DEPARTMENT OF CIVIL ENGINEERING

LABORATORY MANUAL

FOR

ESTIMATION PRACTICE-I,
3RD SEMESTER

C. V. RAMAN POLYTECHNIC

(Affiliated to SCTE & VT and Approved by Govt. Odisha)
BIDYANAGAR, MAHURA, JANLA, BHUBANESWAR-752054, ODISHA

Vision:

Civil engineering department is committed to impart knowledge and excellence in civil Engineering to the students and to produce civil engineers of high calibre, technical skills and ethical values to meet current and future challenges.

Mission:

M1: To produce civil engineers with quality technical skills aligned with industry needs to solve real life problems of the society.

M2: To create teaching learning environment for students to acquire knowledge as per need and to motivate towards entrepreneurship and to pursue higher studies.

M3: To serve construction industries, civil engineering profession and the community at large through dissemination of knowledge and technical services to improve quality of life and enhance employability.

M4: To inculcate self-learning attitude and professionalism.

Program Educational Objectives (PEOs)

PEO1- To analyze in civil engineering profession or Higher education by acquiring thorough knowledge and concepts in fundamentals of engineering.

PEO2-To Apply knowledge and skills to real life problems and there by rendering safe and economical structures against natural calamities and also environmentally sustainable and useful to society.

PEO3- To understand entrepreneurial endeavors and to develop effective communication skill and passion for learning.

Program Specific outcomes (PSO)

PSO1- Able to meet the needs of public in the design and execution of quality construction work considering health, safety, cultural and environmental factors.

PSO2- Analyze and design regular and complex structures applying knowledge of building analysis software package.

PSO3- Able to work effectively as an individual or in a team having acquired leadership skills and manage projects in multidisciplinary environment.

EXPERIMENT NO-1

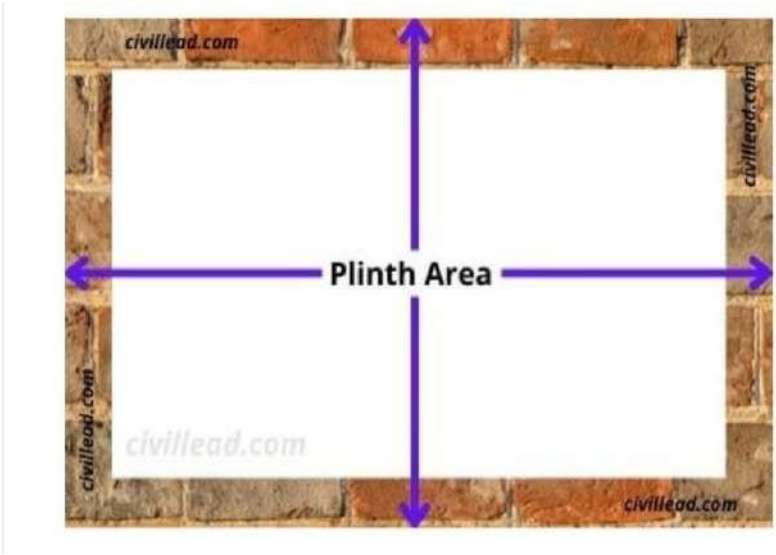
- Aim of the Experiment: -

To calculate the plinth area of a building.

- Requirement: - Given the details of plinth area work.

Theory

Plinth area: - The built up covered area of a building measurement at floor level of any storey is called plinth area.



Procedure – Find out outer to outer distance of walls.

- Find out distance of long wall.
- Find out distance short wall.

Calculation: - Plinth area = long wall * short wall

= 5m*4m

= $20m^2$

Precaution: -

1. All unit of item of works area correct.
2. Calculate should be done carefully.

Result – Total plinth area =$20m^2$

Conclusion: - In above experiment we have concluded that the calculation of plinth.

Experiment-2

- Aim of the Experiment: -

Calculate single storeyed two roomed building with specification as per PWD rate analysis.

Requirement: - Given plan, section and elevation of a two roomed building.

- Given specification.

Procedure: - Calculate quantities of all items of work.

- Find out the total rate of given specification and quantities of all items of work of a building.

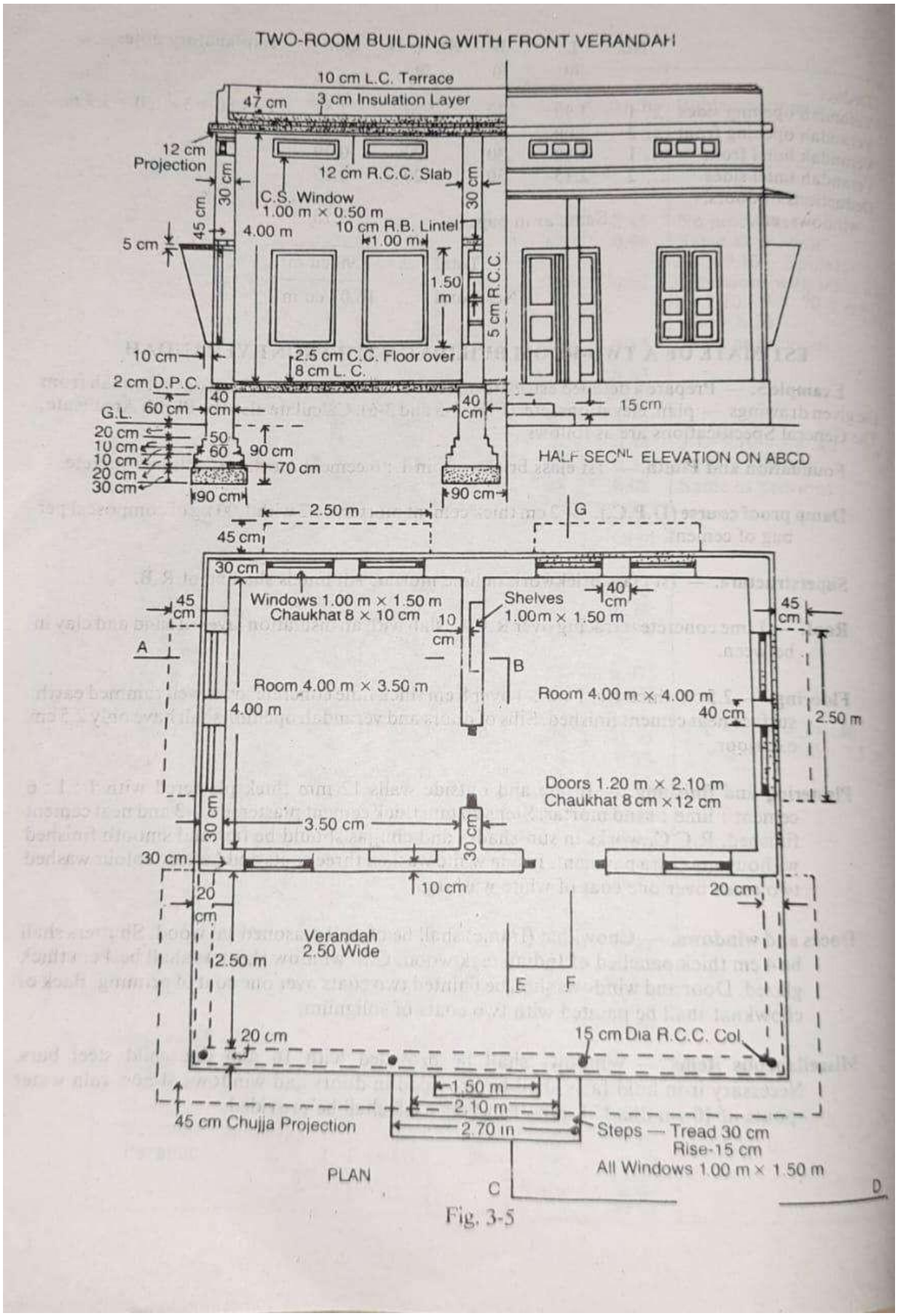
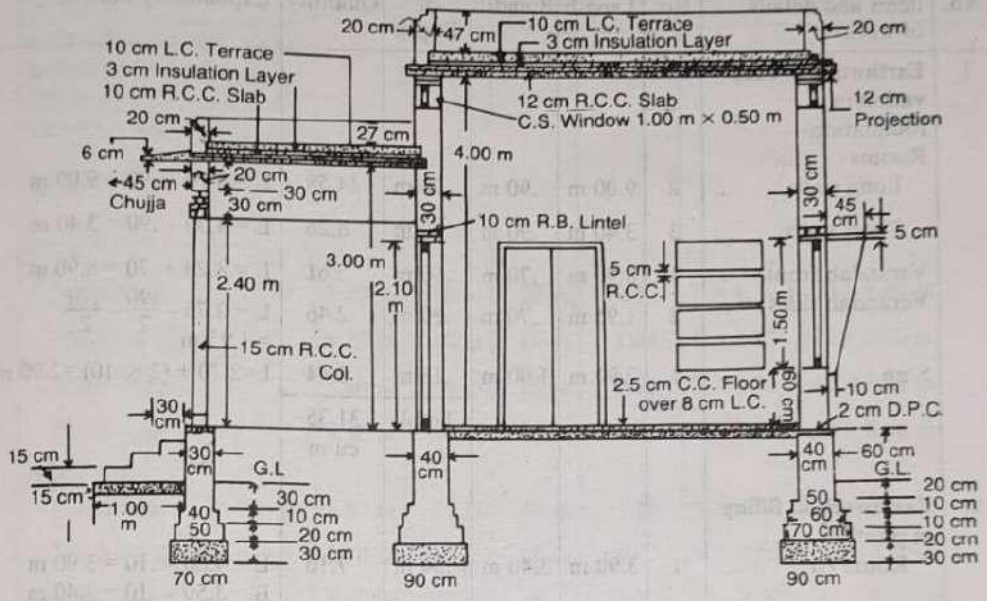

TWO-ROOM BUILDING WITH FRONT VERANDAH
10 cm L.C. Terrace
47 cm
3 cm Insulation Layer
12 cm Projection
12 cm R.C.C. Slab
C.S. Window 1.00 m × 0.50 m
10 cm R.B. Lintel
1.00 m
4.00 m
30 cm
45 cm
5 cm
1.50 m
5 cm R.C.C.
10 cm
2.5 cm C.C. Floor over 8 cm L. C.
2 cm D.P.C.
G.L.
60 cm
40 cm
20 cm
10 cm
10 cm
20 cm
30 cm
50
60
90 cm
70 cm
90 cm
15 cm
HALF SECNL ELEVATION ON ABCD
2.50 m
45 cm
G
30 cm
Windows 1.00 m × 1.50 m
Chaukhat 8 × 10 cm
Shelves
1.00m × 1.50 m
10 cm
A
B
Room 4.00 m × 3.50 m
Room 4.00 m × 4.00 m
4.00 m
Doors 1.20 m × 2.10 m
Chaukhat 8 cm ×12 cm
3.50 cm
10 cm
20 cm
Verandah
2.50 Wide
2.50 m
E
F
20 cm
15 cm Dia R.C.C. Col
1.50 m
2.10 m
2.70 m
45 cm Chujja Projection
Steps — Tread 30 cm
Rise-15 cm
All Windows 1.00 m × 1.50 m
PLAN
C
D

Fig. 3-5

CROSS-SECTION OF TWO-ROOMED BUILDING



SECNL ELEVATION ON CEFG

Fig. 3-6

Note — *Foundation of verandah is continuous of same section.*

Centre to centre lengths —

Room Long walls -- $3.50+4.00+.30+(2\times\frac{.30}{2})$=**8.10 m** *combined total length.*

Room Short walls—$4.00+(2\times\frac{.30}{2})$=**4.30 m**

Verandah Front—Extreme outer length at plinth—$(2\times\frac{.30}{2})$

$=\{3.50+4.00+(3\times.30)+(2\times.05)\}-.30$=**8.20 m**

Verandah Sides—$2.50+\frac{.30}{2}+\frac{.20}{2}$=**2.75 m**

DETAILS OF MEASUREMENT AND CALCULATION OF QUANTITIES (Ex. 5)

Item No.	Particulars of items and details of works	No.	Length	Breadth	Height or Depth	Quantity	Explanatory note
1.	**Earthwork in excavation** in foundation—						
	Rooms						
	Long walls ...	2	9.00 m	.90 m	.90 m	14.58	L = 8.10 + .90 = 9.00 m
	Short walls ...	3	3.40 m	.90 m	.90 m	8.26	L = 4.30 – .90 = 3.40 m
	Verandah front ...	1	8.90 m	.70 m	.90 m	5.61	L = 8.20 + .70 = 8.90 m
	Verandah sides ...	2	1.95 m	.70 m	.90 m	2.46	$L = 2.75 - \frac{.90}{2} - \frac{.70}{2}$ = 1.95 m
	Step ...	1	2.90 m	1.00 m	.15 m	0.44	L=2.70 + (2 × .10) =2.90 m
					Total	31.35 cu m	
2.	**Earthwork in filling** in plinth—						
	Room (i) ...	1	3.90 m	3.40 m	.54 m	7.16	L = 4.00 – .10 = 3.90 m B = 3.50 – .10 = 3.40 m Ht. = 60 + 2 – 8 = 54 cm = .54 m
	Room (ii) ...	1	3.90 m	3.90 m	.54 m	8.22	L = 8.20 – .30 = 7.90 m
	Verandah ...	1	7.90 m	2.40 m	.54 m	10.23	$B = 2.75 - \frac{.40}{2} - \frac{.30}{2}$ = 2.40m
					Total	25.61 cu m	
3.	**Lime concrete in** foundation						
	Rooms —						
	Long walls ...	2	9.00 m	.90 m	.30 m	4.86	May be taken 1/3 of excavation.
	Short walls ...	3	3.40 m	.90 m	.30 m	2.75	
	Verandah front ...	1	8.90 m	.70 m	.30 m	1.87	
	Verandah sides ...	2	1.95 m	.70 m	.30 m	0.82	
	Step ...	1	2.90 m	1.00 m	.15 m	0.44	
					Total	10.74 cu m	

(Ex. 5 Contd.)

