ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
UTUKUR (P), C. K. DINNE (V&M), KADAPA, YSR DIST.
Approved by AICTE, New Delhi & Affiliated to JNTUA, Anantapuramu.
Accredited by NAAC with 'A' Grade, Bangalore.

Estimation, Specifications, Costing & Valuation

(23HSC0102)

Lecture Notes

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CIVIL ENGINEERING					
III B.Tech – I Semester					
Course Code	**ESTIMATION, SPECIFICATIONS, COSTING AND VALUATION**	**L**	**T**	**P**	**C**
23HSC0102		0	1	2	2

Course Objectives:

The objectives of this course are to make the student to:

1. **Understand** the various methods and types of estimates used in civil engineering projects.
2. **Develop** detailed estimates for single and multi-storey buildings using standard estimation methods.
3. **Analyze** rate analysis, abstract estimation, and bill preparation as per standard procedures.
4. **Prepare** detailed specifications and tender documents for construction works.
5. **Evaluate** the valuation, cost escalation, and value analysis of buildings.

Course Outcomes:

Upon successful completion of this course, students will be able to:

1. **Apply** estimation techniques to prepare detailed estimates for various construction projects.
2. **Develop** abstract estimates and rate analysis for different civil engineering works.
3. **Analyze** the preparation of measurement books and bill preparation as per AP State Government procedures.
4. **Create** detailed specifications and tender documents for construction projects.
5. **Assess** building valuation, cost escalation, and value analysis techniques.

CO – PO Articulation Matrix:-

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO -1	3	2	2	1	-	-	-	-	-	1	-	2	3	2
CO -2	3	3	3	2	2	-	-	-	-	-	-	1	3	3
CO -3	3	3	3	2	2	-	2	1	-	-	-	1	3	3
CO -4	3	3	3	2	2	-	2	1	-	-	-	1	3	3
CO -5	2	2	2	1	3	-	3	1	-	1	1	2	2	2

List of Experiments

1. Activity Based On Learning Methods and Types of Estimates
2. Preparation of Detailed Estimate for A Single-Storied Residential Building Using Wall to Wall Method
3. Preparation of Detailed Estimate for A Single Storied Residential Building Using Centre Line Method for Earthwork, Foundations, Super Structure, Fittings Including Sanitary and Electrical Fittings & Paintings
4. Preparation of Detailed Estimate for A Two Storied Residential Building Using Centre Line Method for Earthwork, Foundations, Super Structure, Fittings Including Sanitary and Electrical Fittings &Paintings.
5. Activity Based Learning of Estimate Data and Rate Analysis
6. Preparation of Abstract Estimate for The Detailed Estimate in Exercise No.3
7. Preparation of Abstract Estimate for The Detailed Estimate in Exercise No.4
8. Writing of Measurement Book and Bill Preparation as Per AP State Govt Procedure for Detailed Estimate in No. 3 and Abstract Estimate of No. 6
9. Writing of Detailed Specifications for Various Items of Estimate and Preparing A Model Tender Document for The Work Listed in No. 3 and 6
10. Activity Based Learning for Valuation of Buildings, Cost Escalation Procedures and Value Analysis for Any One Work

TEXT BOOKS:

1. B.N. Dutta - Estimating and Costing in Civil Engineering, CBS Publishers & Distributors, 28th Revised Edition (2020).
2. Rangwala - Estimating, Costing and Valuation, Charotar Publishing House, 2023.
3. D.D. Kohli& R.C. Kohli - A Textbook of Estimating and Costing (Civil), S. Chand Publishing, 2011.

REFRENCE BOOKS:

1. M. Chakraborti - Estimating, Costing, Specification &Valuationin Civil Engineering, 29th Edition (2021).
2. Gurcharan Singh - Estimating, Costing and Valuation, Standard Publishers, 2018.
3. V.N. Vazirani& S.P. Chandola - Civil Engineering Estimating & Costing, Khanna Publishers, 4th Edition (2001).

Online Learning Resources:

https://onlinecourses.swayam2.ac.in/nou20_cs11/preview

https://www.coursera.org/learn/construction-cost-estimating

S.No.	Name of the Experiments	Date	Page No.	
1.	Introduction to Estimate	16/8/2024	1-31	10
2.	Methods of Estimate	23/08/2024	32-41	10
3.	Estimate the quantities of given plan for single room wall to wall distance	30/08/2024	42-45	10
4.	Estimate the quantities of given plan for double room by wall to wall distance	6/9/2024	46-50	10
5.	Estimate the quantities of given plan for Residential Building by wall to wall distance	13/9/2024	51-58	9
6.	Estimate the quantities of single room building by center-line method	20/9/2024	59-61	10
7.	Estimate the quantities of Residential Building by center-line method	27/9/2024	62-65	10
8.	preparation of Abstract estimation work of given plan	4/10/2024	66-67	10
9.	Analysis of Rates	18/10/2024	68-72	10
10	Estimate of Abstract cost of given work. Exercise-No:-7	25/10/2024	73-74	10
11.	Estimate of Abstract cost of given work. Exercise NO:-8	1/11/2024	75-77	10
12.	preparation of Bills	8/11/2024	78-81	10

Introduction to Estimate

Exp. No. : 1
Date : 16/2/2024

Estimate:-

Before under taking the construction of the project it is a necessary to know the probable cost which is worked out by estimating. An estimate is a computation or calculation of the quantity is required and expenditure lightly to be inkered in the construction of a work. The primary objective of the estimate is to enable one to know before and the cost of work (buildings, structures etc) the estimate is probable cost of a work and is determined theoretically by mathematical calculations based on plans and drawings and current rates.

Actual cost:

The actual cost of a work is known at the completion of the work account of all expenditure is maintained day-to-day during the execution of the work in the account section and at the end of the completion of the work

Exp. No. :
Date :

when the account is completed the actual cost is known. The actual cost should not differ much more from the estimated cost worked out at the beginning.

Detailed Estimate:-

Preparation of detailed estimate consists of working out the quantities of different items of works and then working out the cost i.e, the estimate is prepared in two stages.

1. Details of measurements and calculation of quantities.

The whole work is divided into different items of work as earth work, concrete, brick work etc. and the items are classified and group under different subgrades and details of measurements of each item of work are taken out and quantities under each item are computed in prescribed form. Details of measurement form.

Item No	Description	No	length	breadth	Height (or) depth	Quantity	Remarks

Main items of work:

1. Earth work
2. Concrete in foundation
3. Soiling
4. DPC (Damp proof Course)
5. Masonry
6. Arch Masonary work
7. Lintels
8. R.C.C
9. Flooring and roofing
10. plastering and pointing
11. Doors and windows
12. Wood work
13. Iron work
14. White washing (or) Colour washing (or) Distempering
15. painting

1. Earthwork:

Earthwork in excavation and earthwork in filling are usually taken out seperately under different items and quantities are calculated in cum. Foundation trenches are usually dug to the extract width of foundation with vertical sides. Earthwork in excavation in foundation is calculated by taking the dimensions of each trench length x breadth x depth. Filling in trenches after the construction of foundation masonry is ordinary neglected. If the trench filling is accounted, this may be calculated by deducting the masonry from the excavation.

Earthwork in plinth filling is calculated by taking the internal dimensions in between plinth wall (length x breadth) which are usually less than the internal dimensions of the room by two off-sets of plinth wall i.e, 10 cm (4½") and height is taken after deducting the thickness of concrete in floor, usually 7.5 cm (3"). If sand filling is done in plinth this should be taken seperately. The length and breadth for each filling

may be same as the internal dimensions of the room if there is no off-set in plinth wall.

Excavated earth is used in trench filling and plinth filling and usually not paid for seperately, but may also be included under a seperate item. Return fill and ram or backfill" and paid at a lesser rate. Extra earth if required for filling is brought from outside. If there is surplus earth after trench and plinth filling, this may be utilised in levelling and dressing of site or carted away and removed.

2. Concrete in Foundation:

The concrete is taken out in cum by length x breadth x thickness. The length and breadth of foundation concrete are usually the same as for excavation, only the depth or thickness differs. The thickness of concrete varies from 20cm to 45cm, usually 30cm (a" to 18", usually 12"). 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.

3. Soiling:

When the soil is soft or bad, one layer of dry bricks or stone ~~is~~ soiling is applied below the foundation concrete the soiling layer is computed in sq.m (length x breadth) specifying the thickness.

4. Damp proof course:

D.P.C usually of 2.5cm (1") thick rich cement concrete 1:1½:3 or 2cm (½") thick rich cement mortar 1:2 mixed with standard waterproofing material, is provided at the plinth level to full width of plinth wall, and the quantities are computed in sq.m (length x breadth). Usually D.P.C is not provided at the sills of doors and verandah openings, for which deductions are made (one kg of cemseal or Impermo or other standard water proofing compound per bag of cement is generally used).

5. Masonry:-

Masonry is computed in cum (length x breadth x height). Foundation and plinth masonry is taken under one item and masonry

in Superstructure is taken under a seperate item. In storeyed building the masonry in each storey as ground floor above plinth level. First floor etc. is computed seperately. In taking out quantities the walls are measured as solid and then deductions are made for openings as doors, windows, etc. and such other portions as necessary masonry of different types or classes, masonry items. Arch masonry work is taken seperately. Splayed or rounded sides of wall are considered as rectangular and extreme dimensions are taken to findout the quantities. The partition wall is measured in sq.m. deduction is made for holes. Stone masonry is calculated in the same manner as for brick masonry.

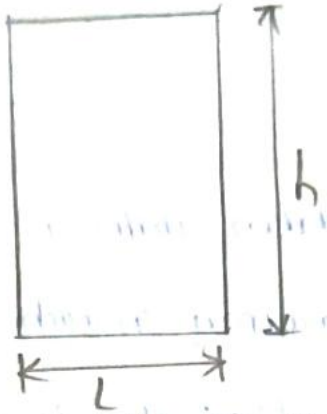
Deduction for opening, bearings etc in masonary

No deduction is made for the following

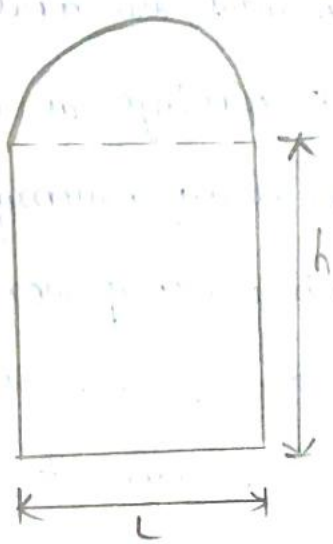
(i) Opening each upto 1000 sq.cm or 0.1 sq.m (1 sq.ft)

(ii) Ends of beams, posts, rafters, purlins, etc. upto 500 sq.cm or 0.05 sq.m (72 sq in) in Section.

