(Q.) Prepare an approximate estimate of building project with total plinth area of all building is 800 sqm. and from following data.

(i) Plinth area rate Rs 4500 per sqm.
(ii) cost of water supply @ 7.5% of cost of building.
(iii) cost of Sanitary and Electrical Installation each @ 7.5% of cost of building.
(iv) cost of architectural features @ 1% of building cost.
(v) cost of roads and lawns @ 5% of building cost.
(vi) cost of P.S and contingencies @ 4% of building cost of overall cost.

Determine the total cost of building project.

Sol^{n}:- Given data:-
Plinth area of all building = 800 m^2.
Plinth area rate Rs 4500 per m^2.

Approximate cost = Rate X Plinth area of all building.
= 4500 X 800 = 36,00,000 Rs.
↳ cost of Building.

(i) cost of water Supply = 7.5% of cost of Building.

$= \frac{7.5}{100} \times 36,00,000$

$= 27,0000$ Rs.

(ii) cost of Sanitary and Electrical installation
= 7.5% each of cost of building

$= \frac{15}{100} \times 36,00,000$

$= 54\,0000$ Rs.

(iii) cost of Architectural features

$= \frac{1}{100} \times 36,00,000$

$= 36,000$ Rs.

(iv) cost of road and lawns
= 5% of building cost

$= \frac{5}{100} \times 36,00,000$

$= 180,000$ Rs.

Total approximate cost = 46,26,000 Rs.

(v) cost of P.S and contingencies
= 4% building of overall cost.

$= \frac{4}{100} \times 4626000$

$= 185,040$ Rs.

Grand Total = 46,26,000 Rs. + 185.040 Rs.
= 4,8 11, 040 Rs.

(Q.) Prepare an approximate estimate of a proposed building from the following?

(i) Plinth area of the building = 226 sqm.
(ii) Cost of the structure = 25 00 per sqm.
(iii) water supply and Sanitary arrangement = 12.5%.
(iv) Electrification = 7%.
(v) fluctuation of rates = 5%.
(vi) Petty & supervision charges = 3%.

Solution:- Given data
Plinth area of the building = 226 sqm.
Cost of the structure = 2500 sqm.

Cost of Building
= Plinth area of the building x cost of the structure.
= 226 x 2500 = 565000 Rs.

(i) cost of water & supply and Sanitary arrangement

$$= \frac{12.5}{100} \times 565000$$

= 70625 Rs.

Cost of Electrification

$= \frac{1}{100} \times 565000$

$= 39550$ Rs.

Cost of fluctuation

$= \frac{5}{100} \times 565000$

$= 28250$ Rs.

Overall cost of the Building

$= (565000 + 70625 + 39550 + 28250)$ Rs.

$= 703425$ Rs.

Supervision charges = 3% of Overall cost

$= \frac{3}{100} \times 703425$

$= 21102.75$ Rs.

$\simeq 21103$ Rs.

Grand Total $= (703425 + 21103)$ Rs.

$= 724528$ Rs.

★ Aim of Experiment -

Prepare a list of items to be executed with units for detailed estimate of a load bearing structure.

➤ Theory -

In order to construct a load bearing structure a list of items to be executed with units are as follows -

List of Items	Units
1. Site Clearance.	m^2
2. Excavation in Earthwork for foundation.	m^3
3. Sand Filling in foundation trenches	m^3
4. Burnt Brick Soiling	m^2
5. P.C.C. layer in foundation trenches	m^3
6) Foundation Brick Work	m^3
7. Plinth Work of RCC (thickness specified)	m^2
8. D.P.C at Plinth level (thickness specified)	m^2
9. Earthfilling in Plinth bounded area	m^3
10. P.C.C. flooring on compacted earth.	m^2
11. Superstructure Brickwork. (Wall)	m^3
12. Lintel & Sill for door & Windows	m^3
13. Weathershead & Chajja	m^3
14 Cornice outside the structure.	m
15 Slab R.C.C Work	m^3
16. R.C.C. work for Stairs.	m^3

17. Plastering of Superstructure by Cement Mortar — m^2
18. Painting of Superstructure — m^2
19. Plastering of Ceeling by Cement Mortar — m^2
20. Painting of Ceeling. — m^2
21. Floor finishing — m^2

★ Aim of Experiment -

Prepare a report on market rates for given material, labour wages, hire charges of tools & equipments required to construct the given structure as mentioned in at Serial Number 1 above.