Item No.	Particulars of items and details of works	No.	Length	Breadth	Height or Depth	Quantity	Explanatory note
4.	**I-class Brick-work in Foundation and Plinth** in 1 : 6 cement mortar—						
	ROOMS —						
	Long walls —						
	1st footing ...	2	8.80 m	.70 m	.20 m	2.46	L = 8.10 + .70 = 8.80 m
	2nd footing ...	2	8.70 m	.60 m	.10 m	1.04	L = 8.80 – .10 = 8.70 m
	3rd footing ...	2	8.60 m	.50 m	.10 m	0.86	L = 8.70 – .10 = 8.60 m
	Plinth wall ...	2	8.50 m	.40 m	.80 m	5.44	L = 8.60 – .10 = 8.50 m
	Short walls —						
	1st footing ...	3	3.60 m	.70 m	.20 m	1.51	L = 4.30 – .70 = 3.60 m
	2nd footing ...	3	3.70 m	.60 m	.10 m	0.67	L = 3.60 + .10 = 3.70 m
	3rd footing ...	3	3.80 m	.50 m	.10 m	0.57	L = 3.70 + .10 = 3.80 m
	Plinth wall ...	3	3.90 m	.40 m	.80 m	3.74	L = 3.80 + .10 = 3.90 m
	VERANDAH—						
	Front wall (long)—						
	1st footing ...	1	8.70 m	.50 m	.20 m	0.87	L = 8.20 + .50 = 8.70 m
	2nd footing ...	1	8.60 m	.40 m	.10 m	0.34	L = 8.70 – .10 = 8.60 m
	Plinth wall ...	1	8.50 m	.30 m	.90 m	2.30	L = 8.60 – .10 = 8.50 m
	Side wall (short) —						
	1st footing ...	2	2.15 m	.50 m	.20 m	0.43	$L=2.75-\frac{.50}{2}-\frac{.70}{2}=2.15m$
	2nd footing ...	2	2.25 m	.40 m	.10 m	0.18	$L=2.75-\frac{.40}{2}-\frac{.60}{2}=2.25m$
					C.O.	20.41	

Item No.	Particulars of items and details of works	No.	Length	Breadth	Height or Depth	Quantity	Explanatory note
					B.F.	20.41	
	Plinth wall 10 cm above footing ...	2	2.35 m	.30 m	0.10 m	0.14	L=2.75 − $\frac{.50}{2}$ − $\frac{.30}{2}$ =2.35 m
	Plinth wall remaining portion ...	2	2.40 m	.30 m	.80 m	1.15	L=2.75 $\frac{.40}{2}$ − $\frac{.30}{2}$ =2.40 m
	Steps —						
	1st step ...	1	2.70 m	.90 m	.15 m	0.36	
	2nd step ...	1	2.10 m	.60 m	.15 m	0.19	
	3rd step ...	1	1.50 m	.30 m	.15 m	0.07	
					Total	22.32 cu m	
5.	**2 cm Damp proof course**						
	Rooms —						
	Long walls ...	2	8.50 m	.40 m	—	6.80	Length, breadth same as for plinth wall.
	Short walls ...	3	3.90 m	.40 m	—	4.68	
					Total	11.48	
	Deduct door sills ...	2	1.20 m	.40 m	—	0.96	
				Net	Total	10.52 sq m	
6.	**I-class Brick-work in superstructure** in lime mortar—						
	Rooms —						
	Long walls ...	2	8.40 m	.30 m	4.00 m	20.16	Length — Out to out.
	Short walls ...	3	4.00 m	.30 m	4.00 m	14.40	Length — In to in.
	Ver. above lintels (over pillars)—						
	Front (long) ...	1	8.40 m	.20 m	.30 m	0.50	
	Sides (short) ...	2	2.50 m	.20 m	.30 m	0.30	
	Parapet —						
	Over Rooms —						
	Long walls ...	2	8.40 m	.20 m	.60 m	2.02	Ht. = 47 + 10 + 3 = 60 cm = .60 m
	Short walls ...	2	4.20 m	.20 m	.60 m	1.01	L=4.00 + (2 × .30) − (2 × .20) = 4.20 m
					C.O.	38.39	

(Ex. 5 Contd.)

Item No.	Particulars of items and details of works	No.	Length	Breadth	Height or Depth	Quantity	Explanatory notes
					B.F.	38.39	
	Verandah —						
	Front (long) ...	1	8.40 m	.20 m	.40 m	0.67	Ht. = 27 + 10 + 3 = 40 cm = 40 cm
	Side (short) ...	2	2.50 m	.20 m	.40 m	0.40	
					Total	39.46 cu m	
	Deduct—						
	Door openings ...	2	1.20 m	.30 m	2.10 m	1.51	
	Window openings	10	1.00 m	.30 m	1.50 m	4.50	
	C.S. Window ,, ...	12	1.00 m	.30 m	0.50 m	1.80	
	Shelves ,, ...	2	1.00 m	.20 m	1.50 m	0.60	Back of shelf 10 cm
	R.B. lintels over—						
	Doors ...	2	1.40 m	.30 m	.10 m	0.084 (a)	10 cm bearing.
	Windows ...	10	1.20 m	.30 m	.10 m	0.360 (a)	
	C.S.Windows ...	12	1.20 m	.30 m	.10 m	0.432 (a)	Total of (a) s = 0.948 cu m
	Shelves ...	2	1.20 m	.30 m	.10 m	0.072 (a)	
					Total	9.36	
				Net	Total	30.10 cu m	
7.	**R. B. work in lintels** excluding steel and its bending but including centering and shuttering and binding steel— Over doors, windows and shelves ...		Same (a) in	as for item	items no. 6 =	marked 0.948	
	Over ver. pillars—						
	Front ...	1	8.40	.20	.30	0.504	Out to out.
	Sides ...	2	2.80	.20	.30	0.336	Inside bearing 30 cm
					Total	1.788 cu m	

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
8.	**R. C. C. work** in ver. columns excluding steel and its bending, but including form work and binding steel complete fair finished	4	$\frac{\pi (.15)^2}{4}$	×	2.70	= 0.19 cu m	30 cm insertion into the plinth wall below floor.
9.	**R.C.C. work** excluding steel and its bending, but including centering and shuttering and binding steel, fair finished—						
	Roof slab rooms ...	1	8.64	4.84	.12	5.018	12 cm projections.
	Roof slab ver. ...	1	8.40	2.80	.10	2.352	10 cm inner bearing, excluding chujja.
	Chujja projections						
	Ver. front ...	1	9.30	.45	.06	0.251	Average thickness.
	Ver. sides ...	2	2.70	.45	.06	0.146	
	Sun-shed and breakers in windows—						
	Top ...	4	2.50	.45	.05	0.225	
	Bottom ...	4	2.50	.15	.05	0.075	5 cm insertion into wall.
	Sides ...	4 × 2	1.50	$\frac{.50 + .15}{2}$	.05	0.195	5 cm insertion and average breadth.
	Shelf slab ...	2 × 3	1.10	.20	.05	0.066	5 cm bearing.
					Total	8.328 cu m	
10.	Mild steel bars including bending in reinforcement @ 1% of R.B. and R.C.C. works ...		10.31	× $\frac{1}{100}$ ×	78.5 =	8.10q	1% of total of items 1, 8 and 9.

Note. — *Chujjas, sun sheds, etc. may be taken under a separate item.*

(Ex. 5 Contd.)

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
11.	**10 cm Lime concrete in roof** terracing complete with surface finishing—						
	Rooms ...	1	8.00	4.20	—	33.60	Clear roof area in between parapet.
	Verandah ...	1	8.00	2.50	—	20.00	„ „ „
					Total	53.60 sq m	
12.	**3 cm thick insulation layer of** sand and clay—						
	Rooms ...	1	8.00	4.20	—	33.60	Clear roof area.
	Verandah ...	1	8.00	2.50	—	20.00	„ „
					Total	53.60 sq m	
13.	**Sal wood work in chowkhat** wrought framed and fixed—						
	Doors (3 cm insertion into floor) ...	2	5.46	.12	.08	0.105	2 Vert.—2.13 m each. 1 Hor.—1.20 m each.
	Windows ...	10	5.00	.10	.08	0.400	2 Vert.—1.50 m each 2 Hor.—1.00 m each.
	C.S. Windows ...	12	3.00	.08	.08	0.230	2 Vert.—0.50 m each. 2 Hor.—1.00 m each.
					Total	0.735 cu m	
14.	**4 cm thick Indian teak wood panelled** door and window shutters including fittings—						
	Doors ...	2	1.07	—	2.035	4.355	Rebate 1.5 cm.
	Windows ...	10	0.87	—	1.37	11.919	
					Total	16.274 sq m	
15.	**4 cm thick Indian teak wood glazed** shutters including fittings—						
	C.S. Windows ...	12	0.87		0.37	3.863 sq m	

...item 14) has been taken on area basis, if required the volume

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
16.	**Iron work (mild steel)** in hold fasts and window gratings—						
	Hold fasts in doors	2×6	—	—	—	12 nos.	6 nos. per door.
	Hold fasts in windows ...	10×4	—	—	—	40 nos.	4 nos. per window.
	Hold fasts in C.S. windows ...	12×2	—	—	—	24 nos.	2 nos. per C.S. window.
					Total	76 nos. @ 1 kg each = 76 kg	
	Window bars 16 mm dia. @ 1.58 kg/m—						
	Windows ...	10×8	1.50	—	—	120	Ver. bars at 10 cm centres approx.
	C.S. windows ...	12×2	1.00	—	—	24	Two horizontal bars.
						144 m @ 1.58 kg = 227.52 kg	
17.	**12 mm thick plastering in walls 1 : 1 : 6 cement, sand, lime mortar —**						
					Total	303.52 kg = 3.035 q	
	INSIDE —						
	Rooms —						
	(i) ...	2	3.50	—	4.00	28.00	May be taken as inner perimeter × ht. = 15.00 × 4.00
		2	4.00	—	4.00	32.00	
	(ii) ...	4	4.00	—	4.00	64.00	
	Verandah inner wall	1	8.40	—	3.00	25.20	Length out to out.
	Ver. Front above cols. inner face ...	1	8.00	—	.60	4.80	
	Ver. Sides above cols. inner face ...	2	2.50	—	.60	3.00	
	Jambs sills and soffits of shelves ...	2	5.00	.20	—	2.00	L=2 × 1.0 + 2 × 1.5=5.0 m
	Soffits of ver. lintel —						
	Front ...	1	8.40	.20	—	1.68	No deduction for col. ends
	Sides ...	2	2.50	.20	—	1.00	
					Total	161.68	

(Ex. 5 Contd.)

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
	Deduct openings in wall in between ver. and room —						
	Door openings ...	2	1.20	—	2.10	5.04	One surface of each.
	Window openings ...	2	1.00	—	1.50	3.00	One surface of each.
					Total	8.04	Other doors and windows deducted from outside.
				Net	Total	153.64 sq m	Total of inside plastering.
	OUTSIDE —						
	Rooms —						
	Back plinth including 10 cm below G.L. ...	1	8.50	—	.75	6.38	Ht. = .60 + .05 + .10=.75 m
	Back super-structure ...	1	8.40	—	4.00	33.60	These can be combined as- $1 \times 8.40 \times 4.75 = 39.90$
	Sides plinth including 10 cm below G.L. ...	2	4.70	—	.75	7.05	These can be combined as- $2 \times 4.60 \times 4.75 = 43.70$
	Sides super-structure ...	2	4.60	—	4.00	36.80	
	Verandah —						
	Above cols. front outer face ...	1	8.40	—	.60	5.04	
	Above cols. sides outer face ...	2	2.70	—	.60	3.24	
	Plinth front including 10 cm below G.L. ...	1	8.50	—	.70	5.95	Ht. =.60 + .10 = .70 m
	Plinth sides ...	2	2.75	—	.70	3.85	
	Wall above ver. roof	1	8.40	—	.77	6.47	Ht. = 4.00 – 3.23 = .77 m
	Parapet —						
	Rooms —						
	Long wall outer face	2	8.40	—	.60	10.08	These can be taken approx. in one operation as — = (total centre length + inner ht. + top width × outer ht.)
	Long wall inner face ...	2	8.00	—	.47	7.52	
	Long wall top face ...	2	8.40	.20	—	3.36	
	Short walls outer face ...	2	4.60	—	.60	5.52	
	Short walls inner face ...	2	4.20	—	.47	3.95	= (2 × 8.40 + 2 × 4.20) ×(.47 + .20 + (.47 + .10 + .03)
	Short walls top face ...	2	4.20	.20	—	1.68	= 25.20 × 1.27=32.00 sq m
					C.O.	140.49	

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
					B.F.	140.49	
	Verandah parapet—						
	Front wall outer face ...	1	8.40		.40	3.36	These can be taken appr. in one operation as = (Total centre length) × (inner ht. +top width × outer ht.)
	Front wall inner face ...	1	8.00		.27	2.16	
	Front wall top face	1	8.40	.20		1.68	
	Side wall outer face	2	2.70		.40	2.16	= (8.65 + 2 × 2.50) × [.27+.20+(.27+.10 + .03)
	Side wall inner face	2	2.50		.27	1.35	= 13.65 × .87 = 11.88 sq
	Side wall top face ...	2	2.50	20		1.00	
					Total	152.20	
	Deduct —						
	Window openings (in outer walls) ...	8	1.00		1.50	12.00	One surface of each.
	C.S. window openings ...	12	1.00		0.50	6.00	One surface of each.
	Step from plinth wall ...	1	2.70		0.70	1.89	Including 10 cm below G.L.
	Ends of ver. side wall and lintel above col. level ...	2		.20	.60	0.24	This may be neglected.
	Ends of ver. parapet wall, from wall above ver. roof level	2		.20	.27	0.11	This may be neglected.
			Total of	deductions		20.24	
				Net	Total	131.96 sq m	Total of outside plasterin
			Grand outside	Total of plaster	inside ing =	and 285.60 sq m	
18.	**20 mm thick cement plaster 1:3** in step finished cement rendered —						
	1st step riser ...	1	4.50	—	.15	= 1.49	Front and sides.
	2nd step riser ...	1	3.30	—	.15		Front and sides.
	3rd step riser ...	1	2.10	—	.15		Front and sides.