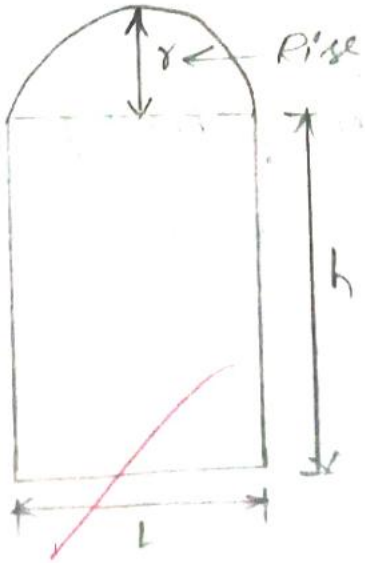
Rectangular openings:



Doors and windows with small segmental arches:



Segmental arch openings:



(iii) Bed plate, wall plate, bearing of chajjas and the like upto 10 cm (4") depth.

Bearings of floor and roof slabs are not deducted from wall masonry.

For other openings deductions are made in the following manner.

Rectangular openings: Full deductions is made.

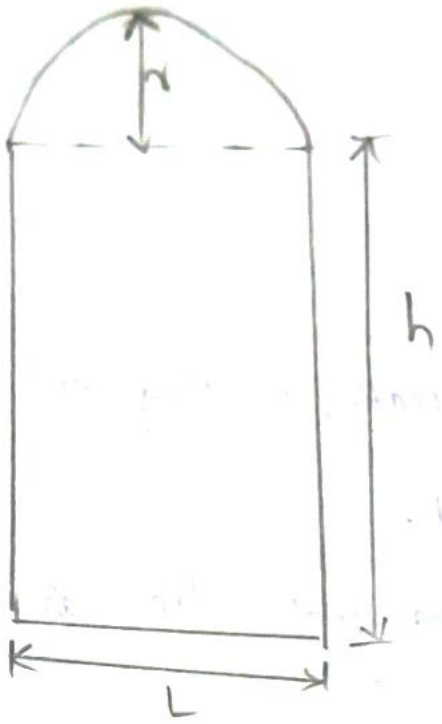
Deduct- Length x height x thickness of wall.

Doors and windows with Small Segmental Arches:-

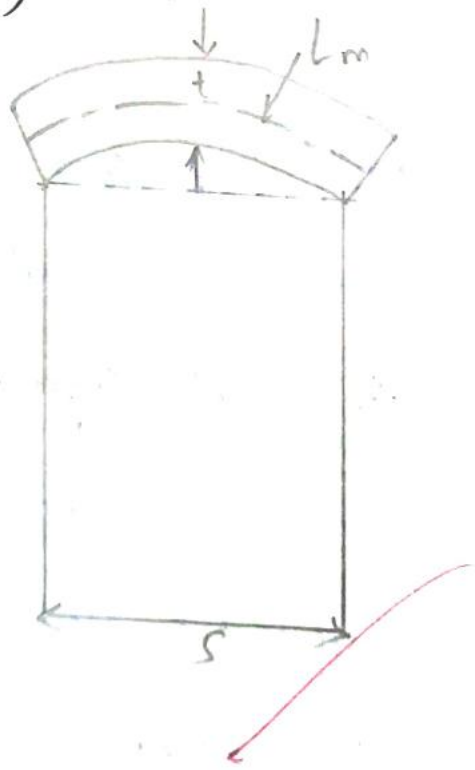
Deduction is made for rectangular portion only upto the springing line. The Segmental portion is considered as solid to allow for the extra expenses in constructing the arch, and the filling up with thin wall.

Deduction- length x height x thickness of wall.

Semi-circular arch openings:-



Arch Masonry work:



Segmental Arch Openings:-

Deduction is made for the whole opening, the rectangular portion as well as the segmental line the area of

Segmental portion $= \frac{2}{3} L r + \frac{r^3}{2L}$

But for deduction, the area of segmental portion is obtained approximately by taking 2/3 of span x rise ($\frac{2}{3} \times L \times r$) and the quantity for deduction is $\frac{2}{3} \times l \times r \times$ thickness of wall ($r^{3/2} L$ being small is neglected for simplicity).

The total deduction will be $= [(L \times h) + (\frac{2}{3} \times l \times r)] \times$ thickness of wall.

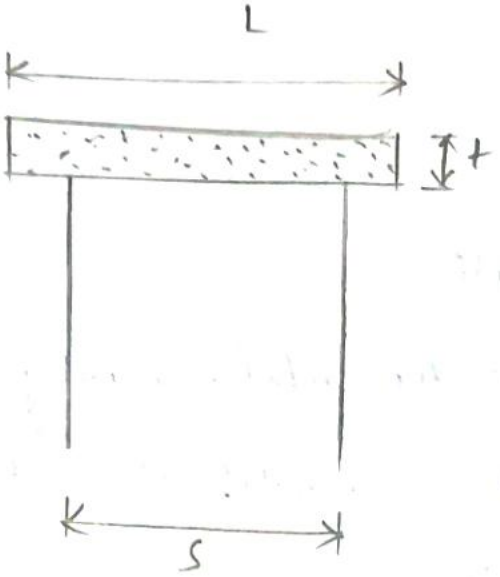
Semi-circular arch openings:-

The area of semi-circular portion $= \frac{1}{2} \pi r^2$.

But for the deduction. The area of the semi-circular portion is obtained approximately by 1/4 of span x rise ($\frac{1}{4} \times L \times r$)

The total deduction will be $[(L \times h) + (\frac{3}{4} \times L \times br)] \times$ thickness of wall.

Lintels over opening :-



Elliptical arches may be considered as semi-circular arches and may be considered as semi-circular arches and may be dealt in the same manner. For large arches the actual area of opening should be calculated correctly by mensuration formulae, and deduction should me made for actual area.

6. Arch masonry work:-

Masonry work in arches is calculated in cum seperately by multiplying the mean length of the arch by the thickness of arch and by the breadth of the wall. Quantity of arch masonry = $l_m \times t \times$ thickness of wall deduction = $L_m \times t \times$ thickness of wall.

7. Lintels over openings:-

Lintels are either of R.C.C or of R.B quantities are calculated in cum. Length of the lintel is equal to the clear span plus two bearings. If dimension of bearing

is not given the bearing may be taken as same as the thickness of lintel with a minimum of 12cm (4½"). Thus the length of the lintel, L = S+2t, i.e, clear span plus two bearings.

Quantity of lintel = L x t x thickness of wall

Deduction = L x t x thickness of wall

8) R.C.C and R.B work:

R.C.C and R.B work may be in roof or floor slab, in beams, lintels, columns, foundations etc. and the quantities are calculated in cum, length, breadth and thickness are found correctly from the plan, elevation and section or from other detailed drawings, Bearings are added with the clear span to get the dimensions. The quantities are calculated in cum exclusive of steel reinforcement and its bending but inclusive of centering and shuttering and fixing and binding reinforcement in position. The

reinforcement including its bending is taken up seperately under steel works in quintal. for this purpose 0.6 % to 1% (usually 1%) of R.C.C or R.B work by volume may be taken for steel, If other details are not given. The volume of steel is not required to be deducted from the R.C.C or R.B work.

R.C.C and R.B works may also be estimated inclusive of steel and centering and shuttering for the complete works, if specified.

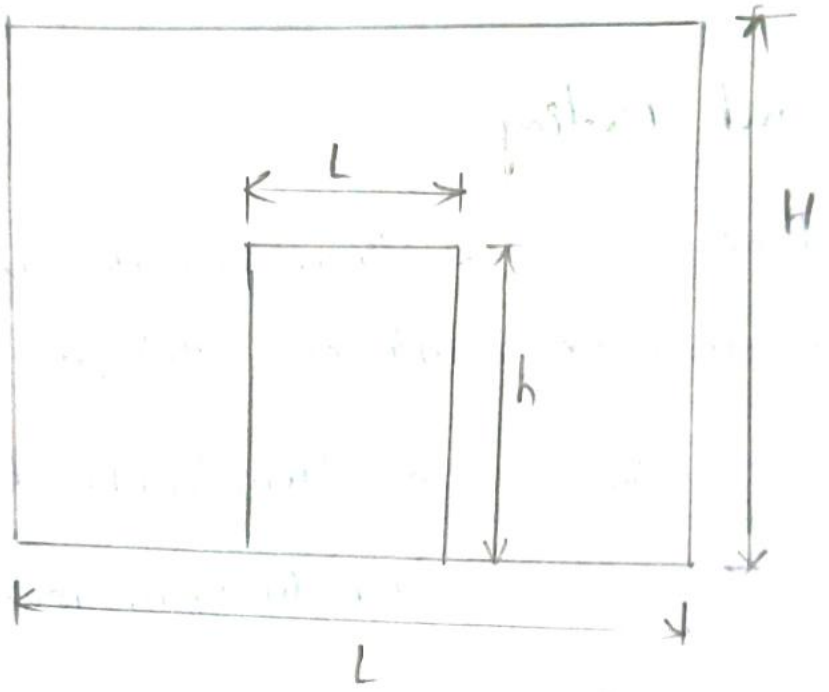
Centering and shuttering (from work) are usually included in the R.C.C or R.B work, but may also be taken separately in sq.m of surface in contact with concrete.

In R.C.C work plastering is not taken seperately, but the exposed surface are finished with thin rich cement sand mortar plastering to give smooth and even surface, which usually is not taken into consideration.

9. Flooring and Roofing:-

(i) Ground floor - The base lime concrete and floor finishing of C.C or stone or marble or mosaic, etc. are usually taken are one job or one item (combined in one item), and the quantity is calculated in sq.m multiplying the length by the breadth. The length and breadth are measured as inside dimensions from wall to wall of super structure. Both the works of base concrete and floor finishing are paid under one item.

(ii) 1st floor, 2nd floor etc:- Supporting structure is taken seperately in cum as R.C.C, R.B etc. and the floor finishing is taken seperately in Sq.m as 2.5 cm or 4 cm (1" or 1½") C.C. or marble or mosaic, etc. If a cushioning layer of lime concrete is given in b/w the slab and the floor the cushioning concrete may be measured with the floor



Inside plaster = L x H

outside plaster = L x H - L x h

under one item or taken seperately.

ii) Roof - Supporting Structures is taken seperately in cum and the lime concrete terracing is computed in sq.m with thickness specified. under a seperated item including surface rendering smooth. The compacted thickness of lime concrete terracing is 7.5 cm to 12 cm (3" to 4½") average. L.C terracing may also be calculated in cum with avg. thickness The bearing of roof or floor slab is given same as the thickness of slab, usually 10 cm to 15 cm (4" to 5"). In case of tiled, galvanised iron sheet, or asbestos cement sheet roofing the roof coverings are takenout in sq.m and measure incl- including overlaps with all fittings and supporting trusses and members are taken under seperate item.

Floor of door sills and sills of openings should also be taken into seperately, as there is no lime concrete in sills.

10. plastering and pointing :-

plastering usually 12mm (1/2") thick is calculated in sq.m for walls the measurements are taken for the whole face of the wall for both sides as solid, and deductions for openings are made in the following manner.

(i) No deduction is made for ends of beams, posts, rafters etc.

