	
Living rooms	2	3.10	3.70	-	22.94m ²		
First floor study room, Kitchen, bath and W.C verandahs, staircase, Sunshades, etc		Same as in item (22) of G.F.			103.83m ²		
Mumty room - Ceiling	1	2.30	3.70	-	8.51m ²		
Chujjas long	2	5.10	0.50	-	5.10m ²	L = 3.7 + .4 + 2 x 0.5 = 5.10m	
Chujjas short	2	2.70	0.50	-	2.70m ²	L = 2.30 + 0.40 = 2.70 m	
		Total			170.46m ²		

Item No.	Particulars items and of works	No.	Length m	Breadth m	Height or depth m	Quantity	Explanatory notes	
19	Skirting 20 cm high with 12 mm thick 1:3 cement coarse sand mortar neat cement finished - Bedrooms Livingrooms Jambs of main room doors D Study rooms, verandahs, etc	2	14.80	-	-	29.60m	L=Inner perimeter	
		2	13.60	-	-	27.20m		
		10	0.20	-	-	2.00m		
		Same as in item (23) of G.F.						69.30m
						Total		128.10m
20	Dado 12 mm thick 1:3 cement coarse sand mortar neat cement finished (in kitchen, bath and W.C) VII. Flooring	12	1.00	-	-	12.00m		
						Net total		116.10m
21	2.5 cm C.C. 1:2:4 floor Bed rooms Living rooms Study rooms Kitchens Bath rooms W.Cs Front verandah Back verandahs Staircase landing (first floor levels) Staircase landing (middle) Staircase landing (2nd floor levels) Sills of doors D Sills of doors D ₁ Sills of doors D ₂	Same as in item (24) of G.F.				22.45m ²	Including sills openings Including sills openings	
		2	3.70	3.70	-	27.38m ²		
		2	3.10	3.70	-	22.94m ²		
		2	3.70	2.00	-	14.80m ²		
		2	2.50	2.50	-	12.50m ²		
		2	1.20	1.40	-	3.36m ²		
		2	1.20	1.00	-	2.40m ²		
		1	8.90	2.20	-	19.58m ²		
		2	4.15	2.70	-	22.41m ²		
		1	2.60	0.40	-	1.04m ²		
		1	2.60	1.00	-	2.60m ²		
		1	2.60	0.40	-	1.04m ²		
		12	1.00	0.20	-	2.40m ²		
		2	0.90	0.20	-	0.36m ²		
		4	0.75	0.20	-	0.60m ²		
						Total		133.41m ²
		22	VIII. Painting Painting two coats over one coat of priming - First floor doors, windows, window bars, staircase railing grills Front verandah grill Back verandah grill Staircase upper landing grill Mumty room panelled door Glazed windows Window bars	Same as in item (28) of G.F.				
1	8.10			-	0.80	6.48m ²		
2	3.75			-	0.80	6.00m ²		
1	1.20			-	0.80	0.96m ²		
1 x 2 1/4	0.90			-	2.10	4.25m ²		
3x1	1.20			-	0.90	3.24m ²		
3x1	1.05			-	0.75	2.36m ²		
				Total	159.40m ²			

Item No.	Particulars items and of works	No.	Length m	Breadth m	Height or depth m	Quantity	Explanatory notes
23	Coaltar painting two coats on back of chaukhats - First floor doors and windows Mumty room - Door D ₁ Windows W ₂		Same as in	item 29 of	G.F.	16.00m ²	
		1	4.60	0.10	-	0.46m ²	
		3	4.20	0.10	-	1.26m ²	
					Total	17.72m ²	
24	IX. White washing and Colour washing - White washing 3 coats - Walls (inside) Ceiling underside of sunshades		Same as inside plastering in item (17) F.F			448.08m ²	
			Same as plastering in item (18)	F.F.		170.46m ²	
					Total	618.54 m ²	
25	Colour washing two coats over one coat of white washing walls (out side)		Same as out side plastering in item (17) F.F.			238.41 m ²	
26	X Misc. Items 100mm dia. A.C. rain water pipe	6	3.20	-		19.20m	Including bend