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
	1st step tread ...	1	3.90		.30	2.43	Front and sides.
	2nd step tread ...	1	2.70		.30		Front and sides.
	3rd step tread ...	1	1.50		.30		Front and sides.
	Plinth wall above						
	1st step ...	2	.30		.45	0.27	Sides.
	2nd step ...	2	.30		.30	0.18	Sides.
	3rd step ...	1	1.50		.15	0.22	Sides.
					Total	4.59 sq m	
19.	**2.5 cm thick c.c. 1 : 2 : 4 over and including 8 cm lime concrete floor—**						
	Room *(i)* ...	1	4.00	3.50		14.00	
	Room *(ii)* ...	1	4.00	4.00		16.00	
	Verandah ...	1	8.00	2.50		20.00	Sills of verandah opening have been taken under item 20.
					Total	50.00 sq m	
20.	**2.5 cm thick c.c. 1 : 2 : 4 floor** in sills						
	Door sills ...	2	1.20	.30		0.72	
	Sills of ver. opening front ...	1	8.50	.25		2.12	Including .05 m plinth outer offset, No. deduction for cols.
	Sills of ver. opening sides ...	2	2.50	.25		1.25	
					Total	4.09	
	Deduct pillars ...	4	$\frac{\pi \times (.15)^2}{4}$			0.07	This deduction may be neglected.
				Net	Total	4.02 sqm	

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
21.	**White washing** three coats inside —						
	Walls	Same as for plastering		inside in item	wall (17) =	153.64	
	Ceiling of room ...	1	4.00	3.50	—	14.00	
	Ceiling of room ...	1	4.00	4.00	—	16.00	
	Ceiling of ver. ...	1	8.00	2.50	—	20.00	
					Total	203.64 sq m	
22.	**Colour washing** two coats over one coat of white washing outside —						
	Walls ...	Same as for plastering		outside in item	wall (17) =	131.96	
	Chujja ver. front	1	9.30	.95	—	8.84	Upper and lower faces and edges.
	Chujja ver. sides	2	2.70	.95	—	5.13	Upper and lower faces and edges.
	Sunshade and sun-breakers in windows —Top	4	2.50	.95	—	9.50	Upper and lower faces and edges.
	Bottom	4	2.50	.25	—	2.50	,, ,, ,, ,,
	Sides	8 × 2	1.50	$\frac{.45 + .10}{2}$	—	6.60	Inner and outer faces.
	Edges of sides	8	1.50	.05	—	0.60	This may be neglected.
	Outer projection of roof slab	1	26.00	.36	—	9.36	L=Outer perimeter of room. B = .12 + .12+.12=.36 m
					Total	174.49	
	Deduct portion below G.L.	1	29.10	—	.10	2.91	L=Outer perimeter—Steps = 2(8.50 + 7.40) – 2.70 = 29.10 m
				Net	Total	171.58 sq m	

Note—*Lower sides of chujjas and sunshades and ... washed instead of ...*

(Ex. 5 Contd.)

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
23.	**Painting doors and windows** two coats over one coat of priming—						
	Doors panelled ...	2 × 2¼	1.20	—	2.10	11.34	2¼ times one surface for both sides.
	Windows panelled	10 × 2¼	1.00	—	1.50	33.75	,, ,, ,, ,,
	C.S. windows glazed ...	12×1	1.00	—	0.50	6.00	One surface for both sides.
	Window bars ...	10	0.84	1.34	—	11.25	Excluding chowkhat, one flat area for over all.
	C.S. window bars	12	0.84	0.34	—	3.43	
					Total	65.77 sqm	
24.	**Solignum painting** two coats in back of chaukhat—						
	Doors ...	2	5.46	.12	—	1.31	Lengths same for chowkhat in item (13)
	Windows ...	10	5.00	.10	—	5.00	
	C.S. windows ...	12	3.00	0.08	—	2.88	
					Total	9.19 sq m	
25.	**C.I, Pipe 10 cm dia.** (rain water spout) complete with painting ...	4	1.00	—	—	4.00	

ABSTRACT OF ESTIMATED COST (Ex. 5)

Item No.	Particulars of items	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
1.	Earthwork in excavation in foundation ...	31.35	cu m	350.00	% cu m	109.72
2.	Earthwork in filling in plinth ...	25.61	cu m	275.00	% cu m	70.43
3.	Lime concrete in foundation ...	10.74	cu m	220.00	per cu m	2362.80
4.	I-class brickwork in foundation and plinth in 1 : 6 cement sand mortar ...	22.32	cu m	320.00	per cu m	7142.40
5.	2 cm damp proof course (D.P.C.) 1 : 2 cement mortar with water proofing compound ...	10.52	sq m	18.00	per sq m	189.36
6.	I-class brickwork in superstructure in lime mortar ...	30.10	cu m	320.00	per cu m	9632.00
7.	R.B. Work in lintels with 1 : 3 cement mortar excluding steel and its bending, but including centering and shuttering and binding steel.	1.788	cu m	520.00	per cu m	929.76
8.	R.C.C. work 1 : 1½ : 3 in verandah columns excluding steel and its bending, but including form work and binding steel complete fair finished ...	0.19	cu m	590.00	per cu m	112.10
9.	R.C.C. work 1 : 2 : 4 in slab excluding steel and its bending, but including centering and shuttering and binding steel, complete fair finished ...	8.328	cu m	775.00	per cu m	6454.20
10.	Mild steel including bending in reinforcement bars ...	8.10	q	515.00	per q	4171.50
11.	10 cm Lime concrete in roof terracing complete with surface finishing ...	53.60	sq m	12.00	per sq m	643.20
12.	3 cm thick insulation layer of sand and clay	53.60	sq m	1.50	per sq m	80.40
13.	Sal wood work in chaukhat wrought framed and fixed.	0.735	cu m	4700.00	per cu m	3454.50
					C.O.	35352.37

Item No.	Particulars of items	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
					B.F.	35352.37
14.	4 cm thick C.P. teak wood panelled door and window shutters including fittings ...	16.274	sq m	225.00	per sq m	3661.65
15.	4 cm thick C.P. teak wood glazed shutters including fittings ...	3.863	sq m	200.00	per sq m	772.60
16.	Iron work in hold fasts and window gratings	3.035	quin-tal	700.00	per q	2124.50
17.	12 mm thick plastering in walls 1 : 1 : 6 cement : lime : sand mortar ...	285.60	sq m	2.90	per sq m	828.24
18.	20 mm thick cement plaster in steps finished cement rendered	4.59	sq m	16.00	per sq m	73.44
19.	20 mm thick c.c. 1 : 2 : 4 floor over and including 8 cm lime concrete ...	50.00	sq m	18.65	per sq m	932.50
20.	2.5 cm thick c.c. 1 : 2 : 4 floor in sills ...	4.02	sq m	18.00	per sq m	72.36
21.	White washing 3 coats inside ...	203.64	sq m	0.75	per sq m	152.73
22.	Colour washing 2 coats over one coat of white washing outside ...	171.58	sq m	0.82	per sq m	140.70
23.	Painting doors and windows two coats over one coat of priming ...	65.77	sq m	10.40	per sq m	684.00
24.	Solignum painting two coats	9.19	sq m	3.50	per sq m	32.16
25.	C.I. pipe 10 cm dia. rain water spouts complete with painting ...	4.00	m	27.00	per m	108.00
					Total ...	44935.25
	Add 3% for Contingencies				...	1348.05
	Add 2% for Workcharged Establishment				...	898.70
					Grand Total ...	47181.00

Plinth Area Rate (P.A.) —

Plinth Area = 8.40 m × 7.30 m = 61.32 sq m (Say).

$$\text{Plinth Area Rate} = \frac{\text{Total Cost}}{\text{Plinth Area}} = \text{Rs.}\frac{47181.00}{61.32} = \text{Rs } 769.42 \text{ per sq m.}$$

Precaution: - All units of item of work are concert.

- Calculate should be done carefully.

Conclusion: - From above the experiment we conclude that rate analysis of a two roomed building with specification as per P.W.D.

Experiment -3

- Aim of the Experiment: -

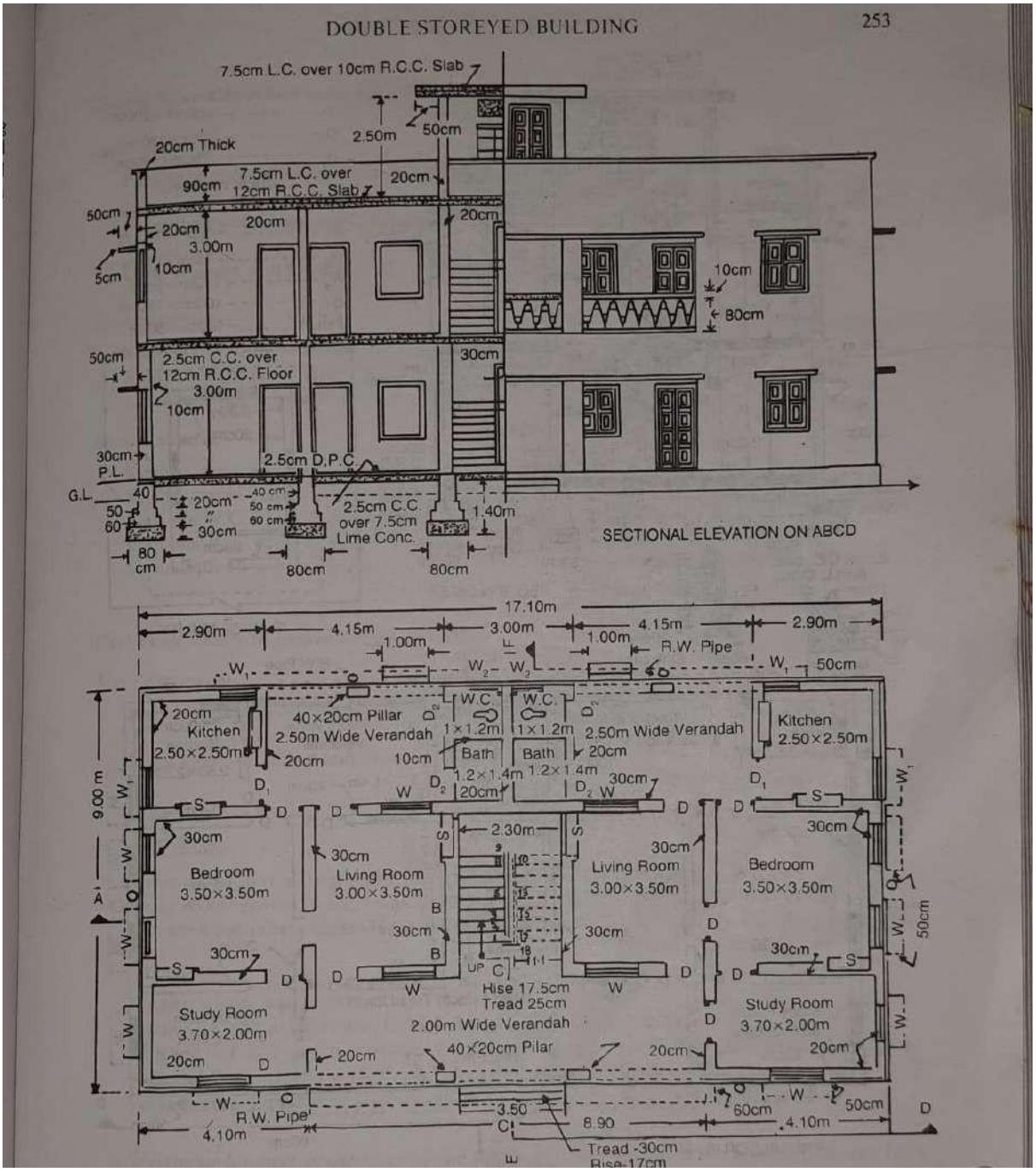
Calculate two stored pucka building with specification.

Requirement: - Given plan

Given specification and rate.

Procedure: -

- Calculate quantities of all items two stored building.
- Calculate the rate of all items of work as per Odisha PWD rate analysis.


