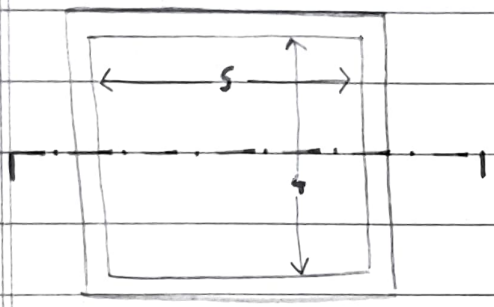
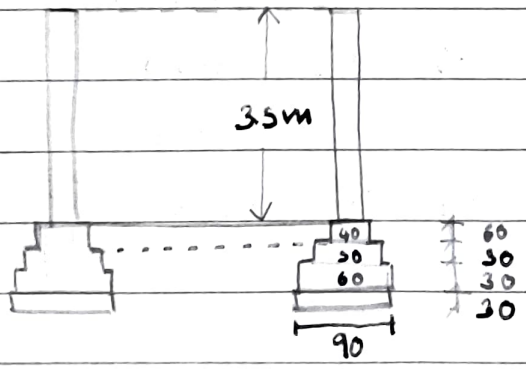
classmate
Date
Page

the plan represents the plan of superstructure wall of a single room building of 5m×4m. And the section represents the cross-section of wall with foundations. Estimate qty. of (i) earth work & excavation in foundation
(ii) Concrete in foundation
(iii) Brick work in foundation & plinth.
(iv) Brick work in super structure.





Lw: c/c dist of long wall + width of sections
= 5.3+0.3 = 5.6

Sw: c/c dist of short wall - width of section
4.3 - 0.3 = 4.

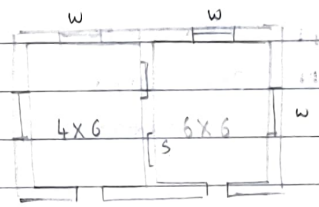
S.No	Item	No	L	B	H/D	Qty	Remarks
(1)	Ew in excavation						
	a) Lw	2	6.2	0.9	0.9	10.04	5.3+0.9
	b) Sw	2	3.4	0.9	0.9	5.51	4.3-0.9
						15.55	

SNo	item	No	L	B	HID	Qty	Remarks
①	Excavation in fndn.						
a)	LW	2	6.2	0.9	0.3	3.35	
b)	SW	2	3.4	0.9	0.3	1.83	
						5.18m³	

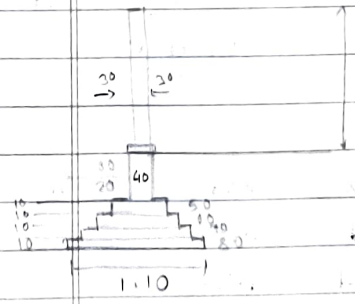
③	B.W in fndn & plint.						
a)	LW						
*	1 footing	2	5.9	0.6	0.3	2.124.	5.3+0.6
*	2 footing	2	5.8	0.5	0.3	1.74	5.3+0.5
						3.864m³	
*	plinth	2	5.7	0.4	0.6	2.73	5.3+0.4
b)	SW						
*	1 footing	2	3.7	0.6	0.3	1.33	4.3-0.6
*	2 footing	2	3.8	0.5	0.3	1.14	4.3-0.5
*	plint	2	3.9	0.4	0.6	1.87	
					Total =	10.94	

④	Bwinss					
LW	2	5.6	0.3	3.5	11.76	
SW	2	4	0.3	3.5	8.4.	
					20.16m³	

Q Estimate qty of materials for a two room building from given plan & section.



(i) Ew in excavation in foundation
(ii) Lime. concrete in foundation
(iii) first class brick work in cement mortar 1:6 in found & plinth.
(iv) 2.5cm cement concrete DPC.
(v) first class brick wor in lime mortar in super structure.



Lintels over doors window & shelb are 15cm thick.