Abstract of estimated cost (Ground floor)

Item No.	Particulars of items of work	Quantity	Unit	Rate	Per	Amount
				Rs.Ps.		Rs.Ps.
I Earthwork						
1	Site clearance and setting out	1	Job		L.S.	
2	Earthwork in excavation in foundation	55.75	cu m		% cu m	
3	Earthwork in filling in plinth	46.52	cu m		% cu m	
II concrete						
4	Lime concrete in foundation	19.36	cu m		/ cu m	
5	R.C.C. work 1:2:4 excluding steel reinforcement bars and its bending but including centering and shuttering and binding steel	21.058	cu m		/ cu m	
6	2.5cm 1:2:4 nosing in steps neat cement finished	32.70	m		/m	
7	R.C.C 1:2:4 Newal post 10cm x 10cm, 1 m height including reinforcement complete work	2	No.		each	
8	R.C.C. 1:2:4 hand rail in staircase including reinforcement complete work.	5.48	m		/m	
9	4cm thick R.C.C. Jalli including reinforcement complete work	1.50	Sq m		/ sq m	
10	2.5 cm Damp proof course C.C 1:2:3 with water proofing compound	28.97	Sq m		/ sq m	
III Brickwork						
11	First class brick work in lime mortar in foundation and plinth	41.94	cu m		/ cu m	
12	First class brickwork in lime mortar in superstructure in 30cm wall	36.45	cu m		/ cu m	
13	First class brickwork in 1:6 cement local sand mortar in superstructure in foundation and plinth	22.74	cu m		/ cu m	
14	10 cm thick first class brickwork in partition wall in 1:3 cement coarse sand mortar with hoop iron or 6mm dia. steel reinforcement every fourth layer	7.20	sq m		/ sq m	
IV Wood work Doors and Windows						
15	Salwood work in chowkhats in doors and windows	1.201	cu m		/ cu m	
16	4 cm thick panelled shutters of deodar wood in doors and windows	41.197	sq m		/sq m	
17	Door and window fittings of oxydized iron	41.197	sq m		/ sq m	

Rates can be quoted from the prevailing schedule of rates

Amount can be calculated by multiplying the quantity with its rate

Item No.	Particulars of items of work	Quantity	Unit	Rate	Per	Amount		
				Rs. Ps.		Rs. Ps.		
V. Steel and Iron work								
18	Steel reinforcement bars including bending	16.226	quintal	Rate can be quoted from the prevailing schedule of rates	/q	Amount can be calculated by multiplying the quantity with its rate		
19	Iron work in hold fasts and window bars	5.633	quintal		/q			
20	Iron grill work in stair case railing	4.304	sq m		/sq m			
VI. Plastering and pointing								
21	12mm plastering with 1:6 cement local sand mortar in walls	562.81	sq m		/ sq m			
22	6mm plastering with 1:3 cement medium sand mortar in ceiling	149.33	sq m		/ sq m			
23	Skirting 20cm high with 12mm thick 1:3 cement coarse sand mortar neat cement finished	114.30	m		/m			
24	Dado 12mm thick 1:3 cement coarse sand mortar neat cement finished	22.45	sq m		/ sq m			
25	20mm plastering with 1:3 cement coarse sand mortar neat cement finished in steps	13.96	sq m		/sq m			
VII flooring								
26	2.5cm C.C. 1:2:4 floor over and including 7.5cm lime concrete	125.85	sq m		/sq m			
27	2.5 cm C.C. 1:2:4 floor	9.55	sq m		/sq m			
VIII painting								
28	Painting two coats over one coat of priming	130.16	sq m		/sq m			
29	Coal tar painting two coats on back of chowkhats	16.00	sq m		/sq m			
IX White washing and colour washing								
30	White washing 3 coats inside	565.81	sq m		/sq m			
31	Colour washing 2 coats over one coat of white washing	159.76	sq m		/sq m			
32	100 mm dia. A.C. rain water pipe	21.60	m		/m			