7.5cm L.C. over 10cm R.C.C. Slab
2.50m
50cm
20cm Thick
90cm
7.5cm L.C. over 12cm R.C.C. Slab
20cm
50cm
20cm
20cm
3.00m
10cm
5cm
20cm
10cm
80cm
50cm
2.5cm C.C. over 12cm R.C.C. Floor
3.00m
10cm
30cm
30cm P.L.
2.5cm D.P.C.
G.L.
40
50
60
20cm
30cm
40 cm
50 cm
60 cm
2.5cm C.C. over 7.5cm Lime Conc.
1.40m
80 cm
80cm
80cm
SECTIONAL ELEVATION ON ABCD
17.10m
2.90m
4.15m
3.00m
4.15m
2.90m
1.00m
1.00m
R.W. Pipe
50cm
20cm
Kitchen
2.50×2.50m
40×20cm Pillar
2.50m Wide Verandah
W.C.
1×1.2m
Bath
1.2×1.4m
10cm
20cm
2.50m Wide Verandah
Kitchen
2.50×2.50m
30cm
Bedroom
3.50×3.50m
Living Room
3.00×3.50m
2.30m
Living Room
3.00×3.50m
Bedroom
3.50×3.50m
Study Room
3.70×2.00m
Rise 17.5cm
Tread 25cm
2.00m Wide Verandah
40×20cm Pilar
Study Room
3.70×2.00m
R.W. Pipe
4.10m
3.50
8.90
4.10m
Tread -30cm
Rise-17cm
9.00m
50cm

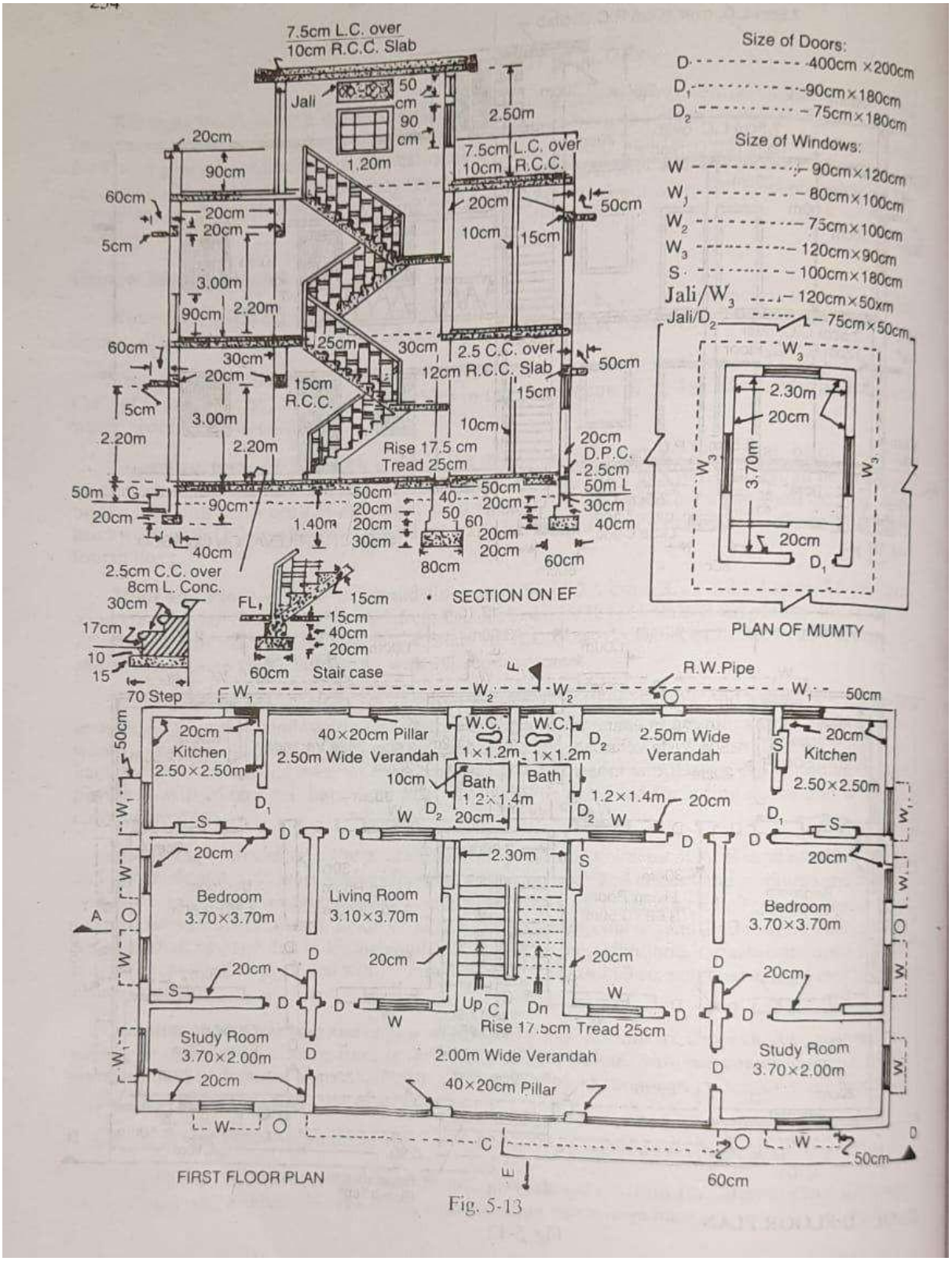

7.5cm L.C. over
10cm R.C.C. Slab
Jali
50 cm
90 cm
2.50m
1.20m
7.5cm L.C. over
10cm R.C.C.
20cm
90cm
60cm
20cm
20cm
5cm
50cm
10cm
15cm
3.00m
90cm
2.20m
60cm
30cm
20cm
25cm
30cm
2.5 C.C. over
12cm R.C.C. Slab
50cm
15cm
R.C.C.
5cm
3.00m
15cm
2.20m
2.20m
10cm
20cm
D.P.C.
2.5cm
50m L
Rise 17.5 cm
Tread 25cm
50m G
90cm
50cm
20cm
20cm
20cm
40
20cm
50
60
30cm
40cm
1.40m
30cm
20cm
20cm
80cm
60cm
40cm
2.5cm C.C. over
8cm L. Conc.
30cm
FL
15cm
SECTION ON EF
17cm
15cm
40cm
10
20cm
15
60cm
Stair case
70 Step
Size of Doors:
D ---------- 400cm ×200cm
D1 ---------- 90cm×180cm
D2 ---------- 75cm×180cm
Size of Windows:
W ---------- 90cm×120cm
W1 ---------- 80cm×100cm
W2 ---------- 75cm×100cm
W3 ---------- 120cm×90cm
S ---------- 100cm×180cm
Jali/W3 ---- 120cm×50xm
Jali/D2 ---- 75cm×50cm
W3
2.30m
20cm
3.70m
W3
W3
20cm
D1
PLAN OF MUMTY
R.W.Pipe
W1
W2
W2
W1
50cm
20cm
Kitchen
2.50×2.50m
40×20cm Pillar
2.50m Wide Verandah
W.C.
1×1.2m
W.C.
1×1.2m
D2
2.50m Wide
Verandah
S
20cm
Kitchen
2.50×2.50m
10cm
Bath
1.2×1.4m
Bath
1.2×1.4m
20cm
D1
W
D2
20cm
D2
W
D1
S
S
D
D
D
D
20cm
2.30m
S
20cm
Bedroom
3.70×3.70m
Living Room
3.10×3.70m
Bedroom
3.70×3.70m
A
D
20cm
20cm
20cm
D
20cm
S
D
D
W
Up
C
Dn
W
D
D
Rise 17.5cm Tread 25cm
Study Room
3.70×2.00m
D
2.00m Wide Verandah
D
Study Room
3.70×2.00m
20cm
40×20cm Pillar
W
C
W
50cm
D
FIRST FLOOR PLAN
60cm

Fig. 5-13

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×.30 +.30/2+.30/2=16.80 m
Front long wall of bed and living room on one side of staircase room C. to C. length
=3.50+3.00+.30+.30/2+.30/2=7.10 m
Cross or short wall C. to C. length=3.50+.30/2+.30/2=3.80 m

Front Verandah—

Study room, front long wall C. to C. length=3.70+.20/2+.20/2=3.90 m
Study room cross or short wall C. to C. length=2.00+.30/2+.20/2=2.25 m
Verandah wall in between study rooms C. to C, length=8.90+.20/2+.20/2=9.10 m

Back Verandah—

Kitchen, back wall C. to C. length=2.50+.20/2+.20/2=2.70 m
Kitchen, cross or short wall C. to C. length=2.50+.30/2+.20/2=2.75 m
Bath and W.C. Two sets combined, back long wall C. to C. length=2×1.20+.20+2×.20/2=2.80 m
Bath and W.C. cross or short wall C. to C. length=1.40+1.00+.10+.30/2+.20/2=2.75 m
Verandah wall in between kitchen and W.C., C. to C. length=4.15+.10+.10+.10=4.45 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)×2+2.30+(4×.20)+.20/2+.20/2=16.90 m
Front long wall of bed and living rooms on one side of staircase room C. to C. length
=(3.70+3.10)+.20+2×.20/2=7.20 m
Cross or short walls C. to C. length=3.70+2×.20/2=3.90 m

Front Verandah—

Study room—Front long wall C. to C. length=3.70+2×.20/2=3.90 m
Study room—Cross or short wall C. to C. length=2.00+2×.20/2=2.20 m
Verandah wall in between study rooms C. to C. length=3.10+2.30+3.10+(2×.20)+2×.20/2=9.10 m

Back Verandah—

Kitchen—Back wall C. to C. length=2.50+2×.20/2=2.70 m
Kitchen—Cross or short wall C. to C. length=2.50+2×.20/2=2.70 m
Bath and W.C.—Two sets combined, back wall C. to C. length=1.20+1.20+.20+2×.20/2=2.80 m
Bath and W.C.—Cross walls C. to C. length=1.40+1.00+.10+2×.20/2=2.70 m
Verandah wall in between kitchen and W.C., C. to C. length=4.15+2×.20/2=4.35 m

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

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×.30 +.30/2+.30/2=16.80 m

Front long wall of bed and living room on one side of staircase room C. to C. length
=3.50+3.00+.30+.30/2+.30/2=7.10 m

Cross or short wall C. to C. length=3.50+.30/2+.30/2=3.80 m

Front Verandah—

Study room, front long wall C. to C. length=3.70+.20/2+.20/2=3.90 m
Study room cross or short wall C. to C. length=2.00+.30/2+.20/2=2.25 m
Verandah wall in between study rooms C. to C, length=8.90+.20/2+.20/2=9.10 m

Back Verandah—

Kitchen, back wall C. to C. length=2.50+.20/2+.20/2=2.70 m
Kitchen, cross or short wall C. to C. length=2.50+.30/2+.20/2=2.75 m
Bath and W.C. Two sets combined, back long wall C. to C. length=2×1.20+.20+2×.20/2=2.80 m
Bath and W.C. cross or short wall C. to C. length=1.40+1.00+.10+.30/2+.20/2=2.75 m
Verandah wall in between kitchen and W.C., C. to C. length=4.15+.10+.10+.10=4.45 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)×2+2.30+(4×.20)+.20/2+.20/2=16.90 m

Front long wall of bed and living rooms on one side of staircase room C. to C. length
=(3.70+3.10)+.20+2×.20/2=7.20 m

Cross or short walls C. to C. length=3.70+2×.20/2=3.90 m

Front Verandah—

Study room—Front long wall C. to C. length=3.70+2×.20/2=3.90 m
Study room—Cross or short wall C. to C. length=2.00+2×.20/2=2.20 m
Verandah wall in between study rooms C. to C. length=3.10+2.30+3.10+(2×.20)+2×.20/2=9.10 m

Back Verandah—

Kitchen—Back wall C. to C. length=2.50+2×.20/2=2.70 m
Kitchen—Cross or short wall C. to C. length=2.50+2×.20/2=2.70 m
Bath and W.C.—Two sets combined, back wall C. to C. length=1.20+1.20+.20+2×.20/2=2.80 m
Bath and W.C.—Cross walls C. to C. length=1.40+1.00+.10+2×.20/2=2.70 m
Verandah wall in between kitchen and W.C., C. to C. length=4.15+2×.20/2=4.35 m