(ii) For small opening up to 0.5 sq.m (5. sq.ft) no deduction is made, and at the same time no additions are made for ends of beams, jambs, soffits and of sills of these openings.

(iii) For opening exceeding 0.5 sqm (5 sq.ft) but not exceeding 5 sq.m (30 sq.ft) deduction is made for one face only. and the other face is allowed for jambs, soffits and sills which are not taken into account seperately.

(iv) For openings above 3 sqm (30 sq.ft) deduction is made for both faces of the opening, and the jambs, soffits and sills are taken into account and added.

As the outer jambs, etc. are much smaller than the inner ones, the deduction is usually made from the outer face.

For deduction for arch opening the same principle as for masonry work

plastering of ceiling usually of 12 mm (1/2") thick is eg. computed in sq.m under a seperate head as this work is done with richer mortar. For R.C.C work usually no plastering is allowed but for fair finish a thin plaster of rich cement mortar may be allowed which should not be taken in the measurement seperately. Thin rich cement mortar plastering in R.C.C work may also be under a seperate item, specially in the ceiling inside room.

pointing:- pointing in walls is calculated in sq.m for whole surface and deductions similar to plastering are made.

11) **Cornice:** Ornamental or large cornice is measured in running metre (running foot) for the complete work which includes masonry, plastering, mouldings, etc. and paid for in R.m (R. ft).

Similarly, string course, drip course, cor-belling, coping etc. are measured and paid for in running metre for the complete work.

12) **pillars:** pillars are taken seperately in cum for their net volume and quantities are calculated by correct geometrical measurements by simple mensuration method.

Quantity = Sec. area x ht = $\frac{\pi d^2}{4}$ x ht. cum for round pillars

d is the dia.

= a^2 x ht. cum for square pillars, a is the side

Hexagonal, octagonal etc. pillars are dealt similarly plastering in the pillars are calculated in Sq.m multiplying the circumference of perimeter by the height.

13. Doors and windows:-

(i) Chowkhat or frames:- Door and window frames or chowkhats are computed in cum. length is obtained by adding the length of all the members of the chowkhat, top and two verticals if there is no sill member, and adding bottom also if there is sill, and this length is multiplied by the two dimensions of the cross-section of the member. ~~vertical~~ members should be ~~inserted into~~ If there is no sill member, vertical members should be inserted into the floor by about 2.5 cm to 4cm (1" - 1½") If there is horn projection these projections also should be added to the length.

(ii) Door or window Leaves or Shutters:-

They are computed in sq.m by multiplying the breadth by the height of the shutters, the rebates in the chowkhat should be taken into consideration in finding the breadth and the height. A clearance of 6mm (1/4") may be allowed at the

bottom of door if there is no sill member. For estimating the clearance may not be taken into consideration, this may be neglected. But for measurement for payment. The clearance should be taken into account. The rebates in the chowkhats may be taken as 12mm to 20mm ($1/2$" to $3/4$"). The Central overlap is not taken into accounts

The name of the timber used the thickness of shutters type of shutters and the nature of fittings (iron, brass etc) should be noted in the item shutters of different types as panelled, glazed; partly panelled and partly glazed venetian etc. should be computed seperately as the rates differ.

Fittings are computed by number i.e, enumerated. Fittings may also be included in the Sq.m rate of shutters. For estimate the fitting may be taken under a seperate item in Sqm basis of shutters or a lump sum provision may be made. Hold fasts are taken seperately under a seperate item by weight or by number.

It is better to purchase the fittings by the department to the choice and requirement, and to get them fitted by the contractor whose rate for shutters shall include the labour for fixing fittings.

14. Wood work -

Wooden beams, burgans, posts, wooden roof trusses, chowkbats, etc. come under this item and the quantities are computed in cum. The dimensions of finished work shall be taken.

15. Iron Work:

This is computed in weight in kg or quintal and the quantities are calculated correctly by multiplying the weights per running metre by the length. The weight per rm can be obtained from the steel section book (steel tables are given at the end of the book). For steel joint the length is equal to the clear span plus two bearings, the bearing may be taken 1/4 thickness of wall or 20cm to 30cm (8" to 12"). Density of mild steel is

equal to 7850 kg/cum or 78.5 q/cum or 0.785 gram/cum (490 lbs/cu.ft).

Weight of Iron hold fasts may be taken as ½ kg (2 lbs to 2 ½ lbs) each. For doors 6 hold fasts (three on each side) and for windows 4 hold fasts may be provided if not specified.

The weight of bolts and nuts and rivets with heads can be calculated by counting their numbers and sizes and consulting steel table. Sometimes certain percentage of the ~~of~~ whole steel work is provided for rivets and bolts and nuts. For steel roof truss 5 per cent of the steel work is usually provided for rivets and bolts and nuts.

16. White-washing or colour-washing or Distempering:-

The quantities are computed in sq.m and are usually same as for plastering. The inside is usually white washed or distempered. and this item will be same as for inside plaster. These

items need not be calculated seperately but simply written as same as for inside plaster or outside plaster. Number of coats of white washing or colour-washing are taken as one job or work and the rates cover for the number of coats which should not be a multiplying factor. The number of coats should be mentioned in the item. Deductions are dealt in the same manner as for plastering. other type of surface finishing may also be done and may be taken accordingly.

17. painting:

painting or varnishing of doors and windows are computed in sqm the dimensions should be taken for outer dimensions of the chowkhat i.e, outer dimensions of doors and windows. The area is measured flat-(not girthed). No seperate measurement is taken for the chowkhat, the area is same as the area of wall opening. For iron bars, grille, etc. the area of the clear

opening inside the chowkhat is taken. For both faces of doors and windows the simple area as measured above multiplied by appropriate numbers as below

(i) panelled, framed and braced
ledged and battend or ledged
battened and braced --- 2 ¼ times one surface area for both sides.

(ii) fully glazed or guaged --- 1 time one surface area, for both sides.

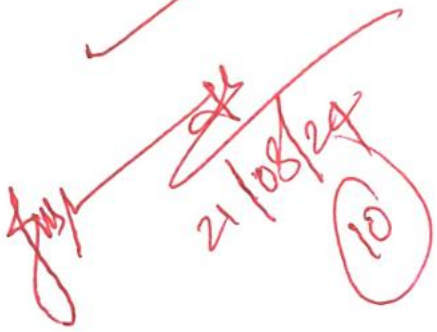
(iii) partly penelled and partly glazed or guaged --- 2 times one surface area, for both sides.

(iv) Flush door --- 2 times one surface area for both sides.

(v) venetian --- 3 times one surface area, for both sides.

(vi) Iron bars, grills in windows --- 1 time the area of clear opening in b/w chowkhat for over all.

This covers also for chowkhat on three faces, painting is done in two or three coats, usually over a coat of priming. The rate covers for the number of coats under one item. The number of coats should be mentioned in the description of item.



Sizes & Dimensions of various works in MKS and the corresponding FPS units.

Exp. No. : 2
Date : 16/8/2024

1. Size of Doors :-

	cm	m	feets
(i)	120×210	1.2×2.1	$4'0'' \times 6'\frac{3}{4}''$
(ii)	110×200	1.1×2	$3'6'' \times 6'6''$
(iii)	100×190	1×1.9	$3'3'' \times 6'3''$
(iv)	90×180	0.9×1.8	$3'0'' \times 6'0''$
(v)	75×180	0.75×1.8	$2'6'' \times 6'0''$

2. Size of windows :-

	cm	m	feets
(i)	100×150	1×1.5	$3'3'' \times 5'0''$
(ii)	90×120	0.9×1.2	$3' \times 4'$

3. Size of CS windows & ventilators

	cm	m	feets
(i)	120×60	1.2×0.6	$4' \times 2''$
(ii)	100×60	1×0.6	$3'3'' \times 2'$
(iii)	90×50	0.9×0.5	$3'0'' \times 1'6''$

4. Size of chowkhat Sections for Doors & windows:-

	cm	m	feet
(i)	12×7.5	0.12×0.075	5"×3"
(ii)	10×10	0.1×0.1	4"×4"
(iii)	10×7.5	0.1×0.075	4"×3"
(iv)	7.5×7.5	0.075×0.075	3"×3"

(v) Thickness of Doors and windows, shutters & leaves:-

	cm	m	feet
(i)	2.5	0.25	1"
(ii)	3	0.03	1 1/4"
(iii)	4	0.04	1 1/2"
(iv)	4.5	0.045	1 3/4"

(vi) Thickness of lime concrete in foundation

	cm	m	feet
(i)	15	0.15	6"
(ii)	20	0.2	8"
(iii)	25	0.25	10"
(iv)	30	0.3	12"

(v)	40	0.4	16"
(vi)	45	0.45	18"

(vii) Thickness of lime concrete in roof concrete:

	cm	m	feet
(i)	7.3	0.073	3"
(ii)	10	.01	4"
(iii)	12	0.12	4 1/2"

(viii) Thickness of RCC slab:—

	cm	m	feet
(i)	7.5	0.075	3"
(ii)	10	0.01	4"
(iii)	12.5	0.125	5"
(iv)	15	0.15	6"

(x) Thickness of plastering:

mm	feets
10	3/8"
12	1/2"
15	5/8"
20	3/4"

Thickness of DPC:

cm	feets
2	3/4"
2.5	1"
4	1 1/2"

Thickness of C.C floor:-

cm	feets
2	3/4"
2.5	1"
4	1 1/2"

2.5 cm CC floor over 7.5cm LC - 1" C.C floor over 3" L.C

Insulation layer in Roof:-

cm	feets
2.5	1"
4	1 1/2"

Steps rise & trade

cm	feet
15 X 30	6" X 12"
15 X 28	6" X 11"
18 X 28	7" X 11"

Height of plinth

cm	feets
30	1' 0"
45	1' 6"
60	2' 0"
75	2' 6"

Height of building:

cm	feets
9.8	9' 3"
3.0	10"
3.3	13' 0"
3.6	12"
3.9	13'
4.2	14'

Size of the rooms:

m	feets
3×3	10'×10'
3×3.6	10'×12'
3.6×3.6	12'×12'
3.6×4.2	12'×14'
3.6×4.8	12'×16'

Standard brick size :- 19×9×9 cm

Standard brick tile - 19×9×4 cm

Thickness of wall with Standard Brick:-

Wall thickness of wall	½ brick	1 brick	1½ brick	2 brick	2½ brick	3 brick
	10 cm	20cm	30cm	40cm	50cm	60cm

Estimate the quantities of brick work and plastering required in a wall 4m long 3m height and 30cm thick calculate also the cost with the rate of brick work is ₹320 per cu.m. and of plastering is ₹8.5 per sq.m

Sol Given: $L = 4m$

$H = 3m$

$t = 30cm = 0.3m$

Quantity of brick work $= L \times H \times t = 4 \times 3 \times 0.3$

$= 3.6\ m^3$

Quantity of plastering $= 2 \times L \times H$

$= 2 \times 4 \times 3 = 24\ m^2$

cost of brick work $= 320 \times 3.6 = 1152/-$

cost of plastering $= 8.5 \times 24 = 204/-$

Total cost $= 1152 + 204$

$= 1356/-$

fool 21/08/24 (12)

Methods of Estimate

Exp. No. : 2
Date : 23/8/24

Methods of building Estimate:-

The dimensions, length, breadth and height or depth are to be taken out from the drawing-plan, elevation and section. From the study of the drawings, the building is to be imagined and pictured in the mind and the dimensions are to be taken out correctly. There is no hard and fast rule for finding out dimensions from the drawing but the dimensions are to be taken out accurately. Junctions of wall at the corners and at the meeting points of walls require special attention.