Total

Add 8% for water supply and sanitary works
Add 8% for electrification works

Total

Add 3% for contingencies
Add 2% for workcharged establishment

Grand Total

Abstract of Estimated Cost (First floor)

Item No.	Particulars of items of work	Quantity	Unit	Rate	Per	Amount		
				Rs.Ps.		Rs.Ps.		
II. Concrete								
1	Lime concrete in roof terracing 7.5 cm thick complete with surface finishing	151.42	sq m	Rates can be quoted from the prevailing schedule of rates	/sq m	Amount can be calculated by multiplying the quantity with its rate		
2	R.C.C work 1:2:4 excluding steel reinforcement and its bending but including contering and shuttering and binding steel	22.644	cu m		/cu m			
3	2.5cm C.C. 1:2:4 nosing in steps of stair case neat cement finished	19.80	m		/m			
4	R.C.C 1:2:4 newal post in stair case 10cm x 10cm, 1m height including reinforcement complete work	3	nos		/nos			
5	R.C.C 1:2:4 hand rail over grill including reinforcement complete work	22.28	m		/m			
6	4cm thick R.C.C jalli including steel reinforcement complete work	3.30	sq.m		sq m			
III Brick work								
7	First class brickwork in 1:6 cement local sand mortar in superstructure in 20cm thick wall	63.56	cu m		/cu m			
8	10cm thick first class brickwork in partition wall with 1:3 cement coarse sand mortar with hoop iron or 6mm dia. steel reinforcement every fourth layer	7.20	sq m		/sq m			
9	10 cm thick brick band with 1:6 cement local sand mortar at top of parapet	52.20	m		/m			
IV Wood work - Doors and Windows								
10	Salwood work in chow khats in doors and windows	1.331	cu m		/cu m			
11	3 cm thick panelled shutters of deodar wood in doors and windows	42.554	sq m		/sq m			
12	3cm thick fully glazed shutters of deodar wood	3.931	sq m		/sq m			
13	Door and window fittings of oxydized iron	46.485	sq m		/sq m			
V Steel and iron work								
14	Steel reinforcement bars including bending	17.544	quintal	/q				
15	Iron work in hold fasts and window bars	6.414	quintal	/q				
16	Iron grill in railings	17.75	sq m	/sq m				

Item No.	Particulars of items of work	Quantity	Unit	Rate		Per	Amount	
				Rs.	Ps.		Rs.	Ps.
	VI. Plastering and pointing							
17	12mm plastering with 1:6 cement local sand mortar in walls	692.76	sq m			/sq m		
18	6mm plastering with 1:3 cement medium sand mortar in ceiling	170.46	sq m			/sq m		
19	Skirting 20cm high with 12mm thick 1:3 cement coarse sand mortar neat cement finished	116.10	m			/m		
20	Dado 12mm thick 1:3 cement coarse sand mortar neat cement finished	22.45	sq m			/sq m		
	VII flooring							
21	2.5cm C.C. floor	133.41	sq m			/sq m		
	VIII painting							
22	Painting two coats over one coat of priming	152.85	sq m			/sq m		
23	Coaltar painting two coats on back of chowkhats	17.72	sq m			/sq m		
	IX White washing and color washing							
24	White washing 3 coats inside	624.54	sq m			/sq m		
25	Colour washing two coats over one coat of white washing	238.68	sq m			/sq m		
	X Miscellaneous items							
26	100mm dia. A.C. rain water pipe	19.20	m			/ m		

Total

Add 8% for water supply and sanitary works
Add 8% for electrification works

Total

Add 3% for contingencies
Add 2% for workcharged establishment

Grand Total

Rate analysis

Objectives: At the end of this exercise you shall be able to

- prepare the rate analysis of plain cement concrete
- prepare the rate analysis of reinforced cement concrete
- prepare the rate analysis of stone masonry
- prepare the rate analysis of brick masonry
- prepare the rate analysis of plastering
- prepare the rate analysis of wood work.