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

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
	Kitchen ...	2	2.40	2.40	B.F.	24.01	
	Bath and W.C. ...	2	1.10	2.40	.425	4.90	
	Verandah front ...	1	8.80	1.90	.425	2.24	
	Verandah back ...	2	4.05	2.40	.425	7.11	
						8.26	
					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	4.22	L. Same as excavation
	Front long walls of bed and living rooms ...	2	7.90	0.80	0.30	3.79	L. Same as excavation
	Cross short walls ...	6	3.00	0.80	0.30	4.32	L. Same as excavation
	Study rooms—						
	Front long walls ...	2	4.50	0.60	0.20	1.08	L. Same as excavation
	Cross short walls ...	4	1.65	0.60	0.20	0.79	L=2.25-.60/2-.60/2 =1.65 m
	Kitchens—						
	Back walls (long) ...	2	3.30	0.60	0.20	0.79	L. Same as excavation.
	Cross walls (short)	4	2.15	0.60	0.20	1.03	L=2.75-.60/2- 60/2 =2.15 m
	Bath and W.Cs.—						
	Back walls (long) ...	1	3.40	0.60	0.20	0.41	L. Same as excavation.
	Cross walls (short)...	3	2.15	0.60	0.20	0.77	L=2.75-.60/2-.60/2 =2.15 m
	Verandah pillars ...	4	0.80	0.60	0.20	0.38	
	Front verandah plinth dwarf wall ...	1	7.50	0.40	0.20	0.60	L=9.10—2×.40/2—2× 60 =7.50 m
	Back verandah plinth dwarf wall ...	2	3.35	0.40	0.20	0.54	L=4.35—2×.40/2—1×.60 =3.35 m
	Staircase base ...	1	1.10	0.60	0.20	0.13	
	Step front ...	1	2.50	0.70	0.15	0.26	
	Step back ...	2	1.20	0.70	0.15	0.25	
					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	6.749	Bearing—ends full wall (30 cm), sides half wall (15 cm).
	Front verandah including study rooms ...	1	17.10	2.35	0.10	4.019	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	4.874	*Total of slab=15.642 cu m.*
	Lintels—						
	Over doors D main room	8	1.30	0.30	0.10	0.312	(a) 15 cm bearing.
	Over windows W main rooms ...	8	1.20	0.30	0.10	0.288	(a)
	Over shelves S in 30 cm wall ...	6	1.30	0.30	0.10	0.234	(a)
	Over entrance of stair case	1	2.70	0.30	0.20	0.162	
	Over doors D study room	2	1.30	0.20	0.10	0.052	(b)
	Over doors D_1 kitchen ...	2	1.20	0.20	0.10	0.048	(b)
	Over doors D_2 bath and W.C. ...	4	1.05	0.20	0.10	0.084	(b)
	Over windows W study room	4	1.20	0.20	0.10	0.096	(b)
	Over windows W_1 kitchen ...	2	1.10	0.20	0.10	0.044	(b) Side windows.
	Over shelves S kitchen ...	2	1.30	0.20	0.10	0.052	(b)
	Over R.C.C. Jalli over door D_2 of Bath and W.C. ...	4	1.05	0.20	0.10	0.084	*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	0.368	Continuous over pillars
	Over back verandah continuous including window W_1 W_2 ...	1	13.60	0.20	0.15	0.408	15 cm thick.
	Sunshades—						
	Over window W, 4 in main rooms and 4 in study rooms ...	8	1.20	0.50	0.05	0.240	Average 5 cm thick.
	Over window W_1 of kitchen ...	2	1.10	0.50	0.05	0.055	Two side windows.
	Over front verandah ...	1	9.20	0.60	0.05	0.276	
					C.O.	18.445	

(Ex. 9. Contd.)

	Over back verandah continuous including back windows W_1 & W_2 ...	1	13.60	0.50	B.F. 0.05	18.445 0.340	Length same as for lintel. Bearing 5 cm.
	Slabs of shelves 25 cm wide 4 cm thick	8×3	1.10	0.25	0.04	0.264	*Total of sunshades and shelf slabs = 1.175 cu m.*
	Staircase—						
	Inclined slabs ...	2	2.54	1.10	0.15	0.838	$L=\sqrt{2^2+1.575^2}=2.54$ m
	Above wall at base	1	1.10	0.50	0.15	0.083	
	Landing slab middle ...	1	2.60	1.05	0.15	0.410	
	Landing slab 1st floor level ...	1	2.60	0.75	0.15	0.293	B=.60+.15=.75 m
	Steps without reinforcement ...	8×2	×1.10	×½(.25×.175)		0.385	Triangular section.
					Total	21.058 cu m	*Total of staircase slabs (excluding base) =1.541 cu m.*
6	2.5 cm C.C. 1 : 2 : 4 nosing in steps—						
	Staircase steps ...	9×2	1.10	—	—	19.80	
	Front steps ...	3	2.30	—	—	6.90	
	Back steps ...	3×2	1.00	—	—	6.00	
					Total	32.70 m	
7	R.C.C. 1:2:4 Newal post 10 cm×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 sqm	Over doors D_2
10	2.5 cm Damp proof course C.C. 1 : 1½ : 3 with water proofing compound—						
	Main rooms—						
	Back long wall ...	1	17.20	0.40	—	6.88	L=16.80+.40=17.20 m
	Front long walls ...	2	7.50	0.40	—	6.00	L=7.10+.40=7.50 m
	Cross short walls ...	6	3.40	0.40	—	8.16	L=3.80~.40=3.40 m.
					C.O.	21.04	

	Study rooms—					2.52	L=3.90+.30=4.20 m
	Front walls (long) ...	2	4.20	0.30	—	2.28	L=2.25–.40/2–.30/2
	Cross walls (short)...	4	1.90	0.30	—		=1.90 m
	Kitchen—					1.80	L=2.70+.30=3.00 m
	Back walls (long) ...	2	3.00	0.30	—	2.88	L=2.75–.40/2–.30/2=2.40 m
	Cross walls (short)...	4	2.40	0.30	—		
	Bath and W.C.—					0.93	L=2.80+.30=3.10 m
	Back walls (long) ...	1	3.10	0.30	—	2.16	L=2.75–.40/2–.30/2=2.40 m
	Cross walls (short)...	3	2.40	0.30	—	0.60	
	Verandah pillars, ...	4	0.50	0.30	—		
					Total	34.21	
	Deduct—						
	Door sills main rooms D ...	8	1.00	0.40	—	3.20	
	Door sills study room D ...	2	1.00	0.30	—	0.60	
	Door sills kitchen D_1 ...	2	0.90	0.30	—	0.54	
	Door sills Bath & W.C., D_2 ...	4	0.75	0.30	—	0.90	
			Total	of ded	uction	5.24	
				Net	Total	28.97 sq m	
	III. Brickwork						
11	First class brickwork in lime mortar and foundation and plinth—						
	Main rooms—						
	Back wall full length—						
	1st footing ...	1	17.40	0.60	0.20	2.09	L=16.80+.60=17.40 m
	2nd footing ...	1	17.30	0.50	0.20	1.73	L=17.40—.10=17.30 m
	Plinth wall ...	1	17.20	0.40	0.70	4.82	L=17.30—.10=17.20 m
	Front long walls—						
	1st footing ...	2	7.70	0.60	0.20	1.85	L=7.10+.60=7.70 m
	2nd footing ...	2	7.60	0.50	0.20	1.52	L=7.70—.10=7.60 m
	Plinth wall ...	2	7.50	0.40	0.70	4.20	L=7.60—.10=7.50 m
	Cross walls—						
	1st footing ...	6	3.20	0.60	0.20	2.30	L=3.80—.60=3.20 m
	2nd footing ...	6	3.30	0.50	0.20	1.98	L=3.20+.10=3.30 m
	Plinth wall ...	6	3.40	0.40	0.70	5.71	L=3.30+.10=3.40 m
	Study rooms—						
	Front walls—						
	Footing ...	2	4.30	0.40	0.20	0.69	L=3.90+.40=4.30 m
	Plinth walls ...	2	4.20	0.30	0.70	1.76	L=4.30—.10=4.20 m
					C.O	28.65	

(Ex. 9 Contd.)

	Cross walls—					B.F 28.65	
	Footing ...	4	1.80	0.40	0.20	0.58	L=2.25 .50/2 .40/2=1.80 m
	Plinth wall ...	4	1.90	0.30	0.70	1.60	L=1.80+.10=1.90 m
	Kitchen—						
	Back walls-						
	Footing ...	2	3.10	0.40	0.20	0.50	L=2.70+.40=3.10 m
	Plinth wall ...	2	3.00	0.30	0.70	1.26	L=3.10 .10=3.00 m
	Cross walls						
	Footing ...	4	2.30	0.40	0.20	0.74	L=2.75—.50/2— .40/2=2.30 m
	Plinth wall ...	4	2.40	0.30	0.70	2.02	L=2.30+.10=2.40 m
	Bath and W.C.—						
	Back walls—						
	Footing ...	1	3.20	0.40	0.20	0.26	L=2.80+.40=3.20 m
	Plinth walls ...	1	3.10	0.30	0.70	0.65	L=3.20—.10=3.10 m
	Cross walls—						
	Footing ...	3	2.30	0.40	0.20	0.55	L=2.75—.50/2 .40/2=2.30 m
	Plinth wall ...	3	2.40	0.30	0.70	1.51	L=2.30+.10=2.40 m
	Verandah pillars—						
	Footing ...	4	0.60	0.40	0.20	0.19	
	Plinth wall ...	4	0.50	0.30	0.70	0.42	
	Front verandah plinth dwarf wall sum total length ...	1	7.80	0.20	0.70	1.09	L=9.10—2×.30/2—2×.50 =7.80 m
	Back verandah plinth dwarf wall ...	2	3.55	0.20	0.70	0.99	L=4.35—2×.30/2—1×.50 =3.55 m
	Staircase base ...	1	1.10	0.50	0.40	0.22	
	Stair front 1st ...	1	2.30	0.60	0.20	0.28	
	Step front 2nd ...	1	2.30	0.30	0.15	0.10	
	Step back 1st ...	2	1.00	0.60	0.20	0.24	
	Step back 2nd ...	2	1.00	0.30	0.15	0.09	
					Total	41.94 cu m	
12	First class brickwork in lime mortar in superstructure in 30 cm walls of main rooms—						
	Back wall full length	1	17.10	0.30	3.00	15.39	L=16.80+.30=17.10 m
	Front long walls ...	2	7.40	0.30	3.00	13.32	L=7.10+.30=7.40 m
	Cross walls ...	6	3.50	0.30	3.00	18.90	L=3.80—.30=3.50 m
	Staircase room front wall ..	1	2.30	0.30	0.60	0.42	Above lintel.
					Total	48.03	

	Deduct—						
	Door openings D ...	10	1.00	0.30	2.00	6.00	
	Window openings W ..	8	0.90	0.30	1.20	2.59	
	Shelves opening ...	6	1.00	0.20	1.80	2.16	4 in main rooms and 2 in kitchen
	Lintels (30 cm wall)		Same as marked *(a)* in item 5 page 258			0.834	
			Total	of deduction		11.58	
13	First class brickwork in 1 : 6 cement local sand mortar in superstructure in 20 cm walls—			Net	Total	36.45	cu m
	Study rooms front walls	2	4.10	0.20	3.00	4.92	L=3.90+.20=4.10 m
	Study rooms cross walls	4	2.00	0.20	3.00	4.80	L=2.25—.30/2—.20/2=2.00 m
	Kitchen back walls	2	2.90	0.20	3.00	3.48	L=2.70+.20=2.90 m
	Kitchen cross walls	4	2.50	0.20	3.00	6.00	L=2.75—.30/2—.20/2=2.50 m
	Bath and W.C. back wall	1	3.00	0.20	3.00	1.80	L=2.80+.20=3.00 m
	Bath & W.C. cross wall	3	2.50	0.20	3.00	4.50	L=2.75—.30/2—.20/2=2.50 m
	Verandah pillars	4	0.40	0.20	2.20	0.70	
	Front verandah wall above lintel ...	1	8.90	0.20	0.60	1.07	Ht. above lintel 60 cm.
	Back verandah walls above lintel ...	2	4.15	0.20	0.65	1.08	Ht. above lintel 65 cm.
					Total	28.35	
	Deduct—						
	Door openings D ...	2	1.00	0.20	2.00	0.80	Study room doors.
	Door openings D_1 ..	2	0.90	0.20	1.80	0.65	Kitchen doors.
	Door openings D_2 ...	4	0.75	0.20	1.80	1.08	Bath and W.C. doors.
	Window openings W ...	4	0.90	0.20	1.20	0.86	Study room windows.
	Window openings W_1 ...	4	0.80	0.20	1.00	0.64	Kitchen windows.
	Window openings W_2 ...	2	0.75	0.20	1.00	0.30	W.C. room windows.
	R.C.C. Jalli over doors D_1	4	0.75	0.20	0.50	0.30	
	Shelves opening in kitchen ...	2	1.00	0.10	1.80	0.36	Back of shelves 10 cm.
	Lintels (20 cm wall)		Same as marked *(b)* in item 5 page 258			0.46	
	Lintel over back wall of W.Cs.	1	3.00	0.20	0.15	0.09	
	Lintel over windows W_1 on back walls of kitchen	2	1.15	0.20	0.15	0.07	
			Total	of deduction		5.61	
14	10 cm thick first class brickwork 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	Net —	Total 3.00	22.74 7.20	cu m sq m

(Ex. 9 Contd.)