➤ Observations -

1.) Materials used :-	Unit	Rate (in Rs)
• Earth	per Tailor	350/-
• Sand	per Tailor	4,200/-
• Cement	per bag	450/-
• Aggregate	per Tailor	5,600/-
• Paint	per litre	150/-
• Reinforcement	per meter	
• Plywood	per m^2	800/-
• Wood	per m^3	1500/-

2.) Labour Wages	Rate per day
• Mistries	800/-
• Labour	400/-
• Carpainter	650/-
• Painter	500/-

3.) Hire Charges of tool & Equipment Required	Rate per day
• Shuttering	300/-
• Vibrator	600/-
• Concrete Mixer	3,000/-
• Water Pump	600/-

4.) Equipments Required -

- Trowel
- Plumb-bob
- Shovel.
- Water Storage Tanker
- Bamboos or Steel Pipes
- Rammer or Roller
- Ropes.
- Level Pipe

★ Aim of Experiment -
Recording in Measurement Book (MB) for any 4 items

➤ Observations -

Serial No.	Description of item of	No.	Details of Measurement			Quantity (in req. unit)
			Length	Breath	Depth	
1.	Earthwork in Excavation of foundation.	4	6m	1m	0.8m	19.2 m^3
2.	Sand filling in Foundation trenches	4	6m	1m	0.2m	4.8 m^3
3.	P.C.C. done in Foundation Trenches	4	6m	1m	0.2m	4.8 m^3
4.	Brickwork in Superstructure	4	6m	0.2m	3m	14.4 m^3

Aim of Experiment :-

Prepare bill of quantities of given items from actual Measurement (any four).

Observations -

S. no.	Description of Item	Quantity	Unit	Rate	Amount
1.	Earthwork in Excavation of foundation trenches	19.2	m^3	200/-	3,840 Rs
2.	Sand filling in foundation trenches	4.8	m^3	250/-	1,200 Rs
3.	P.C.C. done in Foundation Trenches	4.8	m^3	500/-	2,400 Rs
4.	Brickwork in Super Structure.	14.4	m^3	1,200/-	17,280 Rs
				Total -	24,720 Rs

Aim of Experiment:-

Calculate the quantity of items of work from the given set of drawing using standard measurement sheet for load bearing residential structure (1BHK)

Foundation and Plinth -

1st Class brickwork in 1:6 Cement mortar, 20mm of D.P.C. of 1:2 Cement Mortar mixed with standard water-proofing material

Superstructure -

Walls shall be of 1st Class brickwork in Cement Mortar. Inside and Outside wall shall be plastered 12mm thick with 1:1:6 Cement : lime : Sand.

Door and Window -

Door and Window chowkhats shall be of Sal wood and shutter shall be 4cm panelled of deodar wood and painted two coats over one coat of priming.

Centre to Centre length of wall -

Long wall C. to C. length = 4.20 + 0.30 = 4.50m

Short wall C. to C. length = 3.00 + 0.30 = 3.30m

Verandah front C. to C. length = 4.20 + 0.30 = 4.50m

Verandah side C. to C. length = 2.00 + 0.30 = 2.30m

S no.	Items of Work	No.	Length	Breadth	Height	Quantity	Remarks
1.	Earthwork in Excavation in Foundation –						
	(i) Long Walls	2	5.30	0.80	0.65	5.51	L = 4.5+0.8 = 5.3
	(ii) Short Walls	2	2.50	0.80	0.65	2.60	L = 3.3-0.8 = 2.5
	(iii) Verandah pillars ..	3	0.70	0.70	0.65	0.96	
	(iv) Plinth drawrf of wall front (Sum total length) ...	1	3.10	0.40	0.25	0.31	L = 4.50-2×0.7 = 3.10m
	(v) Plinth drawrf of wall sides	2	1.55	0.40	0.25	0.31	L = 2.3 - $\frac{0.9}{2}$ - = 1.55m
	(vi) Step	1	2.10	0.65	0.10	0.14	
					Total	9.83 m^3	
2.	Earthwork in filling in Plinth –						
	Room	1	4.10	2.90	0.375	4.46	
	Verandah	1	4.10	2.10	0.375	3.54	L = 4.90-0.40 = 4.50m
							B = 2.35-0.2 = 0.05 = 2.10m
					Total	8.00 m^3	
B	Deduct –						
	Projection Central Pillar	1	0.40	0.20	0.375	0.03	May be
	Projection side pillar –	2	0.20	0.20	0.375	0.03	Neglected
					Total	0.06	
				Net	Total	7.94 m^3	