D = 1.2X2.1
W = 1.00 x1.5
S = 1.00x1.5

SNo	Item	No	L	B	H/D	Qty	Remark.
①	excavation						
	LW	2	11.7 to 11.9	1.01	1	23.85 to 23.93	10.6+1.1.
	SW	3	5.2	1.1	1	17.16	6.3-1.1
						42.9 m^3	
②	LC in bndt:						
	LW	2	11.7	1.1	0.3	7.72	
	SW	3	5.2	11	0.3	5.14	
						12.86	
③	SWinF&P						
a)	LW(F)	2	11.4	0.8	0.2	3.64	10.6+0.8
	#2 footing	2	11.3	0.7	0.1	1.58	10.6+0.2
	#3 footing	2	11.2	0.6	0.1	1.34	10.6+0.4
	#4 footing	2	11.1	0.5	0.1	1.11	
	plinth	2	11	0.4	0.8	7.04	10.6+0.4
						14.71 m^3	
b)	SW						
	1F	3	5.5	0.8	0.2	2.64	6.3-0.8
	2F	3	5.6	0.7	0.1	1.176	
	3F	3	5.7	0.6	0.1	1.026	

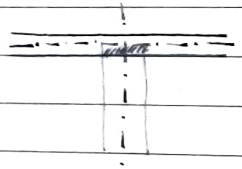
SNo	item	No	L	B	H/D	Qty	Remarks
	4F	2	5.8	0.5	0.1	0.87	
	plinth	3	5.9	0.4	0.8	5.66	
						15.36 m^3	
④	DPC						
a)	LW	2	11	0.4	-	8.8	10.6+0.4
b)	SW	3	5.9	0.4	-	7.08	6.3-0.4
						15.88 m^2	
	Deduction						
	under the door	2	1.2	0.4		0.96	
						GRAND TOTAL = 14.92 m^2	
⑤	BW in SS						
a)	LW	2	10.9	0.3	4.2	27.46	10.6+0.3
b)	SW	3	6	0.3	4.2	22.68	6.3-0.3
						50.14	
	Deduction						
①	Door	2	1.2	0.3	2.1	1.51	
②	window	1	1.0	0.3	1.5	1.8	
③	shelves	2	1.0	0.1	1.5	0.3	

Lintel

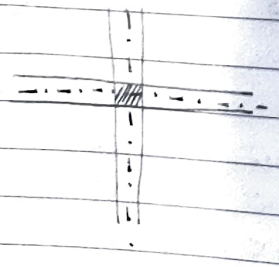
Door	2	1.5	0.15	- 0.13
Window	4	1.3	0.15	- 0.23
Shelf	2	1.3	0.15	- 0.11
	2			46.05

Centre line method:

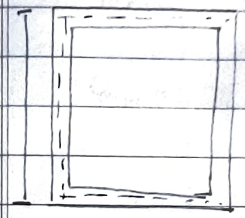
- For each T junction total c/line length of section = c/c length of section.
  $\frac{1}{2}$ width of section.

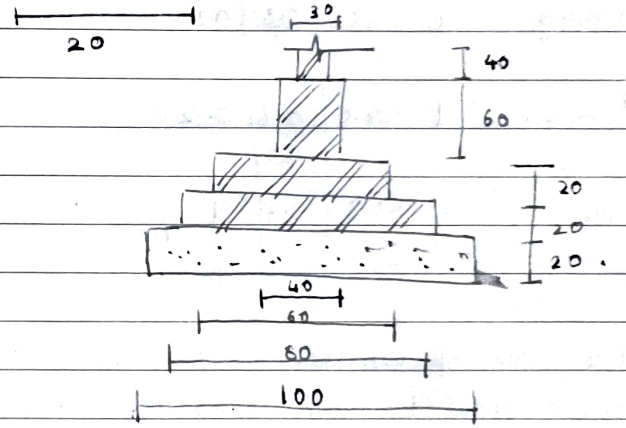


- For each cross wall junction total centre line length of section = c/c length of section - 1 width of section.



Find the qty of earthwork in excavation, cement concrete (1:4:8). And brickwork in cement mortar (1:5), in foundation & plinth of boundary wall enclosing plot; whose plan & section of walls are shown in figure below.





Total c.c = (19.7 + 14.7) 2.
line length

S.No	Description of work	No	L	B	H	Qty	Remark
1.	excavation in e.w	1	68.8	1	1.3	89.4 m^3	
2.	cement concrete	1	68.8	1	0.3	20.64 m^3	
3.	B.W, found & plinth	~~1~~	~~68.8~~				
	1st footing	1	68.8	0.8	0.20		
	2nd footing	1	68.8	0.6	0.2.		
	plinth	1	68.8	0.4	1		

Q. Calculate Qty of following items from the give fig to ground level using c.l method.

(i) exc for foundation.