For symmetrical foundation which is the usual case, earth-work in excavation in foundation concrete, brickwork in foundation and plinth, and brickwork in superstructure may be estimated by either of the following two methods.

Method - I

Seperate or Individual wall method

Exp. No. :

Date :

In this method, measure of find out the external length of walls running in the longitudinal direction generally the long walls out-to-out, and the internal length of walls running in the transverse direction in-to-in i.e, of cross or short walls in-to-in, and calculate quantities multiplying the length by the breadth and the height of wall. The same rule applies to the excavation in foundation, to concrete in foundation and to masonry. Care should be taken to note the difference in dimensions at different height due to offset, or footings. It is convenient to imagine plans at different level of heights as foundation trench plan, foundation concrete plans of each footing, etc. and dealing each plan or part seperately.

The simple method is to take the long walls and short or cross walls seperately and to find out the centre to centre length of long walls and short walls from the plan. For symmetrical footing on either sides, the centre line

remains same for super structure and for foundation and plinth.

For long walls add to the centre length one breadth of wall, which gives the length of the wall out-to-out multiply this length by the breadth and the height and get the quantities. Thus for finding the quantities of earthwork in excavation, for length of the trench out-to-out add to the centre length one breadth of foundation. Adopt the same process for foundation concrete, and for each footing. It should be noted that each footing is to be taken seperately and the breadth of the particular footing is to be added to the centre length.

(Long wall length out-to-out = centre to centre + half breadth on oneside + half breadth on the other side = centre to centre length + one breadth).

For short or cross walls substract (instead of adding), from the centre length one breadth of wall, which gives the

the length in-to-in, and repeat the same process as for the long walls, subtracting one breadth instead

(Short wall length in-to-in = centre to centre length − one breadth)

That is incase of longwall add one breadth and in case of short wall subtract one breadth from the centre length to get the corresponding lengths.

In foundation the offset of concrete one either side may be 10cm to 20cm depending on the thickness of concrete (usually less than the thickness of concrete). The offset on either side of brick wall of standard bricks is 5cm and of traditional bricks is 5.7cm.

This method can also be worked out in a quicker way. For long walls find the length of the foundation trench of the longwall out-to-out in the same manner as explained above, the length of the foundation concrete is the same, for the

length of the first footing or first step of brickwall subtract two offsets in foundation concrete from the length of the trench or concrete, for the second footing subtract from the length of 1st footing two offsets in footing. i.e, 2x5=10cm (2x5.7=11.4 cm for traditional brick) for the third footing subtract from the length of the 2nd footing two offsets i.e, 10cm (11.4cm for traditional bricks) in this way deal the long walls up to the super structure. [For 25.4 cm x 12.7cm x 7.6cm (10" x 5" x 3½") bricks, one offset in footing = 6.35cm and two offsets = 12.7cm]

For short wall follow the same method but instead of subtracting, add two offsets to get the corresponding length in-to-in.

It will be noticed that by taking dimensions in this way the long walls are gradually decreasing in length from foundation

to superstructure, while the short walls are increasing in length.

It may also be noted that the wall which is taken first is to be treated as long wall through its length may be lesser, and the other wall be treated as short wall.

This method is simple and accurate and there is no chance of any mistake. This method may be normal as long wall and short wall method or general method.

Exp. No. :
Date : 23/8/24

Method II

Centre Line Method

In this method known as centre line method sum-total length of centre lines of walls, long and short, has to be found out. Find the total length of centre lines of walls, of same type, long and short having same type of foundations and footings and then find the quantities by multiplying the total centre length by the respective breadth and the height. In this method, the length will remain same for excavation in foundation, for concrete in foundation, for all footings and for super-structure (with slight difference when there are cross walls or number of functions). This method is quick but requires special attention and consideration at the functions, meeting points of partition or cross walls etc.

For rectangular, circular / polygonal (hexagonal, octagonal, etc.) buildings having no inter or cross walls, this method is quite simple. For buildings having cross or partition walls, for every

function of partition or cross walls with main walls, special consideration shall have to be made to find the correct quantity. For each function half breadth of the respective item or footing to be deducted from the total centre length. Thus in the case of a building with one partition wall or cross wall having two functions, for earthwork in foundation trench and foundation concrete deduct one breadth of trench or concrete from the total centre length (half breadth for one function and one breadth ($1 \times 1/2$ = one for two functions). For footings, similarly deduct one breadth of footing for two junctions from the total centre length, and so on. If two walls come from opposite direction and meet a wall at the same point, then there will be two functions.

For building having different types of walls, each set of walls shall have to be dealt seperately. Find the

total centre length of all walls of one type and proceed in the same manner as described above. Similarly find the total centre length of walls of second type and dealt this seperately, and so on.

In the case of building having different type of walls, Suppose the outer (main) wall are of A type and inter cross walls are of B type, then all.

'A' type walls shall be taken jointly first, and then all B type walls shall be taken together seperately. In such cases no deduction of any kind need be made for A type walls, but when B type walls are taken, for each function deduction of half breadth of A type wall (main wall) shall have to be made from the total centre length of walls.

It may be noted corners of the building where two walls are meeting no subtractions or addition is requir

When there are no. of footings, the length of the first footing is to be determined by deducting half breadth of footing for per function from the total centre line length and then the length of the subsequent footing can be obtained simply by adding one offset of footing i.e, 5cm for every function to the length of the previous footing.

6/9/24

10

Estimate the quantities of given plan for single room wall to wall distance

Exp. No. : 3
Date : 30/08/24

The plan represents fig ⓐ, the plan represents the plan of super structure wall of a single room building of 5m x 4m, and the section represents the c/s of the walls with foundation.

To estimate the quantities of (i) Earthwork in excavation in foundation

(ii) Concrete in foundation

(iii) Brickwork in foundation and plinth

(iv) Brickwork in super structure.

Length of long wall (centre to centre)

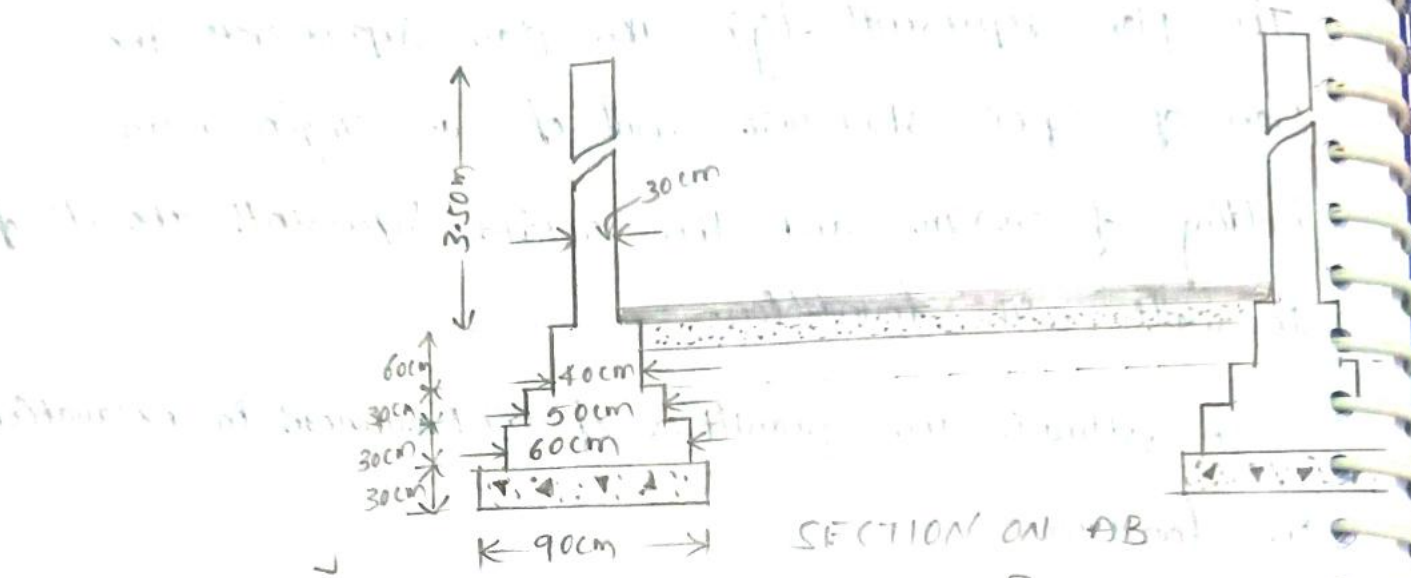
$= 5 + 1/2 \times 0.3 + 1/2 \times 0.3$

$= 5.30$ m

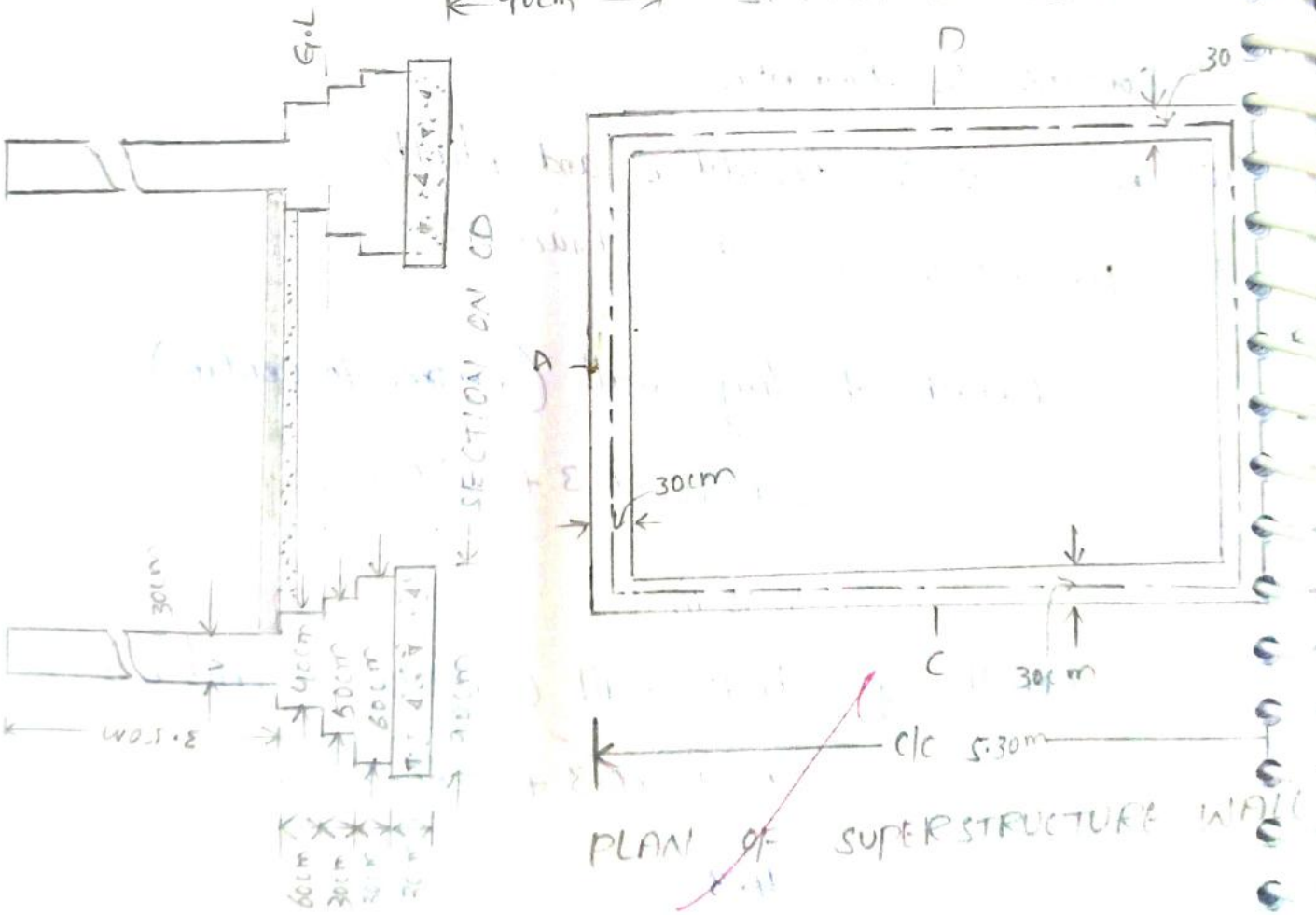
Length of short wall (centre to centre)