	IV. Wood work—Door and window—						
15	Sal wood work in chaukhats in doors and windows—						
	Door D (10 cm×7.5 cm section) ...	12	5.10	0.10	0.075	0.459	5 cm in insertion into floor.
	Door D_1 ...	2	4.60	0.10	0.075	0.069	
	Door D_2 ...	4	4.45	0.10	0.075	0.134	
	Window W ...	12	4.20	0.10	0.075	0.378	
	Window W_1 ...	4	3.60	0.10	0.075	0.108	
	Window W_2 ...	2	3.50	0.10	0.075	0.053	
					Total	1.201 cu m	
16	3 cm thick panelled shutters of Deodar wood in door and windows—						
	Doors D ...	12	0.88	—	1.94	20.486	15 mm rebate
	Doors D_1 ...	2	0.78	—	1.74	2.714	" "
	Doors D_2 ...	4	0.63	—	1.74	4.385	" "
	Window W ...	12	0.78	—	1.08	10.109	" "
	Window W_1 ...	4	0.68	—	0.88	2.394	" "
	Window W_2 ...	2	0.63	—	0.88	1.109	" "
					Total	41.197 sq m	
17	Doors and windows fittings of oxydized iron		Same	as in item (16)		41.197 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 ...		20.67	$\times \frac{1}{100} \times$	78.5	16.226 q	@ 1% of R.C.C. work in item 5 excluding steps = 1% of (21.055—.385)= 1/100×20.67 cu m .
19	Iron work in hold fasts and window bars—						
	Hold fasts in doors ...	18×	6@1kg	each	=	108 kg	6 nos. in each door.
	Hold fasts in windows ...	18×	4@1kg	each	=	72 kg	4 nos. in each window.
	20 mm dia. window bars @ 2.47 kg per m—						
	12 windows 90×120 cm (W) ...	12×	8×1.20	=	115.20	m	8 bars 1.20 m each.
	4 windows 80×100 cm (W_1) ...	4×	7×1.00	=	28.00	m	7 bars 1.00 m each.
	2 windows 75×100 cm (W_2) ...	2×	6×1.00	=	12.00	m	6 bars 1.00 m each.
			Total @ 2.47	155.20 kg per	m m	= 383.34	kg
					Total	563.34 =5.633 q	kg

20	Iron grill work in stair case railing two flights (80 cm high)	1	5.38		0.80	4.304 sq m	L=2×2.54+.30=5.38 m
	VI. Plastering and Pointing—						
21	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	78.40	L=Inner perimeter= 14.00 m
	Living rooms	2	13.00	—	2.80	72.80	L=Inner perimeter=13.00 m
	Staircase room	1	11.60	—	2.80	32.48	L=Inner perimeter= 11.60 m
	30 cm face of wall below stair case entrance lintel	2	0.30	—	2.00	1.20	
	Shelves—Jambs, sill and soffits	6	5.60	0.20	—	6.72	L=(1.0+1.8)×2=5.60 m
	Shelves—Jambs, sill and soffits	2	5.60	0.10	—	1.12	L=(1.0+1.8)×2=5.60 m
	Study rooms	2	11.40	—	2.80	63.84	L=Inner perimeter=11.40 m
	Kitchens	2	10.00	—	2.50	50.00	L=Inner perimeter=10.00 m
	Bathrooms	2	5.20	—	2.00	20.80	L=(1.4+1.2)×2=5.20 m
	W.C.	2	4.40	—	2.50	22.00	L=(1.0+1.2)×2=4.40 m
	Front verandah—						
	Long wall inner	1	8.90	—	2.80	24.92	Openings to be deducted.
	Long wall outer above pillar	1	8.90	—	0.80	7.12	
	Side walls	2	2.00	—	2.80	11.20	
	Back verandah—						
	Long walls inner	2	4.15	—	2.80	23.24	
	Long wall outer above pillar	2	4.15	—	0.80	6.64	
	Side walls	4	2.50	—	2.80	28.00	
	Pillars 3 faces	4	0.80	—	2.00	6.40	L=40+20+20=80 cm
	20 cm face of wall below verandah lintel	6	0.20	—	2.00	2.40	*Total of Study, Kitchen, Bath and W.C. rooms, Verandahs, etc. of 20 cm wall*=268.80 sq m
					Total	459.28	Sq m above Skirting and Dado.
	Deduct—						
	Door openings D	12	1.00	—	1.80	21.60	One face only.
	Door openings D_1	2	0.90	—	1.60	2.88	One face only.
	Door openings D_2	4	0.75	—	1.60	4.80	One face only.
	Window openings	4	0.90	—	1.20	4.32	One face only.
	R.C.C. Jalli	—	—	—	—	—	No deduction being small.
	Staircase entrance openings	2	2.30	—	2.00	9.20	
			Total	of ded	uction	42.80	sq m
	Net	Total	of	Inside	plaster	416.48	sq m

(Ex. 9 Contd.)

	Outside Plastering—						L=outer perimeter =2 (17.10+9.00) =52.20 m
	Outer side (including plinth and 10 cm below G.L.) ...	1	52.20	—	3.77	196.79	Ht. =3.0+.50+.05+ .10+.12= 3.77 m
	Deduct—						
	Window openings W ...	8	0.90	—	1.20	8.64	One face.
	Window openings W_1 ...	4	0.80	—	1.00	3.20	
	Window openings W_2 ...	2	0.75	—	1.00	1.50	
	Front verandah openings	1	8.10	—	2.20	17.82	L=8.90—2×.40= 8.10 m
	Back verandah openings	2	3.75	—	2.20	16.50	L=4.15—.40=3.75 m
	Step front ...	1	2.30	—	0.65	1.50	Ht.=.50+.05+.10
	Step back ...	2	1.00	—	0.65	1.30	=.65 m
			Total	of ded	uctions	50.46	
			Net	Total plas	of out tering	side 146.33	sq m
22	6 mm plastering with 1 : 3 cement, medium sand mortar in ceilings—		Grand inside plaster	Total and ing =	of outside 562.81	sq m	
	Bedrooms ...	2	3.50	3.50	—	24.50	
	Living rooms ...	2	3.00	3.50	—	21.00	
	Study rooms ...	2	3.70	2.00	—	14.80	
	Kitchens ...	2	2.50	2.50	—	12.50	
	Baths ...	2	1.20	1.40	—	3.36	
	W.C.s ...	2	1.20	1.00	—	2.40	
	Front verandah ...	1	8.90	2.00	—	17.80	
	Back verandahs ...	2	4.15	2.50	—	20.75	
	Soffits of front verandah lintels ...	1	8.10	0.20	—	1.62	L=8.90—2×.40 =8.10 m
	Soffits of back verandah lintels ...	2	3.75	0.20	—	1.50	L=4.15—.40=3.75 m
	Staircase—						
	Inclined slab ...	2	2.54	1.10	—	5.59	
	Landing slab middle ...	1	2.30	0.90	—	2.07	
	Landing slab (1st floor level) ...	1	2.30	1.10	—	2.53	
	Soffit of lintel at entrance	1	2.30	0.30	—	0.69	
	Under sides of sun-shades—						
	Sun shades W ...	8	1.20	0.50	—	4.80	*Total of sunshade=18.22sq m*
	Sun shades W_1 kitchen side ...	2	1.10	0.50	—	1.10	*Total excluding bed rooms and living rooms =103.83 m*
	Front verandah sun shade ...	1	9.20	0.60	—	5.52	
	Back verandah sun shade continuous ...	1	13.60	0.50	—	6.80	
					Total	149.33	sq

23	Skirting 20 cm high with 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished—						
	Bedrooms ...	2	14.00	—	—	28.00	Lengths inner perimeter.
	Living rooms ...	2	13.00	—	—	26.00	
	Jambs of main rooms doors D ...	10	0.30	—	—	3.00	
	Staircase room ...	1	9.90	—	—	9.90	
	Jambs at entrance ...	2	0.30	—	—	0.60	
	Study rooms ...	2	11.40	—	—	22.80	
	Front verandah long wall	1	8.90	—	—	8.90	
	Front verandah side walls	2	2.20	—	—	4.40	
	Back verandah long walls	2	4.15	—	—	8.30	
	Back verandah side walls	4	2.70	—	—	10.80	
	Pillars 3 faces ...	4	0.80	—	—	3.20	
	Jambs study rooms door D	2	0.20	—	—	0.40	*Total of study room, verandahs etc. = 69.30 m*
					Total	126.30	
	Deduct door opening D	12	1.00	—	—	12.00	
				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	10.00	Lengths inner perimeter.
	W.C. 50 cm high ...	2	4.40	—	0.50	4.40	
	Bathroom 1 m high ...	2	5.20	—	1.00	10.40	
	Jambs of kitchen door D_1	2	0.20	—	0.50	0.20	
	Jambs of W.C. door D_2	2	0.20	—	0.50	0.20	
	Jambs of bath door D_2	2	0.20	—	1.00	0.40	
					Total	25.60 sq m	
	Deduct—						
	Kitchen door D_1 ...	2	0.90	—	0.50	0.90	
	W.C. door D_2 ...	2	0.75	—	0.50	0.75	
	Bath door D_2 ...	2	0.75	—	1.00	1.50	
			Total	of deduction		3.15 sq m	
				Net	Total	22.45 sq m	

(Ex. 9 Contd.)

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	—	2.78	B=2×.30+3×.17+.10= 1.21 m
	Back steps, tread and riser ...	2	1.00	1.21	—	2.42	
	Sides of front and back steps ...	3×2	—	0.60	0.27	0.97	
		3×2	—	0.30	0.17	0.31	
	Stair case steps, tread and riser ...	2×8	1.10	0.425	—	7.48	B=25+17.5=42.5 cm =.425 cm
					Total	13.96 sq m	
	VII. Flooring—						
26	2.5 cm C.C. 1 : 2 : 4 floor over and including 7.5 cm lime concrete —						
	Bedrooms ...	2	3.50	3.50	—	24.50	
	Living rooms ...	2	3.00	3.50	—	21.00	
	Staircase room ...	1	2.30	3.50	—	8.05	
	Sill of entrance ...	1	2.30	0.30	—	0.69	
	Study rooms ...	2	3.70	2.00	—	14.80	
	Kitchens ...	2	2.50	2.50	—	12.50	
	Bathrooms ...	2	1.20	1.40	—	3.36	
	W.Cs. ...	2	1.20	1.00	—	2.40	
	Front verandah ...	1	8.90	2.00	—	17.80	
	Back verandahs ...	2	4.15	2.50	—	20.75	
					Total	125.85 sq m	
27	2.5 cm C.C. 1 : 2 : 4 floor (without lime concrete)—						
	Sills of door D ...	10	1.00	0.30	—	3.00	
	Sills of door D (study room) ...	2	1.00	0.20	—	0.40	
	Sills of door D_1 ...	2	0.90	0.20	—	0.36	
	Sills of door D_2 ...	4	0.75	0.20	—	0.60	
	Sills of verandah openings over plinth dwarf wall—						
	Front verandah ...	1	8 10	0.20	—	1.62	L=8.90—2×.40= 8.10 m
	Back verandah ...	2	3.75	0.20	—	1.50	L=4.15—.40=3.75 m
	Staircase landing ...	1	2.30	0.90	—	2.07	Over R.C.C. landing slab.
					Total	9.55 sq m	

	VIII. Painting—						
28	Painting two coats over one coat of priming —						
	Panelled door D ...	12×2¼	1.00	—	2.00	54.00	1⅛ for one face.
	Panelled door D_1 ...	2×2¼	0.90	—	1.80	7.29	,, ,,
	Panelled door D_2 ...	4×2¼	0.75	—	1.80	12.15	,, ,,
	Panelled Window W ...	12×2¼	0.90	—	1.20	29.16	,, ,,
	Panelled Window W_1	4×2¼	0.80	—	1.00	7.20	,, ,,
	Panelled Window W_2	2×2¼	0.75	—	1.00	3.38	,, ,,
	Painting Window bars W ...	12	0.75	—	1.05	9.45	One clear flat area in between chaukhat.
	Painting Window bars W_1 ...	4	0.65	—	0.85	2.21	
	Painting Window bars W_2 ...	2	0.60	—	0.85	1.02	
	Iron grill in staircase railing ...	1	5.38	—	0.80	4.30	
					Total	130.16 sq m	
29	Coaltar painting two coats on back of chaukhats—						
	Door D ...	12	5.10	0.10	—	6.12	Lengths same as for chaukhats in item 15.
	Door D_1 ...	2	4.60	0.10	—	0.92	
	Door D_2 ...	4	4.45	0.10	—	1.78	
	Window W ...	12	4.20	0.10	—	5.04	
	Window W_1 ...	4	3.60	0.10	—	1.44	
	Window W_2 ...	2	3.50	0.10	—	0.70	
					Total	16.00 sq m	
	IX. White washing and colour washing —						
30	White washing 3 coats—Walls (inside)		Same plastering	as for in item	inside (21)	416.48	
	Ceiling, under side of sunshade, etc.		Same plastering	as for in item	ceiling (22)	149.33	
					Total	565.81 sq m	
31	Colour washing two coats over one coat of white washing (outside)—						
	Walls (outside) ...		Same plastering	as for in item	outside (21)	wall 146.33	Portion below G.L. to be deducted
	Upper surface of sunshades ...		Same item	as (22)	marked	* in 18.22	Under surface same as lower surface.
					Total	164.55	Edges neglected.
	Deduct 10 cm portion below G.L. ...	1	47.90	—	0.10	4.79	L=outer perimeter−steps = (2×17.10+2×9.00)−(2.30+2×1.00)= 47.90 m
				Net	Total	159.76 sq m	
	X Misc. Items—						
32	10 mm dia. A.C. rain water pipes (6 nos.) ...	6	3.60	—	—	21.60 m	L=3.00+.12+.50=3.62 =3.60 m

FIRST FLOOR

Details of Measurement and Calculation of Quantities (Ex. 9)

Item No.	Particulars of items and details of works	No.	Length m	Breadth m	Height or Depth m	Quantity	Explanatory notes
	II. Concrete						
1	Lime concrete in roof terracing 7.5 cm thick complete with surface finishing —						
	Roof of 1st floor in between parapet ...	1	16.70	8.60	—	143.62	Mumty room to be deducted.
	Roof of stair case room (mumty room) including chujja projection	1	3.70	5.10	—	18.87	L=2.30+2×.20+2×.50 =3.70 m B=3.70+2×.20+2×.50 = 5.10 m
					Total	162.49	
	Deduct mumty room at 1st floor level	1	2.70	4.10	—	11.07	
				Net	Total	151.42 sq.m.	
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 of G.F.	as in page	item (5) 258	15.642	Slab of all rooms and verandahs.
	Lintels—						
	Over main room doors D	8	1.30	0.20	0.10	0.208	Bearing 15 cm
	Over main room windows W ...	8	1.20	0.20	0.10	0.192	
	Over main room shelves	4	1.30	0.20	0.10	0.104	
	Over entrance of staircase	1	2.70	0.20	0.20	0.108	
	Over doors D study room	2	1.30	0.20	0.10	0.052	
	Over doors D_1 kitchen	2	1.20	0.20	0.10	0.048	
	Over doors D_2 Bath and W.C. ...	4	1.05	0.20	0.10	0.084	
	Over window W study room ...	4	1.20	0.20	0.10	0.096	
	Over window W_1 kitchen	2	1.10	0.20	0.10	0.044	Side windows
	Over shelves kitchen ...	4	1.30	0.20	0.10	0.104	
	Over R.C.C. Jalli over door D_2 of bath and W.C.	4	1.05	0.20	0.10	0.084	