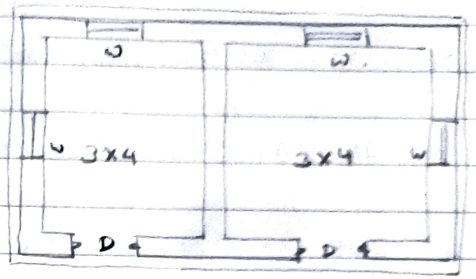
(ii) plain concrete in foundation.

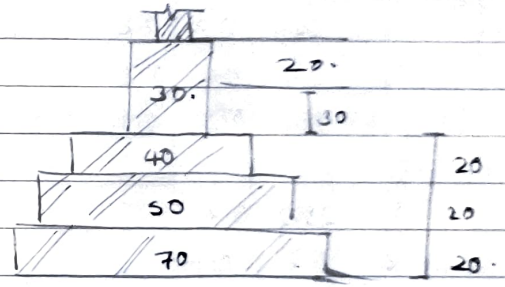
(iii) B.W in cement mortar (1:4).

(iv) in foundation & plinth

(v) DPC

(vi) B.W in super structure.





Total c/c line length = $2x(0.1+3+0.2+3+0.1) + 3(0.1+4+0.1)$.

$= 25.4$ m.

Total c/line length of the wall = 25.2 m.

S.No.	Description of work	No	L	B	H	Qty	Remarks
1.	Earthwork in excavation	1	24.7	0.7	0.9		L = 25.4 - 0.2.
2	C.C in foundation	1	24.7	0.7	0.2		L = 25.4 - 0.7
3	1st class BW.						
	1st footing	1	24.9	0.5	0.2		25.4 - 0.5
	2nd footing.	1	25	0.4	0.2		25.4 - 0.4
	plinth	1	25.1	0.3	0.5		25.4 - 0.3
4.	DPC	1	25.2	0.2			
		-2	1.2	0.2.			
5.	BW:SS	1	25.2	0.2	3.3		
	DEDUCTION.						
	Door.	-2.	1.2	0.2	2.1		
	window	-4	1	0.2	1.2.		
6.	lintel (D)	2	1.5	0.2	0.15		1.2+0.3
	lintel (W)	4	1.3	0.2	0.15		1+0.3

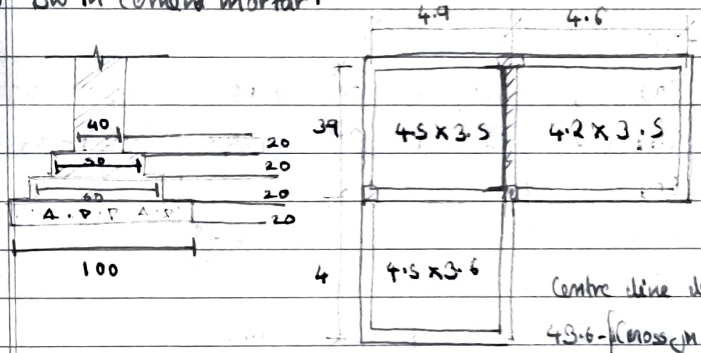
Q Write the detailed estimate for following item using long wall - short wall method & centreline data.

Assume necessary data.

(i) E.W in excavation

(ii) CC in foundation.

(iii) BW in cement mortar.



Centre line length = 43.6

43.6 - [(cross(m) - 1] = 41.6.

Centre line method.