$= 4 + 1/2 \times 0.3 + 1/2 \times 0.3$

$= 4.30$ m



SECTION ON AB



PLAN OF SUPERSTRUCTURE WALL

Description	No	Length	Breadth	height	Quantity	Remarks
Earthwork excavation in foundation						
Long wall	2	6.2m	0.9m	0.9m	2X6.2X0.9X 0.9 = 10.04m³	Length = 5.3+0.9= 6.2m
short wall	2	3.40m	0.9m	0.9m	2X3.4X09X 0.9 = 5.51m³	short wall= 4.3 -0.9 = 3.4m
					Total= 15.55m³	
Concrete foundation						
Long wall	2	6.20m	0.9	0.3	2X6.2X0.9X 0.3 = 3.35m³	Length is same as earth work L = 6.2m
short wall	2	3.40m	0.9	0.3	2X3.4X0.9X 0.3 = 1.83m³	L = 3.4m
					Total= 5.18m³	

S/NO	Description	NO	length	breadth	height	Quantity	Remarks
3	Brickwork in foundation and plinth						
	Long Wall						
	1st footing	2	5.80m	0.60m	0.30m	$2.13m^3$	Length = 5.3+0.6 = 5.9m
	2nd footing	2	5.80m	0.5m	0.3m	$1.74m^3$	Length = 5.3+0.5 = 5.80m
	plinth	2	5.7m	0.40m	0.6m	$2.74m^3$	Length= 5.3+0.4 =5.7m
	short wall						
	1st footing	2	3.7m	0.60m	0.30m	$1.33m^3$	Length= 4.3−0.6 = 3.7m
	2nd footing	2	3.80m	0.5	0.3m	$1.14m^3$	Length= 4.3−0.5 = 3.80m
	plinth	2	3.90m	0.4	0.6	$1.872m^3$	Length = 4.3−0.4 = 3.9m
						$10.95m^3$	

S No	Description	No	length	breadth	height	Quantity	Remarks
4	Brick work in super Structure						
	Long Wall	2	5.60m	0.3m	3.5m	$11.76\ m^3$	length $5.3+0.3=5.60$ m
	Short wall	2	4.00m	0.3m	3.5m	$8.40\ m^3$	length $4.3-0.3=4.00$ m

Estimate the quantities of plan

Exp. No. : 4
Date : 6/9/2024

Estimate the quantities of the following items of a two roomed building from the given plan and section (fig).

(i) Earthwork in excavation in foundation

(ii) Lime concrete in foundation

(iii) first class brick work in cement mortar 1:6 in foundation and plinth.

(iv) 2.5cm c.c damp proof course and

(v) First class brick work in Lime mortar in super structure.

Length of long wall (Centre to centre)

$= 6 + 1/2 \times 0.3 + 1/2 \times 0.3 + 4 + 0.3$

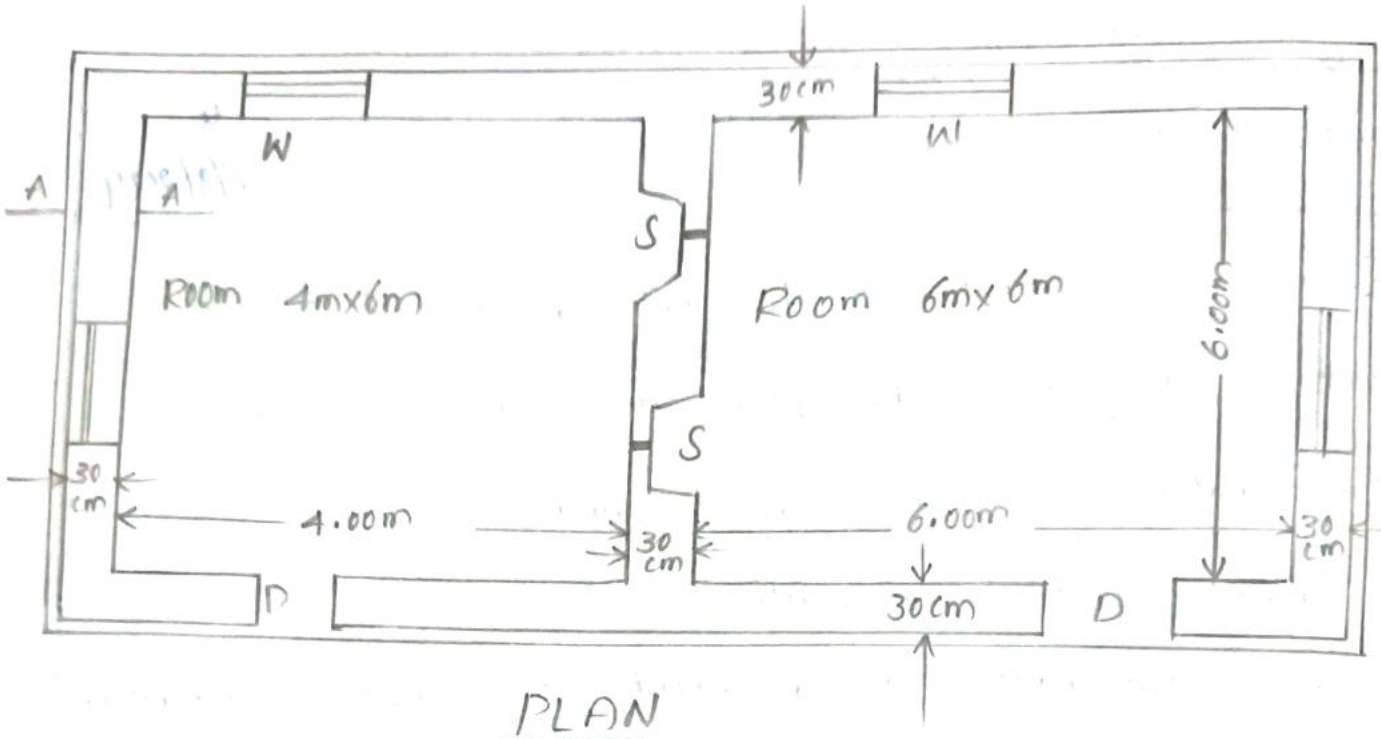
$= 10.6\ m$

Length of short wall (Centre to centre)

$= 6 + 1/2 \times 0.3 + 1/2 \times 0.3$

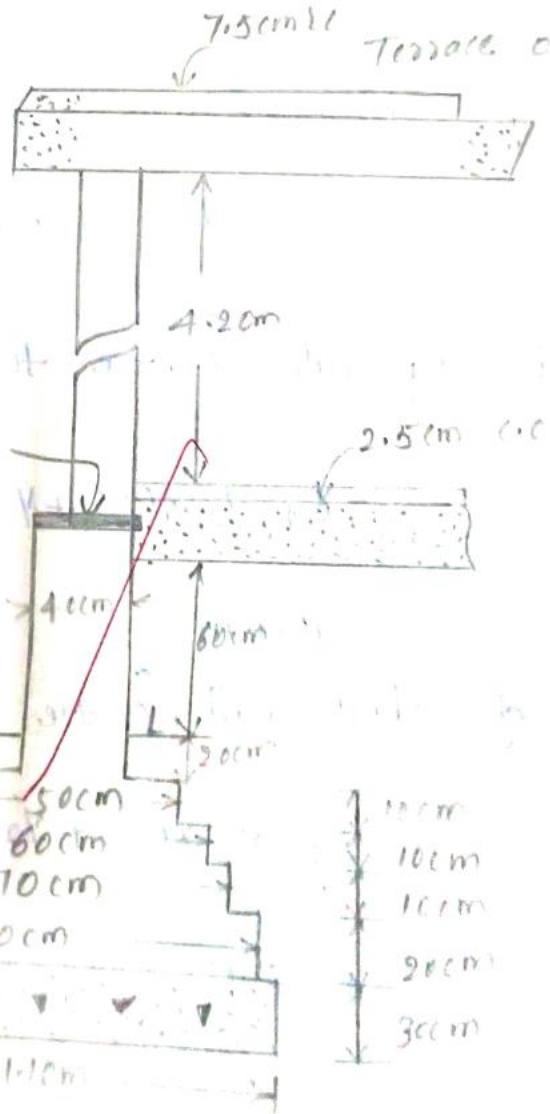
$= 6.30\ m$

TWO ROOMED BUILDING



PLAN

All walls are of same section Lintels over doors windows and shelves are 15cm thick R.B



Doors D 1.20m x 2.10m

Windows W 1.00 x 1.50m

Shelves S 1.00m x 1.50m

Cross Section of wall on A-A

S NO	Description	NO	length	breadth	height	Quantity	Remarks
1.	Earthwork in excavation in foundation						
	Long wall	2	11.7	1.1	1	$2\times11.7\times1.1\times1=$ $25.74\,m^3$	$10.6+1.10=$ $11.70m$
	Short wall	3	5.2	1.1	1	$3\times5.2\times1.1\times1=$ $17.16m^3$	$6.3-1.1=$ $5.2m$
						Total $=42.9m^3$	
2	Lime concrete in foundation						Length is same as earth work
	Long wall	2	11.7	1.1	0.3	$2\times11.7\times1.1\times0.3=$ $7.72m^3$	$L=11.70m$
	short wall	3	5.2	1.1	0.3	$3\times5.2\times1.1\times0.3$ $=5.14\,m^3$	$L=5.2m$
						Total $=12.86m^3$	
3	First class brickwork in cement mortar 1:6 in foundation and plinth						