					0.20	0.368	20 cm thick.
	Over front verandah ...	1	9.20	0.20			
	Over back verandah continuous including window W_1 W_2 ...	1	13.60	0.20	0.15	0.408	15 cm thick.
	Sunshades, shelf slab		Same of G.F.	as in page	item (5) 259	1.175	
	Stair case inclined slab and landings		Same of G.F.	as in page	item(5) 259	1.541	
	Steps (without reinforcement) ...	8×2	1.10	½ (.25×	175)	0.385	
	Mumty room—						
	Roof slab including chujja projections ...	1	3.70	5.10	0.10	1.887	
	Lintel over door ...	1	1.20	0.20	0.10	0.024	Bearing 15 cm
	Lintel over windows ...	3	1.50	0.20	0.10	0.090	
					Total	22.644 cu m	
3	2.5 cm c.c. 1 : 2 : 4 nosing in steps of stair case neat cement finished ...	9×2	1.10	—	—	19.80m	
4	R.C.C. 1 : 2 : 4 newal post in stair case 10 cm × 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	—	—	5.38	
	Upper landing ...	1	1.30	—	—	1.30	
	Front verandah ...	1	8.10	—	—	8.10	L=8.90—2×.40 =8.10 m
	Back verandah ...	2	3.75	—	—	7.50	L=4.15—.40=3.75 m
					Total	22.28 m	
6	4 m thick R.C.C. Jalli including reinforcement complete work — Over doors of Bath and W.Cs.	4	0.75	—	0.50	1.50	
	Over windows of mumty room ...	3	1.20	—	0.50	1.80	
					Total	3.30 sq m	

(Ex. 9 Contd.)

7	**III. Brickwork—** First class brickwork in 1 : 6 cement local sand mortar in superstructure Main rooms—						
	Back wall full length ...	1	17.10	0.20	3.00	10.26	L=16.90+.20 =17.10 m
	Front long walls ...	2	7.40	0.20	3.00	8.88	L=7.20+.20=7.40 m
	Cross walls ...	6	3.70	0.20	3.00	13.32	L=3.90—.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 openings D ...	10	1.00	0.20	2.00	4.00	
	Window opening W ...	8	0.90	0.20	1.20	1.73	
	Shelve opening ...	4	1.00	0.10	1.80	0.72	Back of shelf 10 cm.
	Lintels over door ...	10	1.30	0.20	0.10	0.26	
	Lintels over window W	8	1.20	0.20	0.10	0.20	
	Lintels over shelves ...	4	1.30	0.20	0.10	0.10	
			Total	of ded	uction	7.01	
	Net	Total	for	main	rooms	25.73 cu m	(i)
	Study room, kitchen, Bath and W.Cs., front and back verandahs		Same G.F.	as for page	item 262	(13) 22.74	(ii)
	Mumty room—						
	All 4 walls ...	1	12.80	0.20	2.50	6.40	Total centre line length =12.80 m
	Deduct Door W_1 ...	1	0.90	0.20	1.80	0.32	= 1.33 cu m
	Deduct Window W_2 ...	3	1.20	0.20	0.90	0.65	
	Deduct Jalli above W_3 ...	3	1.20	0.20	0.50	0.36	
			Total	of	Mumty room	5.07	(iii)
	Parapet long wall ...	2	17.10	0.20	0.975	6.67	
	Parapet short wall	2	8.60	0.20	0.975	3.35	
			Total	of para	pet	10.02	(iv)
	Grand	Total	of (i),	(ii), (iii)	and(iv)	63.56 cu m	

8	10 cm thick first class brickwork in partition wall with 1 : 3 cement coarse sand mortar with hoop iron of 6 mm dia. steel reinforcement every fourth layer ...	2	1.20	—	3.00	7.20	sq m
9	10 cm brick band at top of parapet	1	52.20	—	—	52.20 m	L=2(17.10+9.00) =52.20 m
	IV. Wood work-Doors and Windows						
10	Sal wood work in chaukhats in doors and windows— First floor doors and windows	Same G.F.	as in page	item 263	(15) of	1.201	
	Mumty room door D_1 ...	1	4.60	0.10	0.075	0.035	
	Mumty room window W_2 ...	3	4.20	0.10	0.075	0.095	
					Total	1.331 cu m	
11	3 cm thick panelled shutters of Deodar wood in doors and windows— First floor doors windows ...		Same G.F.	as in page	item 263	(16) of 41.197	
	Mumty room door D_1 ...	1	0.78	—	1.74	1.357	
					Total	42.554 sq m	
12	3 cm thick fully glazed shutters of Deodar wood— Mumty room windows W	3	1.68	—	0.78	3.931	sq m
13	Door and window fittings of oxidized iron ...		Same	as in and (12)	items above	(11)	
	V. Steel and Iron Work—		=42.5	54+	3.931	=46.485	sq m
14	Steel reinforcement bars including bending ...		22.349	$\times \frac{1}{100} \times$	78.5	=17.544 q	@ 1% of R.C.C. work in item (2) excluding stair case steps = 1/100×(22.734—0.385)= 1/100×22.349 cu m

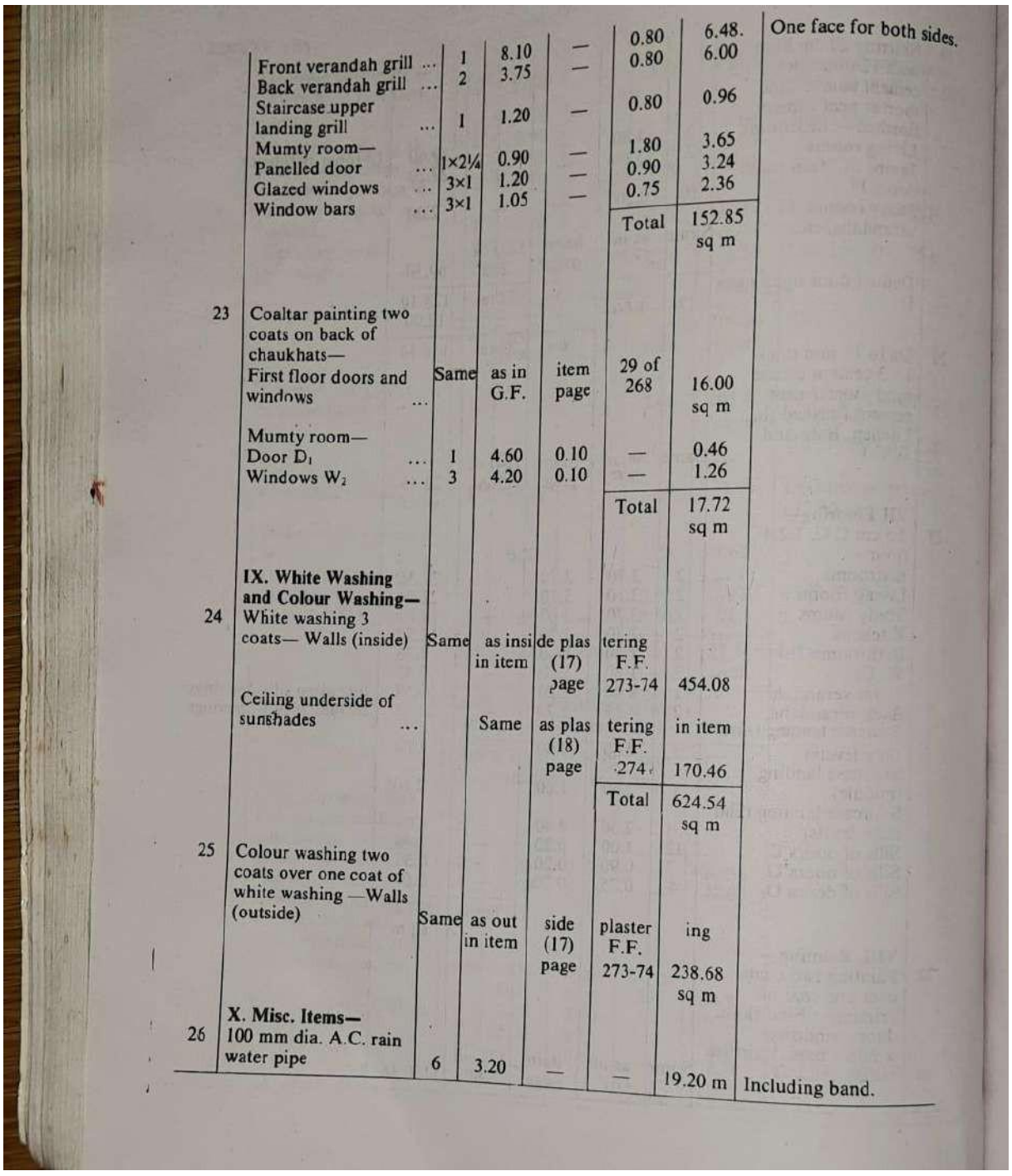
(Ex. 9 Contd.)

15	Iron work in hold fasts and window bars—Doors and windows of first floor ...		Same G.F.	as in page	item 263	(19) of 563.34 kg	
	Mumty room—						
	Hold fast in door D_1 ...	6	@ 1 kg	each	—	6 kg	
	Hold fast in windows W_2	3×4	@ 1 kg	each	—	12 kg	
	20 mm dia window bars in windows W_2 of mumty room @ 2.47kg per m ...	3×9	×0.90	×2.47	=	60.02 kg	6 bars 0.90 m each
					Total	641.36 =6.414 q	kg
16	Iron grill work in railings—Staircase railing two flights ...	1	5.38	—	0.80	4.31	
	Upper landing ...	1	1.20	—	0.80	0.96	
	Front verandah railing ...	1	8.10	—	0.80	6.48	L=8.90—2×.40 =8.10 m
	Back verandah railing ...	2	3.75	—	0.80	6.00	L=4.15—.40=3.75 m
					Total	17.75 sq m	
	VI. Plastering and Pointing—						
17	12 mm plastering with 1 : 6 cement local sand mortar in walls—						Excluding Skirting and Dado at bottom.
	Inside plastering — Main rooms—						
	Bedrooms ...	2	14.80	—	2.80	82.88	L=Inner perimeter =14.80
	Living rooms ...	2	13.60	—	2.80	76.16	L=Inner perimeter =13.60
	Staircase room ...	1	12.00	—	3.00	36.00	L=Inner perimeter =12.00
	Face of wall below stair case entrance lintel 20 cm wide ...	2	0.20	—	2.00	0.80	
	Shelves—Jambs, sills and soflits ...	4	5.60	0.10	—	2.24	
	Study room, Kitchens, Bath and W. Cs., Verandahs, etc. (of 30 cm wall) ...		Same G.F.	as for page	item 264	(21) in 268.80	
	Mumty room ...	1	12.00	—	2.50	30.00	
					Total	496.88	
	Deduct Door and Window openings ...		Same G.F.	as for page	item 264	(21) in 42.80	
		Net	Total plastering	of inside		454.08 sq m	

	Outside plastering — *Outside of first floor*	1	52.20	—	3.00	156.60	L=outer perimeter= 2 (17.10+9.00)=52.20 m
					1.20	8.64	One face.
	Deduct						
	Window opening W	8	0.90	—	1.00	3.20	
	Window openings W_1	4	0.80	—	1.00	1.50	
	Window openings W_2	2	0.75	—			
	Front verandah openings ...	1	8.10	—	2.20	17.82	L=8.90−2×.40=8.10 m
	Back verandah openings ...	2	3.75	—	2.20	16.50	L=4.15−.40=3.75 m
			Total of	deducti	on	47.66	
		Net	Total of plasster	outside ing 1st	floor	108.94 sq m	(i)
	Parapet wall (outer top and inner) ...	1	51.20	—	2.00	102.40 sq m	(ii) L=Total length of 4 walls=51.20 m Ht.=2×.90+.20=2.00 m
	Mumty room — Outer side of walls ...	1	13.60	—	2.50	34.00	L=Outer perimeter =13.60 m
	Deduct door openings D_1 ...	1	0.90	—	1.80	1.62	} =6.66 sq m
	Deduct window openings W_3 ...	3	1.20	—	0.90	3.24	
	Deduct R.C.C. Jalli	3	1.20	—	0.50	1.80	
		Net	Total	of mum	ty	27.34 sq m	(ii)
		Total	of	outside	plas-		
		ter	ing (i),	(ii) and	(iii)=	238.68	sq m
		Gran	d Total	of in	side		
		and	outside	plaster	ing=	692.76 sq m	
18	6 mm plastering with 1 : 3 cement medium sand mortar in ceiling						
	Bedrooms ...	2	3.70	3.70	—	27.38	
	Living rooms ...	2	3.10	3.70	—	22.94	
	First floor study room, Kitchen, bath and W.C., verandahs, stair-case, Sunshades, etc.	Same	as in G.F.	item page	(22) of 265	103.83	
	Mumty room—Ceiling	1	2.30	3.70	—	8.51	
	Chujjas long ...	2	5.10	0.50	—	5.10	L=3.7+.4+2×.5=5.10 m
	Chujjas short ...	2	2.70	0.50	—	2.70	L=2.30+.40=2.70 m
					Total	170.46	sq m