S.No	Item	L	B	H	Total	Remarks.
(i)	E.W	41.6	1	0.8	33.28 m^3	L = 43.6 - 1 - 1
(ii)	CC	41.6	1	0.2	8.32 m^3.	
(iii)	BW					
	footing	42.4	06	0.2	5.088	L = 43.6 - 06.0.8.
	2	42.6	0.5	0.2	4.26	L = 43.6 - 0.5 - 0.5
	3	42.8	0.4	0.2	3.42	L = 43.6 - 0.4 - 0.4

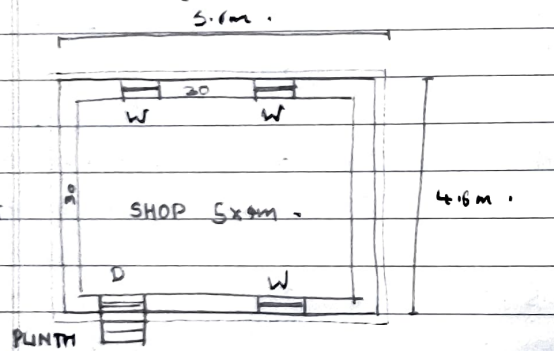
LW/SW method.

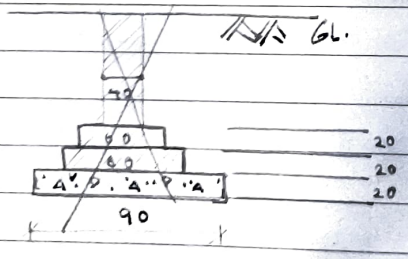
SNo	Item	NO	L	B	H	Total	Remark
1.	E.W.						
	-LW (a)	2	10.3	1	0.8	16.8 ~~8.4~~	~~4.9+4.6+0.5~~
	(b)	1	5.9	1	0.8	4.72	4.9+1+5.9
	-SW						
	(a)	3	2.9	1	0.8	6.96	3.9-0.5-0.5
	(b)	2	3	1	0.8	4.8	~~3.5~~ 4-0.5-0.5
	(c)		-				
						33.28	
2.	CC.						
	LW	2	10.5	1	0.2	4.2	
		1	5.9	1	0.2	1.18	
	SW	3	2.9	1	0.2	1.72	
		2	3	1	0.2	1.2	
						8.32	
3.	BW.						
	(i)						
	LW.	2	10.1	0.6	0.2	~~2.424~~	L= 4.9+4.6+0.6
		1	5.5	0.6	0.2	0.66	L= 4.9+0.6

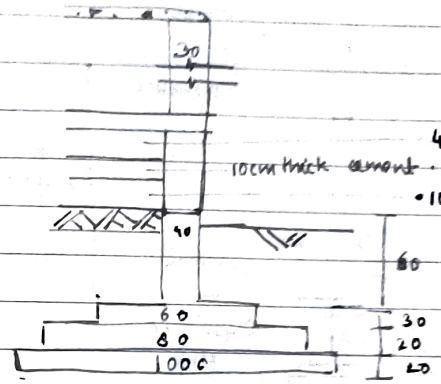
SW.	3	3.3	0.6	0.2	1.188	L= 3.9-0.6
	2	~~3~~ 3.4	0.6	0.2	0.816	L= 4-0.6
					5.088	
(ii)						
LW	2	10	0.5	0.2	2	L= 4.9+4.6+0.5
	1	5.4	0.5	0.2	0.54	L= 4.9+0.5
SW	3	3.4	0.5	0.2	1.02	L= 3.9-0.5
	2	3.5	0.5	0.2	0.7	L= 4-0.5
					4.26	
Prism						
LW	2	8.9	0.4	0.2	1.584	L= 4.9+4.8+0.4
	1	5.3	0.4	0.2	0.424	L= 4.9+0.4
SW	3	3.5	0.4	0.2	0.84	L= 3.9-0.4
	2	3.6	0.4	0.2	0.576	L= 4-0.4
					3.42 m³	

Write detailed estimate for the following items using long wall short wall method. Assume the necessary data.

(i) EW for excavation.
(ii) RCC work for roof slab.
(ii) Tile flooring with PCC base 1:2:4.