S No	Description	No	Length	Breadth	height	Quantity	Remarks
3.	Long wall						Length
							10.6+0.8 =
	1st footing	2	11.4	0.8	0.2	2x11.4x0.8x0.2=	11.4m
						3.648 m^3	
	2nd footing	2	11.3	0.7	0.1	2x11.3x0.7x0.1=	Length =
						1.528 m^3	10.6+0.7=11.3m
	3rd footing	2	11.2	0.6	0.1	2x11.2x0.6x0.1=	Length =
						1.344	10.6+0.6 =11.2m
	4th footing	2	11.1m	0.5	0.1	2x11.1x0.5 x0.1=	Length =
						1.11 m^3	10.6+0.5 =11.1m
	Plinth	2	11	0.4	0.8	2x11x0.4x0.8=	Length =
						7.04 m^3	10.6+0.4 =11.0
	Short wall						
	1st footing	3	5.5	0.8	0.2	2.64 m^3	Length = 6.3-0.8=
							5.5m
	2nd footing	3	5.6	0.7	0.1	3x5.6x0.7x0.1=	Length = 6.3-0.7
						1.176 m^3	= 5.6m
	3rd footing	3	5.5	0.6	0.1	3x5.5x0.5x	Length = 6.3-0.6
						0.1 = 1.026 m^3	5.5m
	4th footing	3	5.8	0.5	0.1	3x5.8x0.4x	Length = 6.3-0.5
						0.1 = 0.87 m^3	=5.8m

S/No	Description	No	Length	breadth	height	Quantity	Remarks
	plinth	3	5.9	0.4	0.8	3x5.9x0.4x 0.8 = 5.28m³ Total = 25.716m³	Length = 6.3-0.4 = 5.9
4.	2.5cm c.c damp proof course						
	Long wall	2	11.0	0.4	—	2x11x0.4 = 8.8m³	Length = 10.6+0.4 = 11.00m
	short wall	3	5.9	0.4	—	3x5.9x0.4 = 7.08m³	Length = 6.3-0.4 = 5.90m
5.	Brick work in super structure						
	Long wall	2	10.9	0.3	4.2	2x10.9x0.3x 4.2 = 27.468m³	Length = 10.6+0.3 = 10.9m
	short wall	3	6	0.3	4.2	3x6x0.3x4.2 = 22.68m³	Length = 6.3-0.3 = 6.00m
						50.148m³	

SNo	Description	No	length	Breadth	Height	Quantity	Remarks
	Doors	2	1.2	0.3	2.1	$1.512 m^3$	
	Windows	4	1	0.3	1.5	$4 \times 1 \times 0.3 \times 1.5 = 1.8 m^3$	
	shelves	2	1	0.2	1.5	$2 \times 1 \times 0.2 \times 1.5 = 0.6 m^3$	
	Lentels						
	Doors	2	1.5	0.3	0.15	$0.14 m^3$	$1.2 + 0.15 \times 2 = 1.5$
	Windows	4	1.6	0.3	0.15	$0.234 m^3$	$1 + 0.15 \times 4 = 1.6$
	shelves	2	1.3	0.2	0.15	$0.08 m^3$	$1 + 0.15 \times 2 = 1.3$
						$4.40 m^3$	
					Total Value	$50.148 - 4.4 = 45.748 m^3$	

10

Estimate the quantities of given plan for Residential Building by wall to wall distances

Exp. No. : 5

Date : 13/9/2024

Estimate the quantities of the following items of a residential building from the given drawings.

(i) Earthwork in excavation in foundation

(ii) Lime concrete in foundation

(iii) First class brick work in 1:6 cement sand mortar in foundation and plinth.

(iv) 2.5cm D.P.C

(v) First class brickworks in lime mortar in Super structure.

(i) Drawing and bed room combined:

length of long wall = $6+4+0.3+\frac{1}{2}\times0.3+\frac{1}{2}\times0.3 = 10.6m$

length of short wall = $5+\frac{1}{2}\times0.3+\frac{1}{2}\times0.3 = 5.3m$

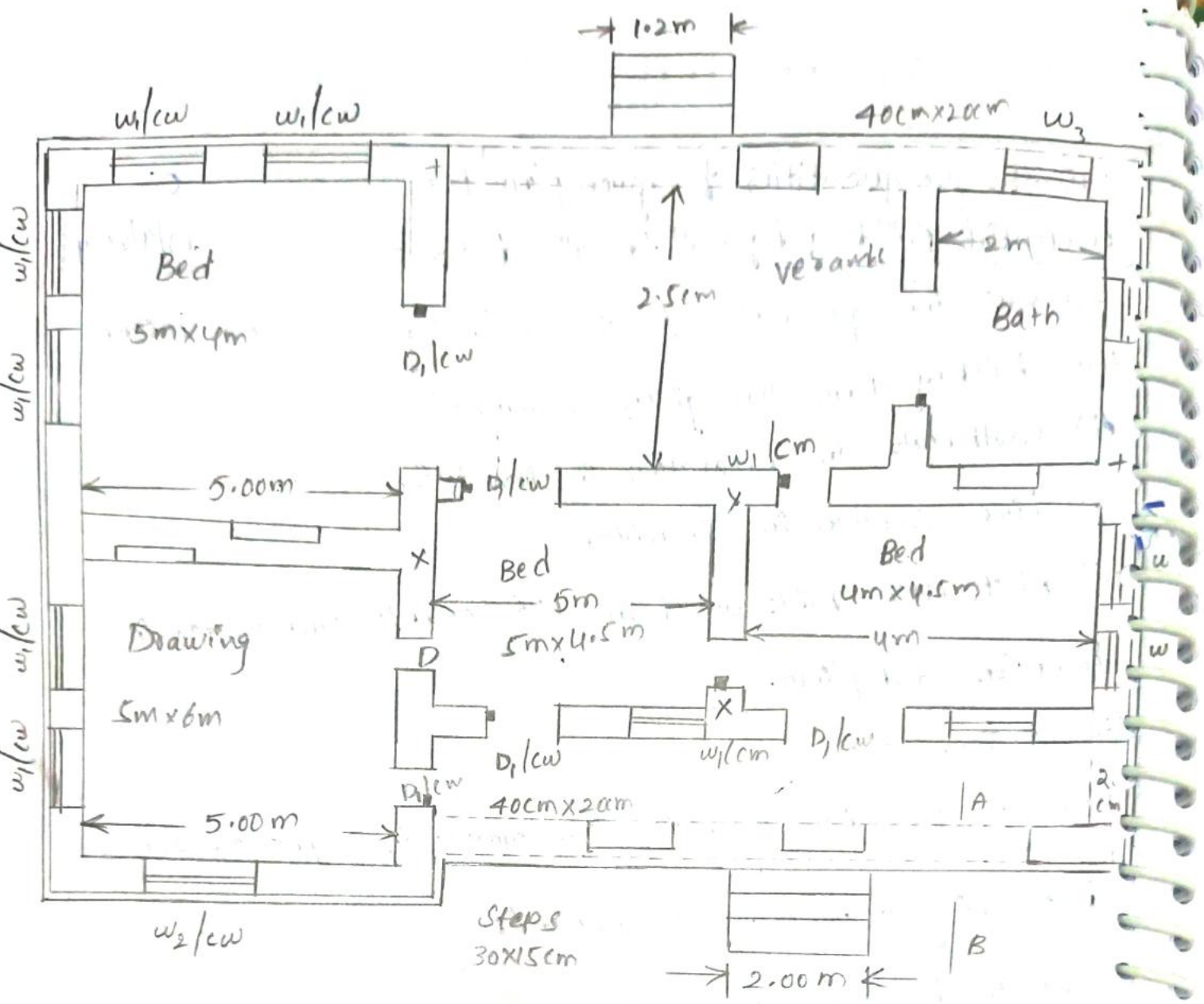
(ii) Two bed rooms combined:-

Length of long wall = $5+4+0.3+\frac{1}{2}\times0.3+\frac{1}{2}\times0.3 = 9.6m$

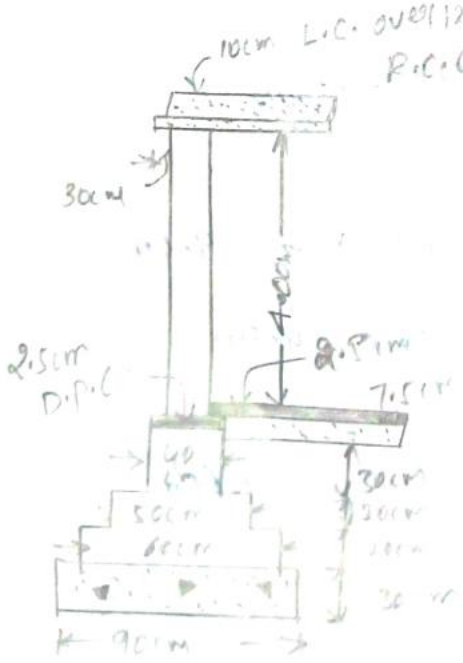
length of short wall = $4.5+\frac{1}{2}\times0.3+\frac{1}{2}\times0.3 = 4.8m$

(iii) Back varandah:

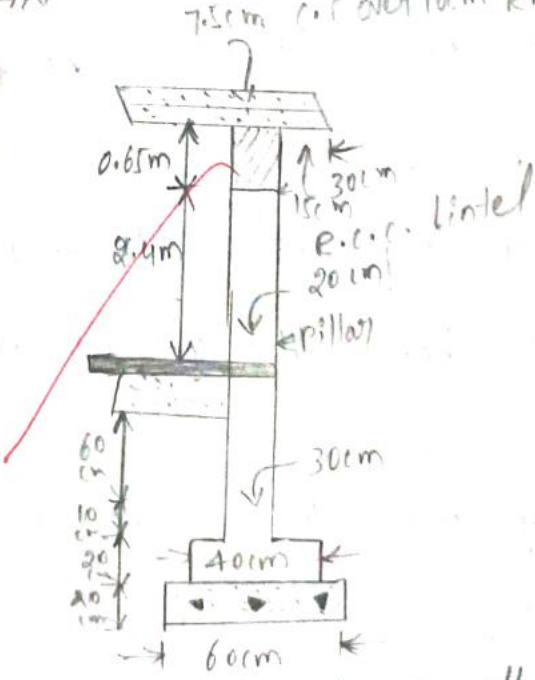
Length of long wall = $5+4+0.3+\frac{0.3}{2}+\frac{0.2}{2}+\frac{0.2}{2} = 9.65m$