TASK 1: Prepare rate analysis of plain cement concrete

DATA (specification)

- PCC : 1:5:10
- Coarse aggregate : 40mm
- Unit : 1m³
- Take : 10m³

Rate of materials and labour charge can be changed to prevailing local rate or CPWD rate.

PROCEDURE

**Cement concrete 1:5:10 in foundation of floor with brick ballast 40mm (1½") thick gauge - unit 1 cu m.
 Take - 10 cu.m**

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Materials					
Broken stone 40mm gauge	9.50 cu m	650.00 per cu m		6175.00	
Sand (local)	4.75 cu m	700.00 per cu m		3325.00	
Cement (28 ^{1/2} bags)	0.95 cu m	7650.00 per cu m		7267.50	
		Total		16767.50	
Labour					
Mistri (Head mason)	½ no	350.00 per day		175.00	
Mason	1 ½ no	300.00 per day		450.00	
Mazdoor (Beldar)	12 nos	220.00 per day		2640.00	
Boy or woman coolie	18 nos	200.00 per day		3600.00	
Bhishti (Including curing)	4 nos	200.00 per day		800.00	
Sundries T and P etc	Lump sum	120.00 L.S		120.00	
		Total		7785.00	
		Total of materials and labour		24552.50	

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Add 1 1/2% water charges	—	—	—	368.00	—
Add 10% contractor's profit	—	—	—	2455.25	—
		Grand total		27375.75	
Rate per cu m- Rs. 27375.75/10	= Rs.2737.57				for 10 cu m

TASK 2 : Prepare the rate analysis of RCC work 1:2:4 for beams, slabs, etc.

DATA (Specification of the work)

- Stone ballast : 20mm
- Sand (Coarse)
- Ratio : 1:2:4
- Unit : 1m³
- Take : 10m³

R.C.C. work in beams, slabs, etc. 1:2:4-unit 1 cu m. Take -10 cu m

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Materials					
Stone ballast 20mm gauge	8.80 cu m	1800.00 per cu m	—	15840.00	—
Sand (coarse)	4.40 cu m	1500.00 per cu m	—	6600.00	—
Cement (66 pags)	2.20 cu m	7650.00 per cu m	—	16830.00	—
Steel, mild steel bars @ 1%= 0.1 cu m @ 78.5 q/cu m=7.85q	7.85 q	4400.00 per q	—	34540.00	—
Binding wire	1.50 kg	65.00 per q	—	97.50	—
		Total		73907.50	
Labour					
Mistri (Head Mason)	1/2 no	350.00 per day	—	175.00	—
Mason	3 nos	300.00 per day	—	900.00	—
Mazdoor (Beldar)	12 nos	220.00 per day	—	2640.00	—
Boy or woman coolie	20 nos	200.00 per day	—	4000.00	—
Bhishti (including curing)	6 nos	200.00 per day	—	1200.00	—
Sundries T. and P etc	Lump sum	140.00 L.S	—	140.00	—
		Total		9055.00	

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Bending cranking and binding steel bars in position blacksmith (II class)	8 nos	280.00	per day	2240.00	
Mazdoor (Belder)	8 nos	220.00	per day	1760.00	
T. and P	Lump sum	90.00	L.S	90.00	
		Total		4090.00	
Centering and shuttering (both erection and dismantling)					
Timber planks and balies	Lump sum	1500.00	L.S	1500.00	
Carpenter (II class)	10 nos	280.00	per day	2800.00	
Mazdoor (Belder)	10 nos	220.00	per day	2200.00	
Nails	Lump sum	200.00	L.S	200.00	
T. and P.	Lump sum	70.00	L.S	70.00	
		Total		6770.00	
Total of materials and labour	—	—		85673.00	
Add 1 1/2% water charges	—	—		1285.00	
Add 10% contractor's profit	—	—		8567.00	
		Grand total		95525.30	
Rate per cu m - Rs. 95525/10	= Rs. 9552.50			for 10 cu m	