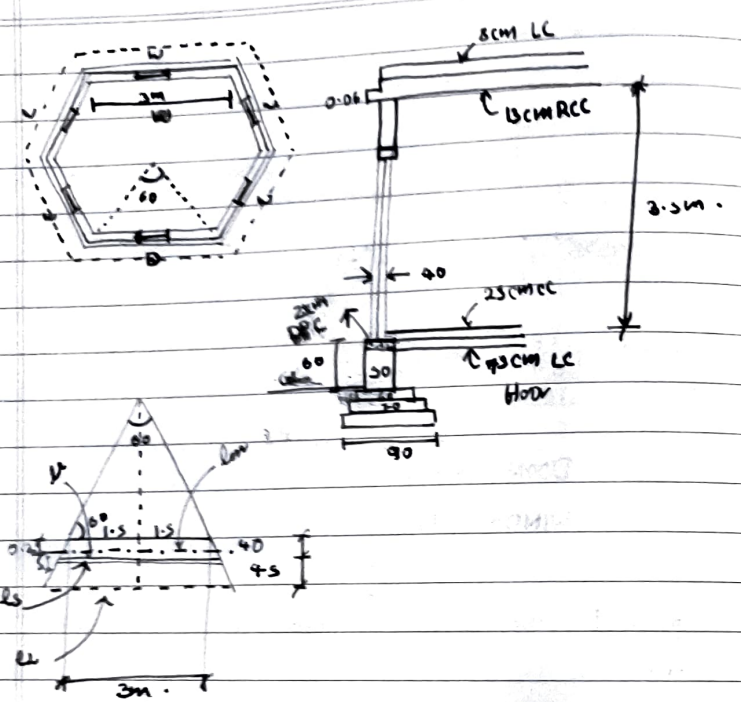


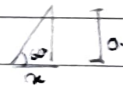


DOOR = 1x2m
WINDOW = 1x1.5m.

Q The plan & cross section of hexagonal roof are given below.

(i) E.W for excavation in foundation
(ii) Lime concrete in foundation
(iii) First class brickwork in foundation
(iv) DPC
(v) First class brickwork in superstructure.
(vi) RCC work in roof & lintel
(vii) Lime concrete in roof terracing.
(viii) 2.5cm cement concrete over 7.5cm lime concrete floor.
(ix) 12 mm cement plastering (1:6 inside & outside walls).





$\tan 60 = \frac{0.2}{x}$

$x = \frac{0.2}{\tan 60}$.

$l_1 = 3 + 2\left[\frac{0.2}{\tan 60}\right] = 3.23m$.

Total centre length = $3.23 \times 6 = 19.38$.

$l_1 = 3 + 2\left[\frac{0.23}{\tan 60}\right] = 3.461$.

$l_2 = 3 + 2\left[\frac{0.85}{\tan 60}\right] = 3.98m$.

$l_3 = 3 + 2\left[\frac{0.45}{\tan 60}\right] = 3.52m$.

S.No	Detail of work	No	L	B	H	Total	Remarks.
1.	EW in excavation	1	19.38	0.9	1	17.44m²	
2.	LC in footn	1	19.38	0.9	0.3	5.23	
3.	1st cl B.W						
	a) 1st Footing	1	19.38	0.7	0.2	2.71m²	
	b) 2nd Footing	1	19.38	0.6	0.2	2.32m².	
	c) plinth	1	19.38	0.3	0.9	5.72m²	
						13.75.	
4.	DPC	1	19.38	0.3		9.69	
		1	1.2	0.5		-0.6	
						9.09m².	
5.	1st class Brickwork	1	19.38	0.4	3.3		
	Deduction.						
	Door	1	1.2	0.4	2.1	- 1.008.	
	Window	5	1.1	0.4	1.2	- 5.30	
	Ventl D	1	1.4	0.4	0.3	- 0.60	
	"	5	1.3	0.4	0.3	- 0.26.	

$l_3 = 3 + 2\left[\frac{0.2}{\tan 60}\right] = 3.23m$.

$\tan\theta = \frac{4}{6} = 22.$

6. R.C.C work

a) Roof 6 $[11 \times 3.46 \times [\frac{3.46}{2} \times 1.732]] \times 0.13 = 4.043$

b) Sunshade 6 $[\frac{1}{2} \times (3.46 + 3.98) \times 0.46] \times 0.06 = 0.603$.

c) Lintel

D	1	1.4	0.4	0.10	0.302 m^2
W	3	1.3	0.4	0.10	

4.566 m^2.

7. LC in roof $6[\frac{1}{2} \times 3.46 \times \frac{3.46}{2} \times 1.732] = 5.18 \cdot 31.10$

8. 24cc cum $6[\frac{1}{2} \times 3 \times \frac{3}{2} \times 1.732] = 23.36 m^2$.
7.5 LC flooring

9. Room plastering 6 3 3.5 63 m^2

inside

outside.