PLAN



c/s of



c/s of NB of wall

Length of short wall = $2 + \frac{0.3}{2} + \frac{0.2}{2} = 2.25m$

(iv) Back varandah including bath :-

Length of long wall = 9.65m

Length of short wall = $2.5 + \frac{0.3}{2} + \frac{0.2}{2} = 2.75m$

S No	Description	No	Length	Breadth	Height	quantity	Remarks
1.	Earthwork in excavation in foundation.						
	(i) Long wall	2	11.5	0.9	1	$2 \times 11.5 \times 0.9 \times 1 = 20.7 m^3$	$10.6 + 0.9 = 11.5m$
	(ii) short wall	3	4.4	0.9	1	$11.88 m^3$	$5.3 - 0.9 = 4.4m$
	(ii) Long wall	2	9.6	0.9	1	$17.28 m^3$	$9.6 + \frac{0.9}{2} - \frac{0.9}{2}$
	short wall	2	3.9	0.9	1	$7.02 m^3$	$4.8 - 0.9 = 3.9m$
	(iii) Long wall	1	9.65	0.6	0.5	$2.85 m^3$	$9.65 - \frac{0.9}{2} + \frac{0.6}{2}$
	short wall	1	1.5	0.6	0.5	$0.45 m^3$	$2.25 - \frac{0.9}{2} - \frac{0.6}{2}$

(iv) Long wall	1	9.5	0.6	0.5	2.85 m^3	$9.65 - \frac{0.9}{2} + \frac{0.6}{2}$
short wall	2	2	0.6	0.5	1.2 m^3	$2.75 - \frac{0.9}{2} - \frac{0.6}{2}$
					64.23 m^3	
2. Lime concrete in foundation						
(i) Long wall	2	11.5	0.9	0.3	6.21 m^3	Length is same as Excation
short wall	3	4.4	0.9	0.3	3.564 m^3	
(ii) Long wall	2	9.6	0.9	0.3	5.184 m^3	
short wall	2	3.9	0.9	0.3	2.106 m^3	
(iii) Long wall	1	9.7	0.6	0.2	1.16 m^3	
short wall	1	1.5	0.6	0.2	0.18 m^3	
(iv) Long wall	1	9.7	0.6	0.2	1.164 m^3	
short wall	2	2	0.6	0.2	0.52 m^3	
					20.11 m^3	
3 First class brick work in 1:6 cement sand mortar in foundation and plinth						

No	Description	no	Length	breadth	Height	Quantity	Remarks
	(i) Long wall						
	1st footing	2	11.2	0.6	0.2	2.688m³	10.6+0.6= 11.2cm
	2nd footing	2	11.1	0.5	0.2	2.22m³	10.6+0.5=11.1cm
	plinth	2	11	0.4	0.9	7.92m³	10.6+0.4=11cm
	short wall						
	1st footing	3	4.7	0.6	0.2	1.692m³	5.3-0.6=4.7
	2nd footing	3	4.8	0.5	0.2	1.44m³	5.3-0.5=4.8
	plinth	3	4.9	0.4	0.9	5.292m³	
	(ii) Long wall						
	1st footing	2	10.2	0.6	0.2	2.31m³	9.6+0.6=10.2
	2nd footing	2	10.1	0.5	0.2	1.92m³	9.6+0.5=10.1
	plinth	2	9.6	0.4	0.9	6.91m³	9.6+0.4=10
	short wall						
	1st footing	2	4.2	0.6	0.2	1.011m³	4.8-0.6=4.2
	2nd footing	2	4.3	0.5	0.2	0.86m³	4.8-0.5=4.3
	plinth	2	4.4	0.4	0.9	3.168m³	4.8-0.4=4.4

(iii) Long wall						
1st footing	1	9.65	0.4	0.2	0.770m³	9.65
Plinth	1	9.65	0.3	0.7	2.02 m³	
short wall						
1st footing	1	1.25	0.4	0.2	0.15	$2.25 - \frac{0.4}{2} - \frac{0.4}{2}$
Plinth	1	1.9	0.3	0.7	0.4	$2.25 - \frac{0.4}{2} - \frac{0.3}{2} = 1.9$
(iv)-Long wall						
1st footing	1	9.65	0.4	0.2	0.772m³	
plinth	1	9.65	0.3	0.7	2.020 m³	
short wall						
1st footing	2	2.35	0.4	0.2	0.38m³	$2.75 - \frac{0.4}{2} - \frac{0.4}{2} = 2.35$
plinth	2	2.4	0.3	0.7	1.01 m³	$2.75 - \frac{0.4}{2} - \frac{0.3}{2} = 2.4$
					44.95m³	
4. 2.5cm Damp proof course						
(i) Long walls	2	11	0.4	—	8.8 m³	L is same as plinth
(ii) short walls	3	4.9	0.4	—	5.88 m³	

(ii) Long walls	2	9.6	0.4	–	7.68	
short walls	2	4.4	0.4	–	3.52	
(iii) verandah	4	0.5	0.3	–	0.6	5cm extra on all sides
(iv) Bathroom						
Real wall	1	2.5	0.3	–	0.75	2.2+2X0.15 = 2.5cm
and Inter walls	2	2.4	0.3		1.44	
					28.67 m^2	
Deduct						
Door sills D_1	6	1.2	0.4		2.88	
Door sills D_2	2	1	0.4		0.8	
Door sills D_3	1	0.75	0.3		0.25	
					3.91	
				Net Total	24.76 m^2	
5. 1st class brick work in super structure						
(i) Long walls	2	10.9	0.3	4	26.16	10.6+0.3=6
short walls	3	5m	0.3	4	18.00	5.3-0.3=5
(ii) Long walls	2	9.6	0.3	4	23.04 m^3	9.6 $-\frac{0.3}{2}+\frac{0.}{2}$

short walls	2	4.5	0.3	4	10.8	4.8 − 0.3
(iii) Long wall	1	9.6	0.2	3.05	5.86	$9.65 - \frac{0.3}{2} + \frac{0.2}{2}$
side wall	1	2	0.2	3.05	1.22	
(iv) Long wall	1	9.6	0.2	3.05	5.86	L is same as front verandah
short wall	2	2.5	0.2	3.05	3.05	
					93.99 m^3	
Deduct						
Doors (D_1)	6	1.2	0.3	2.1	4.54	
D_2	2	1	0.3	2	1.2	
D_3	1	0.75	0.2	1.8	0.27	
Windows w_1	1	1	0.3	1.5	4.95	
w_2	1	2	0.3	1.5	0.9	
w_3	2	0.75	0.2	1.2	0.36	
clere story window	18	0.75	0.3	0.6	2.43	
Shelves	5	1	0.2	1.5	1.5	
Front verandah opening in b/w pillars	1	2.4	0.2	2.4	4.03	L = 9.6 − 3x0.4

S.No	Description	NO	Length	breadth	Height	Quantity	Remarks
	F.V. opening side	1	2	0.2	2.4	0.96	
	B.V. opening	1	6.8	0.2	2.4	3.26	9.6-2.4-0.4
	Lintels D_1	6	1.5	0.3	0.15	0.465	
	D_2	2	1.3	0.3	0.15	0.117	
	D_3	1	0.95	0.2	0.15	0.029	
	W_1	11	1.3	0.3	0.15	0.644	
	W_2	1	2.3	0.3	0.15	0.103	
	W_3	2	0.95	0.2	0.15	0.057	
	over cw	18	0.95	0.3	0.15	0.770	
	over shelves	5	1.3	0.3	0.15	0.293	
	Verandah lintels						
	Front	1	9.75	0.2	0.15	0.293	9.6+0.15
	side	1	2.15	0.2	0.15	0.065	2+0.15
	back	1	7.5	0.2	0.15	0.225	9.6-2.4+2x 0.15
						27.401	
					Total	66.59 m^3	

Expt./Prog.No.: 6
ROLL No.: 102

Centre Line Method (single room Building)

Page No.: 59
DATE: 20/9/2024

Centre Line Method:

To findout the quantity = (Total length - ½ breadth for one function and 1 breadth) x breadth x depth

Esthmate by centre line method the quantities of the following items of a two roomed building refer drawing.

(i) Earthwork in excavation in foundation

(ii) Lime concrete in foundation

(iii) first class brick work in cement mortar 1:6 in foundation and plinth.

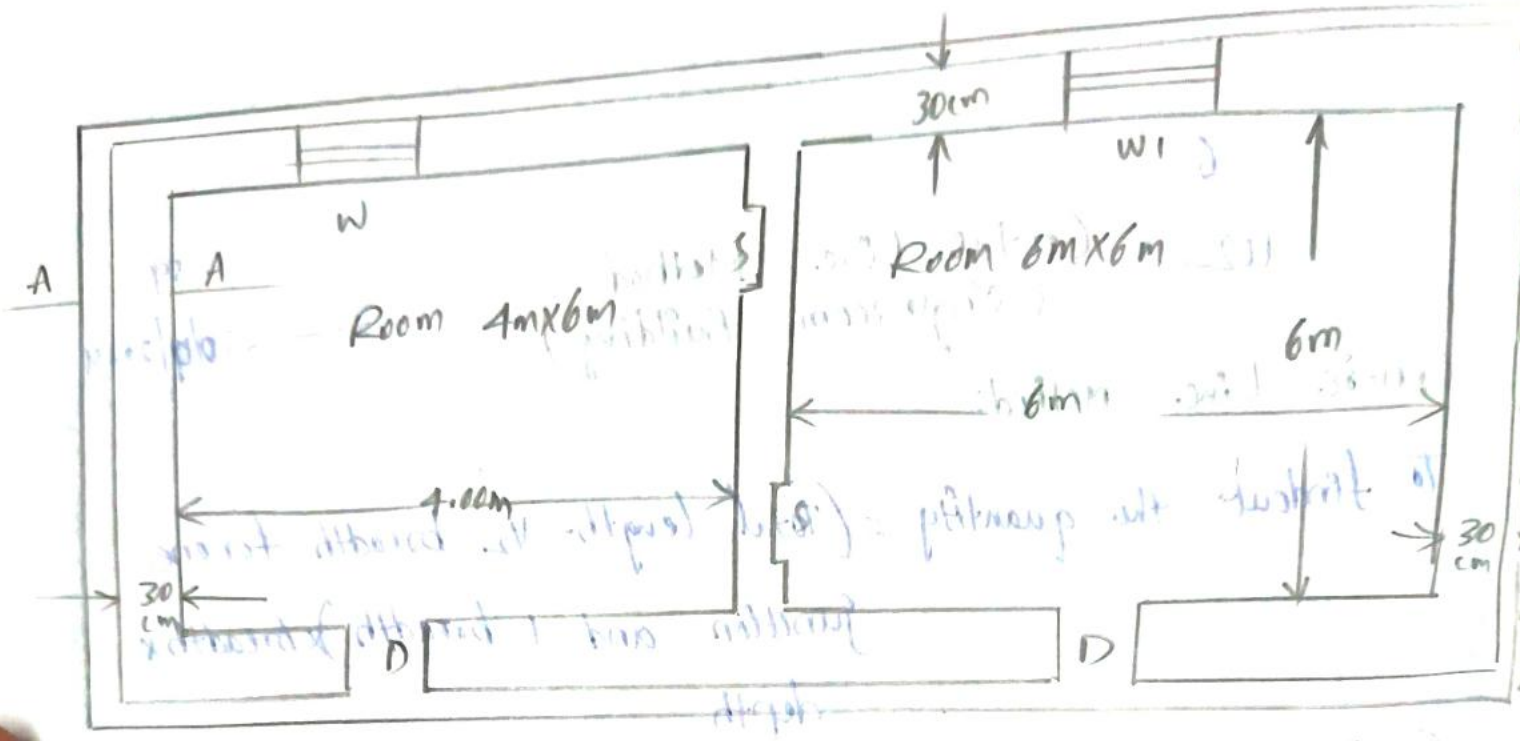
(iv) 2.5 cm c.c. damp proof course and

(v) first class brick work in lime mortar in super structure.