TASK 3 : Prepare the rate analysis of random rubble masonry

DATA (specification of the work)

- Mortar : Cement mortar 1:6
- Unit : 1m³
- Take : 10m³

Random rubble stone masonry in superstructure in 1:6 cement sand mortar - unit 1 cu m Take -10 cu m

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Materials					
Stone including through bond					
Stone and wastage	12.5 cu m	1200.00	per cu m	15000.00	
Cement (21 bags)	0.7 cu m	7650.00	per cu m	5355.00	
Sand or bajri (local)	4.2 cu m	700.00	per cu m	2940.00	
		Total		23295.00	

Labour, etc			
Mistri (Head mason)	1/2 no	350.00 per day	175.00
Mason	12 nos	300.00 per day	3600.00
Mazdoor (Beldar)	10 nos	220.00 per day	2200.00
Coolie (boy or woman)	10 nos	200.00 per day	2000.00
Bhishti	1 1/2 nos	200.00 per day	300.00
Scaffolding	Lump sum	325.00 L.S	325.00
Sundries T and P etc	Lump sum	90.00 L.S	90.00
Total			8690.00
Total of materials and labour			31985.00
Add 1 1/2 % water charge			480.00
Add 10% contractor's profit			3198.50
Grand total			35663.50
Rate per cu m -Rs. 35664 / 10 = 35663.50			for 10 cu m

TASK 4 : Prepare the rate analysis of brick masonry

DATA (specification of the work)

- Bricks : (19x9x9) cm
- Mortar : 1.6 cement mortar
- Unit : 1m³
- Take : 10m³

I-class brick work in superstructure with (19x9x9) cm brick with 1:6 cement sand mortar - unit 1 cu m. Take -10 cu m

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Materials					
Brick I-class (500 bricks per cu m)	5000 nos	4500.00 per 100 nos		22500.00	
Cement (13.5 bags)	0.45 cu m	7650.00 per cu m		3442.00	
Sand (local)	2.7 cu m	700.00 per cu m		1890.00	
			Total		27832.00
Labour					
Mistri (Head mason)	1/2 no	350.00 per day		175.00	
Mason	10 nos	300.00 per day		3000.00	
Mazdoor (Beldar)	7 nos	220.00 per day		1540.00	
Boy or woman coolie	10 nos	200.00 per day		2000.00	
Bhishti	2 nos	200.00 per day		400.00	
Scaffolding	Lump sum	280.00 per day		280.00	
Sundries T and P etc	Lump sum	90.00 per day		90.00	
			Total		7485.00

Total of materials and labour	35317.50
Add 1½ % water charges	530.00
Add 10% contractor's profit	3531.25
Grand total	39378.75 for 10m ³
Rate per cu m -Rs.39379 / 10 = Rs. 3938.00	

TASK 5 : Prepare the rate analysis of wood work

DATA (specification of the work)

Wood work for frame of doors and windows

- Frame size : 8x12mm
- Door size : 200x120 (salwood)

- 1 For fixing the frame in position a lumpsum amount of 100/-may be added
- 2 For soft wood the labour may be reduced to 25%