3. Lime concrete in foundation - Room						
Long Walls	2	5.30	0.80	0.30	2.54	
Short Walls	2	2.50	0.80	0.30	1.20	
Verandah Pillars	3	0.70	0.70	0.30	0.44	
Dwarf wall front	1	3.70	0.40	0.10	0.15	$= 4.5 - 2\times0.40$ $L = 3.70m$
Dwarf wall sides	2	1.85	0.40	0.10	0.15	$L = 2.30 - \frac{0.50}{2} - \frac{0.4}{2}$ $= 1.85$
Step	1	2.10	0.65	0.06	0.08	
4) 1st Class Brickwork in Foundation and Plinth in - Lime Mortar						
Room ① Long Wall.						
1st footing	2	5.10	0.60	0.10	0.61	$L = 5.10$
2nd footing	2	5.00	0.50	0.10	0.50	$L = 5.00$
Plinth wall above footing	2	4.90	0.40	0.60	2.35	$L = 4.90$
② Short Wall -						
1st footing	2	2.70	0.60	0.10	0.32	$L = 2.70m$
2nd footing	2	2.80	0.50	0.10	0.28	$L = 2.80m$
Plinth wall	2	2.90	0.40	0.60	1.39	$L = 2.90m$
③ Verandah -						
Pillars footing	3	0.50	0.50	0.10	0.075	
Pillars Plinth	3	0.40	0.40	0.70	0.336	
Dwarf wall front	1	3.70	0.20	0.60	0.44	$L = 3.70m$
Dwarf wall side	2	1.90	0.20	0.60	0.46	$L = 1.90m$
④ Steps -						
1st Step	1	2.00	0.60	0.19	0.23	
2nd Step	1	1.40	0.30	0.15	0.06	
				Total	7.05 m³	

5. 2 cm DPC of 1:2 Cement mortar with water proffing						
Long Walls	2	4.90	0.40	-	3.92	Length, Breadth same as plinth wall
Short Walls	2	2.90	0.40	-	2.32	
Verandah -						
Pillars	3	0.40	0.40	-	0.48	
Deduct Door Sill	2	1.00	0.40	-	0.80	
				Total	5.92 m²	
6. First Class B rickwork in Superstructure in lime mortar						
① Room -						
Long Walls	2	4.80	0.30	3.50	10.08	L = 4.80 m
Short Walls	2	3.00	0.30	3.50	6.30	L = 3.00 m
⑪ Verandah -						
Pillars	3	0.30	0.30	2.20	0.59	
Front level above lintel	1	4.80	0.30	0.40	0.57	
Sides above lintel.	2	2.00	0.30	0.40	0.48	
Parapet long wall	2	4.80	0.20	0.375	0.72	
Para	2	3.20	0.20	0.375	0.48	
				Total	19.22	
Deduct -				~~Total~~		
Door Opening	2	1.00	0.30	2.00	1.20	
Window Opening	3	1.00	0.30	1.40	1.26	
Shelf	1	1.00	0.20	1.70	0.34	
Ventilators	2	0.60	0.30	0.30	0.11	
Lintel Over Doors	2	1.20	0.30	0.10	0.07	
Lintel Over Window	3	1.20	0.30	0.10	0.11	
Lintel Over Shelves	1	1.20	0.30	0.10	0.04	
				Total	16.07	

7.	Reinforced Brickwork in 1:3 cement mortar excluding steel and its bending but including cenbe its bending but including centering & shuttering and bending Steel -						
	Roof of room ------	1	5.00	3.80	0.15	2.850	
	Roof of Verandah ---	1	5.00	2.55	0.10	1.275	15cm bearing
	Lintel Verandah front	1	4.80	0.30	0.20	0.288	Out to out
	Lintel Verandah Sides	2	2.15	0.30	0.20	2.58	15cm bearing
					Total	4.911 m^3	
8.	7.5cm Lime Concrete in roof dressaring complete with surface finishing -						
	Roof of Room	1	4.40	3.20	-	14.08	
	Roof of Verandha	1	5.00	2.40	-	12.00	
					Total	26.08	m^3
9)	Sal Wood work in						
①	Chaukath -						
	Doors ------	2	5.08	0.10	0.08	0.081	
	Window ------	3	4.80	0.10	0.8	0.115	
					Total	0.196	
10)	Shutter 4mm thick						
	Door ------	2	0.87	1.935	-	3.367	15cm Rebate
	Window ------	3	0.87	1.27	-	3.315	
					Total	6.682 m^2	

12.	Precast RCC Slab shelve complete work including Steel reinforcement & formwork ----	3	1.08	0.20	0.05	0.032 m^3	4 cm bearing
13.	RCC jali work 4 cm thick in ventilators complete working steel reinforcement and formwork.	2	0.60	0.30	-	0.36 m^2	
14.	Mild Steel in Reinforcement bars including bending in RB Work (at 0.7%) ----		$\frac{4.91}{100}$ ×		78.5	= 2.698 g	
	Hold fasts in doors & windows ----------	24	@ 1 kg	each =	24 kg	= 24 g	
						2.938 g	
15.	2.5 cm CC 1:2:4 floor over and including 7.5 cm lime concrete - Room ----	1	4.20	3.00	-	12.60	
	Verandah ---	1	4.50	2.15	-	9.68	
					Total	22.28	
	Deduct - Control pillars -	1	0.30	0.15	-	0.045	
	Side Pillars -	2	0.15	0.15	-	0.045	
					Total	0.090	
				Net	Total	22.19	m^2