(Ex. 9 Conta

19	Skirting 20 cm high with 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished— Bedrooms	2	14.80	—	—	29.60	L=Inner perimeter.
	Living rooms ...	2	13.60	—	—	27.20	
	Jambs of Main room doors D ...	10	0.20	—	—	2.00	
	Study rooms, verandahs, etc. ...	Same	as in G.F.	item page	(23) of 266	69.30	
					Total	128.10	
	Deduct door openings D ...	12	1.00	—	—	12.00	
					Net	Total	116.10
20	Dado 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished (in kitchen, Bath and W.C.) ...	Same	as in G.F.	item page	(24) of 266	22.45 sq m	
	VII Flooring—						
21	2.5 cm C.C. 1:2:4 floor—						
	Bedrooms ...	2	3.70	3.70	—	27.38	
	Living rooms ...	2	3.10	3.70	—	22.94	
	Study rooms ...	2	3.70	2.00	—	14.80	
	Kitchens ...	2	2.50	2.50	—	12.50	
	Bathrooms ...	2	1.20	1.40	—	3.36	
	W. Cs ...	2	1.20	1.00	—	2.40	
	Front verandah ...	1	8.90	2.20	—	19.58	Including sills openin
	Back verandahs ...	2	4.15	2.70	—	22.41	Including sills openin
	Staircase landing (first floor levels) ...	1	2.60	0.40	—	1.04	
	Staircase landing (middle) ...	1	2.60	1.00	—	2.60	
	Staircase landing (2nd floor levels) ...	1	2.60	0.40	—	1.04	
	Sills of doors D ...	12	1.00	0.20	—	2.40	
	Sills of doors D_1 ...	2	0.90	0.20	—	0.36	
	Sills of doors D_2 ...	4	0.75	0.20	—	0.60	
					Total	133.41 sq m	
	VIII. Painting—						
22	Painting two coats over one coat of priming— First floor doors windows, window bars, staircase railing grills ...	Same	as in G.F.	item page	(28) of 268	130.16	



	Front verandah grill ...	1	8.10	—	0.80	6.48.	One face for both sides.
	Back verandah grill ...	2	3.75	—	0.80	6.00	
	Staircase upper landing grill ...	1	1.20	—	0.80	0.96	
	Mumty room—						
	Panelled door ...	1×2¼	0.90	—	1.80	3.65	
	Glazed windows ...	3×1	1.20	—	0.90	3.24	
	Window bars ...	3×1	1.05	—	0.75	2.36	
					Total	152.85 sq m	
23	Coaltar painting two coats on back of chaukhats—						
	First floor doors and windows ...	Same	as in G.F.	item page	29 of 268	16.00 sq m	
	Mumty room—						
	Door D_1 ...	1	4.60	0.10	—	0.46	
	Windows W_2 ...	3	4.20	0.10	—	1.26	
					Total	17.72 sq m	
	IX. White Washing and Colour Washing—						
24	White washing 3 coats— Walls (inside)	Same	as inside plastering in item	(17) page	F.F. 273-74	454.08	
	Ceiling underside of sunshades ...		Same	as plastering (18) page	F.F. 274	in item 170.46	
					Total	624.54 sq m	
25	Colour washing two coats over one coat of white washing —Walls (outside)	Same	as outside plastering in item	(17) page	F.F. 273-74	ing 238.68 sq m	
	X. Misc. Items—						
26	100 mm dia. A.C. rain water pipe	6	3.20	—	—	19.20 m	Including band.

Conclusion: - From above the experiment we get quantiles of two stored building.

Experiment-4

- Aim of the experiment.

Analysis at rates in details for above items of work basing Odisha govt. with help of MS Excel.

Requirement: - MS Excel given specification and rate analysis from above experiment.

Procedure: -

- Open MS Excel.
- Create a new work book.
- Save a work book.
- Enter date and sum → save the date.
- Print, copy etc.

GROUND FLOOR

Abstract of Estimated Cost (Ex.9 Ground Floor)

Item No.	Particulars of items of work	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
	I. Earthwork—					
1	Site clearance and setting out	1	Job	150.00	L.S.	150.00
2	Earthwork in excavation in foundation	55.75	cu m	350.00	% cu m	195.12
3	Earthwork in filling in plinth	46.52	cu m	275.00	% cu m	127.93
	II. Concrete—					
4	Lime concrete in foundation	19.36	cu m	220.00	/ cu m	4259.20
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	675.00	/ cu m	14214.15
6	2.5 cm 1 : 2 : 4 nosing in steps neat cement finished	32.70	m	6.00	/ m	196.20
7	R.C.C. 1 : 2 : 4 Newal post 10 cm × 10 cm, 1 cm height including reinforcement complete work	2	No.	20.00	each	40.00
8	R.C.C. 1 : 2 : 4 Hand rail in stair case including reinforcement complete work	5.48	m	24.00	/ m	131.52
9	4 cm thick R.C.C. Jalli including reinforcement complete work	1.50	sq m	120.00	/ sq m	180.00
10	2.5 cm Damp proof course C.C. 1 : 2 : 3 with water proofing compound	28.97	sq m	20.00	/ sq m	579.40
	III. Brickwork —					
11	First class brickwork in lime mortar in foundation and plinth	41.94	cu m	295.00	/ cu m	12372.30
12	First class brickwork in lime mortar in superstructure in 30 cm wall	36.45	cu m	320.00	/ cu m	11664.00
13	First class brickwork in 1 : 6 cement local sand mortar in superstructure in foundation and plinth	22.74	cu m	340.00	/ cu m	7731.60
					C.O.	51841.42

Item No.	Particulars of items of work	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
14	10 cm thick first class brickwork in partition wall in 1 : 3 cement coarse sand mortar with hoop iron or 6 mm dia. steel reinforcement every fourth layer	7.20	sq m	42.00	/sq m	302.40
	IV. Wood work —Doors and Windows—					
15	Salwood work in chowkhats in doors and windows	1.201	cu m	4700.00	/cu m	5644.70
16	4 cm thick panelled shutters of Deodar wood in doors and windows	41.197	sq m	200.00	/ sq m	8239.40
17	Door and window fittings of oxydized iron	41.197	sq m	30.00	/sq m	1235.91
	V. Steel and Iron work—					
18	Steel reinforcement bars including bending	16.226	quintal	515.00	/q	8356.39
19	Iron work in hold fasts and window bars	5.633	quintal	700.00	/ q	3943.10
20	Iron grill work in stair case railing	4.304	sq m	200.00	/ sq m	860.80
	VI. Plastering and Pointing—					
21	12 mm plastering with 1 : 6 cement local sand mortar in walls	562.81	sq m	7.10	/sq m	3995.95
22	6 mm plastering with 1 : 3 cement medium sand mortar in ceiling	149.33	sq m	5.80	/sq m	866.11
23	Skirting 20 cm high with 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished	114.30	m	4.00	/m	457.20
24	Dado 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished	22.45	sq m	9.50	/ sq m	213.27
25	20 mm plastering with 1 : 3 cement coarse sand mortar neat cement finished in steps	13.96	sq m	15.00	/ sq m	209.40
	VII. Flooring					
26	2.5 cm C.C. 1 : 2 : 4 floor over and including 7.5 cm lime concrete	125.85	sq m	24.40	/ sq m	3070.74
					G.O.	89236.79

Item No.	Particulars of items of work	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
27	2.5 cm C.C. 1 : 2 : 4 floor	9.55	sq m	18.00	/sq m	171.90
	VIII Painting—					
28	Painting two coats over one coat of priming	130.16	sq m	6.90	/ sq m	898.10
29	Coal tar painting two coats on back of chowkhats	16.00	sq m	2.30	/ sq m	36.80
	IX. White washing and colour washing—					
30	White washing 3 coats inside	565.81	sq m	0.75	/sq m	424.36
31	Colour washing 2 coats over one coat of white washing	159.76	sq m	0.82	/ sq m	131.00
	X. Miscellaneous items—					
32	100 mm dia. A.C. rain water pipe	21.60	m	27.00	m	583.20
					Total	91482.15
	Add 8% for Water Supply and Sanitary Works					7318.57
	Add 8% for Electrification Works					7318.57
					Total	106119.29
	Add 3% for Contingencies					3183.58
	Add 2% for Workcharged Establishment					2122.39
					Grand Total	111425.26

Plinth Area Rate of Ground Floor—

Plinth Area=17.10×9.00=153.9 sq m.

Plinth Area Rate Inclusive of Water Supply and Sanitary Work and Electrification Works= $\frac{\text{Total}}{\text{Plinth Area}} = \frac{\text{Rs.}111425.26}{153.9 \text{ sq m}} = 724.00$ per sq m.

ABSTRACT OF ESTIMATED COST (EX. 9 FIRST FLOOR)

Item No.	Particulars of items of work	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
	II. Concrete—					
1	Lime concrete in roof terracing 7.5 cm thick complete with surface finishing	151.42	sq m	18.00	/sq m	2725.56
2	R.C.C. work 1 : 2 : 4 excluding steel reinforcement and its bending but including centering and shuttering and binding steel	22.644	cu m	680.00	/cu m	15397.92
3	2.5 cm C.C. 1 : 2 : 4 nosing in steps of stair case neat cement finished	19.80	m	6.00	/ m	118.80
4	R.C.C. 1 : 2 : 4 newal post in stair case 10 cm × 10 cm, 1 m height including reinforcement complete work	3	nos.	20.00	/ nos.	60.00
5	R.C.C. 1 : 2 : 4 hand rail over grill including reinforcement complete work	22.28	m	20.00	/ m	445.60
6	4 cm thick R.C.C. jalli including steel reinforcement complete work	3.30	sq m	120.00	/ sq m	396.00
	III. Brickwork—					
7	First class brickwork in 1 : 6 cement local sand mortar in superstructure in 20 cm thick wall	63.56	cu m	343.00	/ cu m	21801.08
8	10 cm thick first class brickwork in partition wall with 1 : 3 cement coarse sand mortar with hoop iron or 6 mm dia. steel reinforcement every fourth layer	7.20	sq m	42.00	/ sq m	302.40
9	10 cm thick brick band with 1 : 6 cement local sand mortar at top of parapet	52.20	m	4.00	/ m	208.80
	IV. Wood work Door and windows—					
10	Salwood work in chowkhats in doors and windows	1.331	cu m	4700.00	/ cu m	6255.70
11	3 cm thick panelled shutters of Deodar wood in doors and windows	42.554	sq m	200.00	/ sq m	8510.80
12	3 cm thick fully glazed shutters of deodar wood	3.931	sq m	125.00	/sq m	491.37
13	Door and window fittings of oxydized iron	46.485	sq m	30.00	/ sq m	1394.55
	V. Steel and iron work—					
14	Steel reinforcement bars including bending	17.544	quintal	515.00	/ q	9035.16
15	Iron work in hold fasts and window bars	6.414	quintal	700.00	/ q	4489.80

Item No.	Particulars of items of work	Quantity	Unit	Rate Rs. P.	Per	Amount Rs. P.
16	Iron gril in railings	17.75	sq m	200.00	B.F. / sq m	71633.54 3550.00
	VI. Plastering and pointing—					
17	12 mm plasteing with 1 : 6 cement local sand mortar in walls	692.76	sq m	7.10	/ sq m	4918.59
18	6 mm plastering with 1 : 3 cement medium sand mortar in ceiling	170.46	sq m	5.80	/ sq m	988.67
19	Skirting 20 cm high with 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished	116.10	m	4.00	/ m	464.40
20	Dado 12 mm thick 1 : 3 cement coarse sand mortar neat cement finished	22.45	sq m	9.50	/sq m	213.27
	VII. Flooring—					
21	2.5 cm C.C. floor	133.41	sq m	18.00	/ sq m	2401.38
	VIII. Painting—					
22	Painting two coats over one coat of priming	152.85	sq m	6.90	/ sq m	1054.66
23	Coaltar painting two coats on back of chowkhats	17.72	sq m	2.30	/ sq m	40.75
	IX. White washing and colour washing—					
24	White washing 3 coats inside	624.54	sq m	0.75	/ sq m	468.40
25	Colour washing two coats over one coat of white washing	238.68	sq m	0.82	/ sq m	195.71
	X. Miscellaneous items—					
26	100 mm dia. A.C. rain water pipe	19.20	m	27.00	/sq m	518.40
					Total	86447.77
	Add 8% for Water Supply and Sanitary Works					6915.82
	Add 8% for for Electrification Work					6915.82
					Total	100279.41
	Add 3% for Contingencies					3008.38
	Add 2% for Workcharged Establishment					2005.59
					Total	105293.38
					Say Rs.	105293.00

Plinth Area Rate of First Floor—

Plinth Area=17.10×9.00=153.9 sq m.

Plinth Area Rate Inclusive of Water Supply and Sanitary Work and Electrification Works= $\frac{\text{Total}}{\text{Plinth Area}} = \frac{\text{Rs. } 105293.00}{153.9 \text{ sq m}} = 684.16$ per sq m.

Plinth Area Rate of the Double storeyed building, for both Ground floor and First floor combined= P.A. Rate of G.F.+P.A. Rate of F.F.=Rs. 724.00+Rs. 684.16=Rs. 1408.16 per sq m.

Conclusion: - from above the experiment we know that, how to use MS Excel in estimating rate analysis.