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Materials					
Timber 5.48x0.08x0.12 (L=2x2.14+1x1.2=5.48)	0.053 cu m				
Wastage 5%	0.003 cu m				
	0.056cu m	40000.00	per cu m	2240.00	
Labour, etc.					
Mistri (carpenter)	$\frac{1}{16}$ no	300.00	per day	18.75	
Carpenter	$\frac{3}{4}$ no	280.00	per day	210.00	
Coolie (Helper)	$\frac{1}{2}$ no	200.00	per day	100.00	
Sundries, T and P. etc	Lump sum	45.00	per day	45.00	
		Total of labour		373.75	
Total of materials and labour					
				2613.75	
Add 10% contractor's profit					
				261.37	
Grand total					
				2875.12	
Rate per cu m (dividing by 0.053) -Rs. 2875.12/0.053 = Rs. 54247.00					

TASK 6 : Prepare the rate analysis of plastering

DATA

- Thickness of plastering : 12mm
- Cement mortar : 1:6
- Unit : 1m²
- Take : 100m²

Particular	Qty or Nos	Rate		Cost	
		Rs.	Ps.	Rs.	Ps.
Materials					
Cement (9 bags)	0.30 cu m	7650.00	per cu m	2295.00	
Sand (local)	1.80 cu m	700.00	per cu m	1260.00	
		Total		3555.00	
Labour					
Mistri (Head mason)	1/3 no	350.00	per day	116.70	
Mason	10 nos	300.00	per day	3000.00	
Mazdoor (Beldar) including raking of joints	15 nos	220.00	per day	3300.00	
Bhishti including (curing)	3/4 nos	200.00	per day	150.00	
Scaffolding sundries T.and P. etc	Lump sum	200.00	per day	200.00	
		Total		6766.70	
Total of materials and labour				10321.70	
Add 1 1/2 % water charges				154.80	
Add 10% contractor's profit				1032.17	
Grand total				11508.67	
Rate per cu m-Rs.11508/100 = Rs. 115.00					for 100 sq m

Preliminary estimate

Objective: At the end of this exercise you shall be able to
• **prepare preliminary estimate of different structures.**

DATA

- Plinth area rate : Rs.25,000/m²
- Cubical extend rate : Rs.7500/m³

PROCEDURE

TASK 1 : Prepare preliminary estimate of building

1 Plinth area estimate

Plinth area of building	=	100m ²
Plinth area rate	=	Rs.25000/m ²
Approximate cost of building	=	25000x100
	=	Rs.25,00,000/-

For storeyed building, the plinth area estimate is prepared for each storey seperately.

2 Cube rate estimate

Cubical content of building (100x3.5 (height))	=	350m ³
Cube rate of building	=	Rs.7500/m ³
Cube rate of building	=	350x7500
	=	Rs.2,625,000/-

Per unit basis

Per student for schools and hostels, per classrooms for schools, per bed for hospitals, per seat for cinema theatre halls, per day for factories, barracks and dormetories.

- Approximate estimate of a hostel building for 100 students @ Rs.20,000/-per students work out as

Rs. 20 lakhs.

- Approximate cost of a 100 bed hospital @ 1,00,000 per bed comes to Rs. 1 crore
- Approximate cost of a barrack for 10 days @ 20,000 per days comes to Rs. 2 lakhs.

1 Irrigation channels

- i Per kilometer basis depending on the capacity of channel.
- ii Area of land commanded ie., per hectare basis
- The approximate cost of 10km length of irrigation channel of 3m³/sec, capacity @ Rs. 70,000/per km works out Rs.7 lakhs.
- For an irrigation project having a commanded area 2000 hectares, approximate cost Rs.1000/hectare comes to Rs. 20 lakhs.

2 Roads and highways

Per kilometer basis depending on the nature of raod, the width and thickness of mettaling, etc.

For 10km of a state highway approximate cost Rs. 5 lakhs/km work out 50 lakhs.

Estimation of earth work

Objective: At the end of this exercise you shall be able to
 • quantities of earth work by trapezoidal and prismoidal formula.

PROCEDURE

TASK 1 : Quantities of earth work by trapezoidal and prismoidal formula

A railway embankment is 12m wide. The ground is level in direction transverse to the centre line. Calculate the volume contained in a 100m length by trapezoidal rule and prismoidal rule, if the direction side slope is 1.5:1. The centre heights at 20m interval are 3.7m, 2.6m, 3.4m, 2.8m, 3.0m, 2.2m.