17	2.5 cm CC 1:2:4 floor (without line concrete)-						
	Door Sill - - -	2	1.00	0.30	-	0.60	
	Pillars - - - - -	1	3.90	0.20	-	0.78	L = 3.90m
	Sides - - - - -	2	2.00	0.20	-	0.80	
					Total	2.18 m^2	
18	12mm Plastering in celling with 1:3 cement & Course sand mortar-						
	Room - - - - -	1	4.20	3.00	-	12.60	
	Verandah - - - - -	1	4.20	2.00	-	8.40	
					Total	21.00 m^2	
19.	20mm Cement Plaster 1:3 in steps finished with neat cement-						
	1st Step-						
	Thread - - -	1	2.60	0.30	-	0.78	
	Rise - - - -	1	3.20	-	0.15	0.48	
	2nd Step-						
	Thread - - -	1	1.40	0.30	-	0.42	
	Rise - - -	1	2.00	-	0.15	0.30	
	Plinth Wall-	1	1.40	-	0.15	0.21	
		2	0.30	-	0.30	0.18	
					Total	2.37 m^2	

20.	White Washing 3-coats-						
	Inside Wall - -	Same as inside plaster in item (18)				72.47	
	Ceiling - - - - -	Same as " " " " (17)				21.00	
					Total	93.47 m²	
21.	Colour Washing one coat over two coats of White Washing	Same as outside plaster in item (18)				79.07	
	Deduct portion below G.L.	1	19.80	-	0.10	1.98	
					Total	77.09 m²	
	Painting of doors & windows two coats over one coat of priming -						
	Doors - - - - -	2×2½	1.00	-	2.00	9.00	1 3/8 per one
	Windows - - - - -	3×2½	1.00	-	1.40	9.45	1 1/8 " "
					Total	18.45 m²	
	Coal tarring two coats in back of chowkhats -						
	Doors - - - -	2	5.08	0.10	-	1.02	
	Windows - - -	3	4.80	0.10	-	1.44	
					Total	2.46 m²	

Abstract of Estimated Quantity

Sno.	Particulars of Items	Quantity	Unit
1.	Earthwork in excavation in foundation	9.83	m^3
2.	Earthwork in filling in plinth	7.94	m^3
3.	Lime concrete in foundation	4.56	m^3
4.	I-Class brickwork in foundation & plinth in lime mortar.	7.05	m^3
5.	2cm DPC. with 1:2 cement mortar & water proofing component	5.92	m^2
6.	I-Class brickwork in superstructure in lime mortar.	16.07	m^3
7.	Reinforced Brickwork (L.B.) in 1:3 Cement mortar excluding steel and its bending but including centering & shuttering and Binding Steel.	4.91	m^3
8.	7.5 cm lime concrete in roof tracing	26.08	m^2
9.	Sal Wood Work in Chowkhat	0.196	m^3
10.	4 cm thick panneled shutters of Deodar wood excluding fitting.	6.682	m^2
11.	Iron Fitting in Doors & Window	6.68	m^2
12.	Precast RCC slab 1:2:4 in shelves including steel reinforcement	0.032	m^3
13.	RCC Jalikwork 4 cm thick 1:2:4 cement concrete including steel reinforcement.	0.36	m^2
14.	Mild Steel including bending in reinforcement and hold fasts.	2.938	Quintal (Q)

		Quantity	Unit
15.	2.5cm CC. 1:2:4 floor over and including 7.5cm lime concrete.	22.19	m^2
16.	2.5cm CC. 1:2:4 floor (without L.C.)	2.18	m^2
17.	12mm plastering in celling with 1:3 Cement Mortar	21.00	m^2
18.	12mm plastering in walls with 1:1:6 Cement: Lime: Sand Mortar	151.54	m^2
19.	20mm cement mortar plaster 1:3 in step finished with neat cement.	2.37	m^2
20.	White Washing 3 coats Inside. - - -	93.47	m^2
21.	Colour washing one coat over one coat of white washing - - -	97.03	m^2
22.	Painting Door and Windows two coats, over one coat of priming.	18.45	m^2
23.	Coal tarring two coats in back of chowkat - - - - - - - - - -	2.46	m^2