(a) above plinth 6 3.46 3.5 72.66

(b) plinth 6 3.52 0.7 14.78.

Deduction

Door	1	1.2	21	- 2.52
Window	3	1.1	1.5	- 8.28

139.67 m^2.

Assignment no 1.

4th Module.

Q. Briefly explain the cost parameters of a building.

(i) Shape

(ii) Height

(iii) Enveloping area

(iv) Structural elements

(v) Services & finishes

(vi) Architectural features.

Assignment no: 2

a Give detailed specification for

EW in foundation

LC in foundation

& 1st Class BW.

DPC. 2 sem

CM CC 1:2:4.

RCC.

Wooden door & window

R.B work.

Assignment-1:

Cost parameters of a building.

Plan The shape of a building has a significant effect on cost. The complex the shape of a building the more expensive it unit cost will be. Moreover, buildings with complicated or irregular outlines lead to an increased perimeter/floor area ratio which in turn results to higher unit cost.

Height Tall buildings are invariably more expensive to build than two- or three storey buildings offering the same accomodation, the taller the building the greater the cost. Firstly the cost of special arrangements for the services. Secondly the necessity of lower part of building to be designed to carry the weight of upper floor, also it has to resist heavy wind loading.

Enveloping area.

Structural elements. a frame may not be necessary in low rise building, but generally costs tend to rise rapidly over the first few storey as the frame takes the loads imposed by a succession of upper floors.

Services & Finishes Services cost will increase with an increase in number of storeys since it becomes necessary to install a lift. Also buildings with more complex shape require an additional arrangement for accoustics, lighting & ventilation.

Effect of finishing on the cost of buildings in traditional brick two storey houses, floors, stair & finishes account for about 8-11% of total cost. For flats & high storeys it is 6%.

Architectural features.

ANALYSIS OF RATES [MODULE III]

Determination of rate per unit of a particular item of work from the cost of qty. of materials, cost of labourers & other misc petty expenses required for its completion is known as analysis of rates. The rate of particular item of work depends on the following.

(i) Specification of work & material, quality of materials, proportion of mortars & method of construction.

(ii) Qty of materials their rates number of diff types of labourers & their rates.

(iii) Location of site of work and its distance from source of material, rate of transport & availability of material.

(iv) Profit & misc overhead expenses of a contract.

Overhead costs - This includes general office expenses, rents, tax, supervision & other costs which are indirect expenses. the two types of OC are.

(1) general overhead consists of establishment. (office staffs, stationary printing, travelling expense, telephone or internet, rent & tax.

(ii) job overhead consists of supervision charges & salary of engineers overseers & supervisors), handling of materials, repairs of tools & plants, amenities of labours, workmens compensation & insurance.

the analysis of rates is worked out under the following heads (i) Material

(ii) Labour

(iii) Water charge (1 & 1½ % of total cost)

(iv) Contractors profit (10% of total cost).

1 Prepare a rate analysis for lime concrete 1:2:4, using 40mm broken stone.

2 Prepare a rate analysis for lime mortar 1:2 by grinding in a bullock mill.

3 Prepare a rate analysis cement concrete 1:3:6 using 40mm broken stone.

4 Prepare a rate analysis for lime mortar 1:2 by power driven mortar mill.

	Item	Qty	Rate	Amount.
A)	MATERIAL			
	lime	0.5 m^3	3421.00	1710.5
	Sand	1 m^3	2314	2314.
B)	MILL			
	Charges	0.14 days	Rs 1200/day	168
	Fuel oil	1.2L	45	54.
	LS			1.75
C)	LABOUR			
	driver	0.14	~~456~~ 396	55.4
	Cleaner	0.14	₹396/day	55.4
	Man	0.35	377	131.95
	Woman	0.35	377.	131.95
			Total	4622.45.

Water: 1½ % = ~~30.67~~ 69.33%.

$\left(4622.45 + 69.33\right) \frac{\times 10}{100} = \cancel{44}\ 469.18.$

= 5160.95.

lime concrete (1:2:4)			
40 mm stone	0.95m²	659	626.05
lime mortar (1:2)	0.48	5160.95/m³	2477.256
Mason	0.1	471	47.1
Men	1	377	377
Woman	1	377	527.8
			4054.41

Water : 60.82%.