Solution

For a level section $A = (b + sh) h$

Slope = 1.5:1, hence $s = 1.5$

$b = 12m$

Let the area at different sections be A_1, A_2, \dots

$$A_1 = (12 + 1.5 \times 3.7) 3.7 = 64.935m^2$$

$$A_2 = (12 + 1.5 \times 2.6) 2.6 = 41.34m^2$$

$$A_3 = (12 + 1.5 \times 4.0) 4.0 = 72.00m^2$$

$$A_4 = (12 + 1.5 \times 3.4) 3.4 = 58.14m^2$$

$$A_5 = (12 + 1.5 \times 2.8) 2.8 = 45.36m^2$$

$$A_6 = (12 + 1.5 \times 3.0) 3.0 = 49.50m^2$$

$$A_7 = (12 + 1.5 \times 2.2) 2.2 = 33.66m^2$$

Trapezoidal rule

$$V = L \left[\left(\frac{A_1 + A_7}{2} \right) + A_2 + A_3 + A_4 \right]$$

$$= 20 \left[\left(\frac{64.935 + 33.66}{2} \right) + 41.34 + 72.00 + 58.14 + 45.36 + 49.50 \right]$$

$$= 20 [(49.297) + 266.34]$$

$$= 6312.34m^3$$

Prismoidal rule

$$V = \frac{L}{3} [A_1 + A_7 + 4(A_2 + A_4 + A_6) + 2(A_3 + A_5)]$$

$$= \frac{20}{3} [(64.935 + 33.66) + 4(41.34 + 58.14 + 49.50) + 2(72.00 + 45.36)]$$

$$= 6194.9m^3$$

A road embankment is 8m wide and 200 m in length, at the formation level with a side slope of 1:5:1. The embankment has a rising gradient of 1 in 100m the ground levels at every 50m along the centre line area as follows:

Distance (m)	0	50	100	150	200
RL (m)	164.5	165.2	166.8	167	167.2

The foundation level of zero chain age is 166m. Calculate the volume of earthwork.

Solution : rising gradient is 1 in 100m
 Formation level increases by 0.5m from every 50m distance.

Distance	0	50	100	150	200
RL (m)	164.5	165.2	166.8	167	167.2
Formation level (m)	166	166.5	167	167.5	168
Depth of filling h (m)	1.5	1.3	0.2	0.5	0.8

We know that the area of a cross-section is given by

$$A = (b+sh) h$$

Hence,

$$A_1 = (8 + 1.5 \times 1.5) 105 = 15.375\text{m}^2$$

$$A_2 = (8 + 1.5 \times 1.3) 1.3 = 12.935\text{m}^2$$

$$A_3 = (8 + 1.5 \times 0.2) 0.2 = 1.66\text{m}^2$$

$$A_4 = (8 + 1.5 \times 0.5) 0.5 = 4.375\text{m}^2$$

$$A_5 = (8 + 1.5 \times 0.8) 0.8 = 7.360\text{m}^2$$

$$\text{Interval } L = 50\text{m}$$

Trapezoidal rule

$$V = L \left[\left(\frac{A_1 + A_5}{2} \right) + A_2 + A_3 + A_4 \right]$$

$$= \frac{50}{2} \left[\left(\frac{15.375 + 7.360}{2} \right) + 12.935 + 1.66 + 4.375 \right]$$
$$= 1516.875\text{m}^3$$

Prismoidal rule

$$V = \frac{L}{3} \left[(A_1 + A_5) + 4(A_2 + A_4) + 2A_3 \right]$$

$$= \frac{50}{3} \left[(15.375 + 7.36) + 4(12.935 + 4.375) + (2 \times 1.66) \right]$$
$$= 1588.25\text{m}^3$$