Profit: 411.58.

Total: 4527.39.

ASSIGNMENT - II

Earthwork in foundation.

Types of soil- ~~Contra~~ Thorough study of the type of soil is needed followed by the nature of ground at site.

Clearing the site - The site on which the structure is to built and the area required for setting out & other operations like road, drain, sheds etc should be cleared and all obstructions loose stones, materials and rubbish of all kind and trees removed as directed.

Setting out - After clearing the site & preparing site level plan the contractor will set out centre lines of building.

2. Lime concrete in foundation:- The concrete is taken out in cu.m by length x breadth x thickness. The length & breadth of foundation concrete are usually the same as for excavation. Only the depth or thickness differ. The thickness of concrete usually varies from 20cm to 45cm, usually 30cm. Foundation concrete consists of lime concrete or weak cement concrete. The proportion of cement concrete in foundation may be 1:4:8 or 1:5:10.

Damp proof course:
DPC usually of 2.5cm thick rich cement concrete 1:1½:3 or 2cm thick rich cement mortar 1:2, mixed with standard water proofing material is provided at the plinth level to full width of plinth wall, and the quantities are compared in sq.m.

1st Class Brickwork - In storeyed building the masonary in each storey as GF above plinth level, first floor etc. is computed separately. In taking out quantities the walls are measured solid and then deductions are made for openings as doors, windows etc & such other proportion as necessary. Masonary of diff types or classes masonary with diff mortar, etc are taken out under separate items.

Doors & windows:- Doors and window frames are computed in cu.m. Length is obtained by adding the length of all member of frame, top & 2 vertical if there is no still membe and adding bottom also if there is still, & this length is multiplied by the two dimension of the cross section.

If there is no still member, vertical member should be inserted into floor.

RCC & RB work.
RCC & RB work may be in roof or floor slab in beams, lintels, columns, foundation etc. the qty are calculated in cu.m. length, breadth & thickness are found correctly from the plan, elevation & section or from other detailing drawing. Bearing are added with the clear span to get the dimensions. The qty are calculated in cu.m exclusive of steel reinforcement and its binding but inclusive of centering and shuttering and fixing and binding reinforcement in position. The reinforcement including its bonding is taken up separately under steel works in quintel. For this purpose 0.6% to 1% of RCC or RB work by volume maybe taken for steel, if other details are not given. The volume of steel is not required to be deducted from RCC or RB.

Valuation:

It is a fixation of cost or return expected over a building or a project at present day rate.

The purpose of valuation as follows.

(i) For buying or selling.
(ii) For rent fixation.
(iii) For insurance claiming.
(iv) acquisation of property by govt ie to determine the amount of compensation to be provided.
(v) security loan or mortgage.
(vi) tax fixation.

Key terms:

Value - present day cost of engineering structure or project, which mainly depends on
(i) utility
(ii) scarcity
(iii) events.

Cost - Orginal cost of construction. Used to find out loss of value or property due to various reasons.

Cross grossing - Total amount of income recieved from property during the year without reducting out goings.

Net income - Amount left at the end of year on reducting all usual outgoing.

Outgoing - there are expenses incured on a building. so that it may give back a revenue. the following are outgoings.

(i) taxes - there are annual tax paid by the owner such as wealth tax, property tax & principle tax.
(ii) management - ~~out of~~ upto 10% of gross revenue is kept aside for this expense, which includes the servion of watchman or a sweeper.
(iii) repair - an amount is set aside for this expense and usually calculated as 10% of gross income.
(iv) loss of rent - this is an outgoing incase a building is not fully occupied.
(v) insurance - premium given against fire or theft policy.
(vi) misc - lighting of common place which is to be paid by owner. this is suitable for big building.

Obsolescence - the value of property reo decreases if the style & its design are outdated. the reason for this is. fast engine technology, construction & design ideas, leading to more comfort & luxury.

Freehold property-

leasehold property

scrap value.

Capitalised value.

Annuity.

Market value.

Book value.

Depreciation.

Sinking fund.

A building of replacement value of ₹ 70,000. stands on a main road on a leasehold ppty. the ground rents per annum is ₹ 295. the building is an R.C.C frame structure & it is estimated the building will have a future life of 70 years. the rent of building is ₹ 400 per month. the taxes payable @ 18% of gross rent. & insurance premium is 0.5% of gross rent. Assuming suitable figures of the items of the usual outgoings. Determine the capitalized value of the ppty from ~~the~~ ba on the basis of 5% of and yield. the sinking fund coefficient for replacement of capital in 70 years. at 3% is 0.0043.

capitalised value (CR) = NI * YP.

$$\frac{NI}{i} \qquad i = 0.05$$

NI = GI - Outgoings. = 2116.

GI. 400 × 12 = 4800

Outgoing.

i) ground rent. ₹295

ii) tax = $\frac{18}{100} \times 4800 = ₹864$.

iii) insurance: $\frac{0.5}{100} \times 4800 = ₹24$.

48
5
240

4. (iv) Repair = $\frac{10}{100} \times 4800 = 480$.

(v) Management. $\frac{10}{100} \times 4800 = 480$.

(vi) Sinking fund. $70,000[0.0043]$

$= 301$

(vii) Misc = $\frac{5}{100} \times 4800$ 240

CV: $\frac{2116 \times 100}{5} = 42320$

Determine the present value of building which was constructed 35 years ago @ ₹35,000. Estimated life of building is 80 years. & at the end of which it will have 10% scrap value of its cost of construction. Use straight line method.

Straight line method.

$D = \frac{C-S}{n}$

C: 35,000 orginal cost.

S: $\frac{10}{100} \times 35000$. scrap value.

$= 3500$.

n: 80 years.

$D = \frac{35,000 - 3500}{80} = 393.75$ / per year.

Present value = $35,000 - [393.75 \times 8.35]$.

$= ₹ 21218.75$.

Q. A building was purchased for ₹ 12.1k. assuming scrap value @ end of 6 years as ₹31k. determine the amount of depreciation. for each year by following methods.

(i) straight line method.

(ii) constant % method.

(iii) sinking fund method.

(iv) rate of Int on sinking fund is 4%.

(i) Straight line method.

$D = \frac{C-S}{n}$

C = 12lks.

S. 3lks.

n. 6yrs.

$D. \frac{C-S}{n} = \frac{12,00,000 - 3,00,000}{6} = ₹ 1,50,000.$

Age (years)	Book value (Rs)	dep (Rs)	total dep (₹)
1	10,50,000	1,50,000	1,50,000
2	900,000	1,50,000	3,00,000
3	7,50,000	1,50,000	4,50,000
4	6,00,000	1,50,000	6,00,000
5	4,50,000	1,50,000	7,50,000
6	3,00,000	1,50,000	9,00,000.

B) Constant '%. method

$D = C\left[\frac{S}{C}\right]^{m/n}$ → Depreciated volume per year.

S: 3,00,000

C: 12,00,000

m = 1

n = 6 years.

$= \overline{2}952440.6$

Age (years)	Book Value (₹)	Dep (₹)	Total Dep. (₹).	Total Dep. (₹)
1.	952440.	247559.4		247559.4
2	735285.3	197155.3		444714.7
3	598941.2	352499.3	156344.06.	601058.8
4	474960.4	477480.19	123980.6	725039.7.
5	376643.5	575797.0.	98316.8	823356.5
6	298678.27	77965.25.		901321.8.

C) SF method:

① Age	② Annual SF	③ Interest on SF (₹)	② + ③ Depreciation (₹)	⑤ BV. (₹).
1.	135685.71	0	135685.71	1064314.9
2.	135685.71	5427.48	141113.69	923201.16
3.	135685.71	16499.3	152185.01	771016.09
4.	135685.71	33441.6	169127.31	601888
5.	135685.71	56489.02 754	192174.13.	409713.9
6.	135685.71	89999.9.	225171.43.	188542.5

$I = S\left[\frac{i}{(1+i)^n - 1}\right]$ i: 4%

I = 99,000.

Amount of investment at end of 'n' years.

$A = \left[\frac{(1+i)^{n-1}}{i}\right] \times I.$

Interest = A - (nI).

at 3rd year end

$$A_3 : \left[\frac{(1+0.04)^{4}-1}{0.04}\right] 135685.71$$

Int : $A_3 [3 \times 135685.71]$.

$= 276798.8484$

In