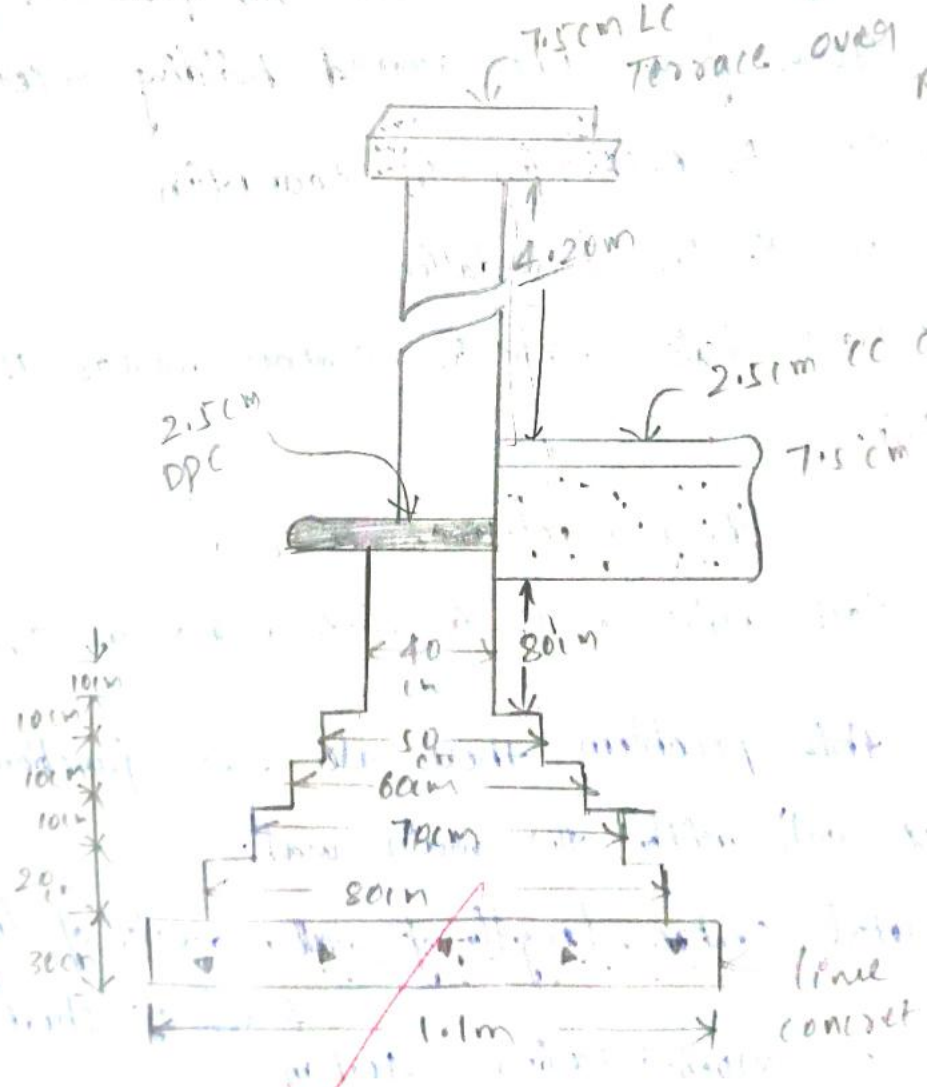
Sol: In this problem there are two functions of the interior wall with the main wall.

∴ Total centre length of wall = 2 x c/c of long wall + 3 x c/c of short wall

= 2x10.6 + 3x6.3 = 40.1 m



PLAN



Cross section of wall on A-A

So	Description	No	Length	Breadth	Height	Quantity	Remarks
(i)	Earthwork in excavation in foundation	1	39	1.1	1	42.9 m3	$40.1 - 2x\frac{1.1}{2}$ = 39
(ii)	Lime concrete in foundation	1	39	1.1	0.3	12.86 m3	$\left[40.1 - 2x\frac{1.1}{2}\right.$ $\cancel{2x\frac{0.8}{2}}$ = 39
(iii)	First class brick works in cement mortar 1:6 in cement of Plinth						
	1st footing	1	39.3	0.8	0.2	6.288	$40.1 - 2x\frac{0.8}{2}$
	2nd footing	1	39.4	0.7	0.1	2.76	
	3rd footing	1	39.5	0.6	0.1	2.37	
	4th footing	1	39.6	0.5	0.1	1.98	
	Plinth	1	39.7	0.4	0.8	12.70	
						26.09 m2	
(iv)	2.5cm damp proof course	1	39.7	0.4	-	15.88	$40.1 - 2x\frac{0.4}{2}$
	Door	2	1.2	0.4	-	0.96	
						14.92 m2	

No	Description	No	Length	Breadth	Height	Quantity	Remarks
(v)	First class brickwork in lime mortar in super structure	1	39.8	0.3	4.2	50.15	$40.1 - \frac{0.3}{2}$
	Deduct Doors, windows shelves, opening, lintels.					50.15 − 4.4 = 45.75 m³	
					Total Value	45.75 m³	

08/11/24

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Expt./Prog.No.: 7
ROLL No.: 102

Estimate the quantities of Residential building by center-line method

Page No.: 62
DATE: 3/9/2024

Estimate by Centre line method the quantities of the following items of a residential building.

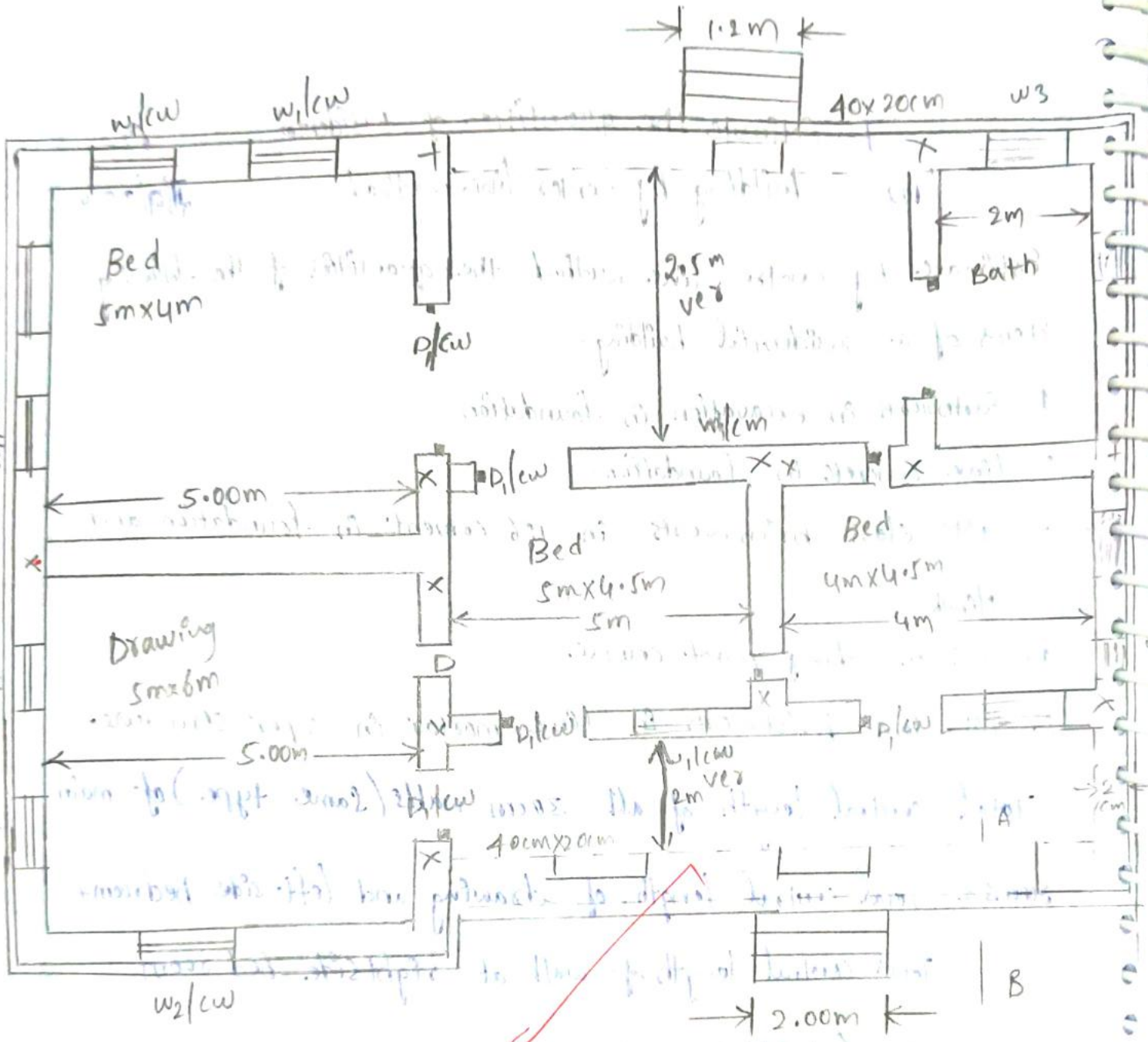
1. Earthwork in excavation in foundation
2. Lime concrete in foundation.
3. 1st class brick work in 1:6 cement in foundation and plinth.
4. 2.5 cm damp proof course
5. 1st class brickwork in lime mortar in super structure.

Total central length of all 30cm walls (same type) of main rooms = Total central length of drawing and left side bedroom + Total central length of wall at right side bed room

$= 3\times10.6 + 2\times5.3 + 2\times9.6 + 2\times4.8 = 65.9\text{ m}$

No. of functions for this walls is six marked functions and all this functions are with main walls of 30cm.

Two verandah = The total centre length of front wall + center to center of length of side wall) + (center to


1.2m
40x20cm
W3
W1/CW
W1/CW
Bed
5mx4m
D/CW
2.5m
ver
2m
Bath
W1/CW
W1/CW
W1/CW
W1/CW
W1/CW
W/CW
D1/CW
5.00m
Bed
5mx4.5m
5m
Bed
4mx4.5m
4m
Drawing
5mx6m
D
D1/CW
D1/CW
D1/CW
5.00m
D/CW
W1/CW
ver
2m
40cmx20cm
A
B
W2/CW
2.00m

Center length back wall including bath + (2x centre to centre long wall of bath 200m).

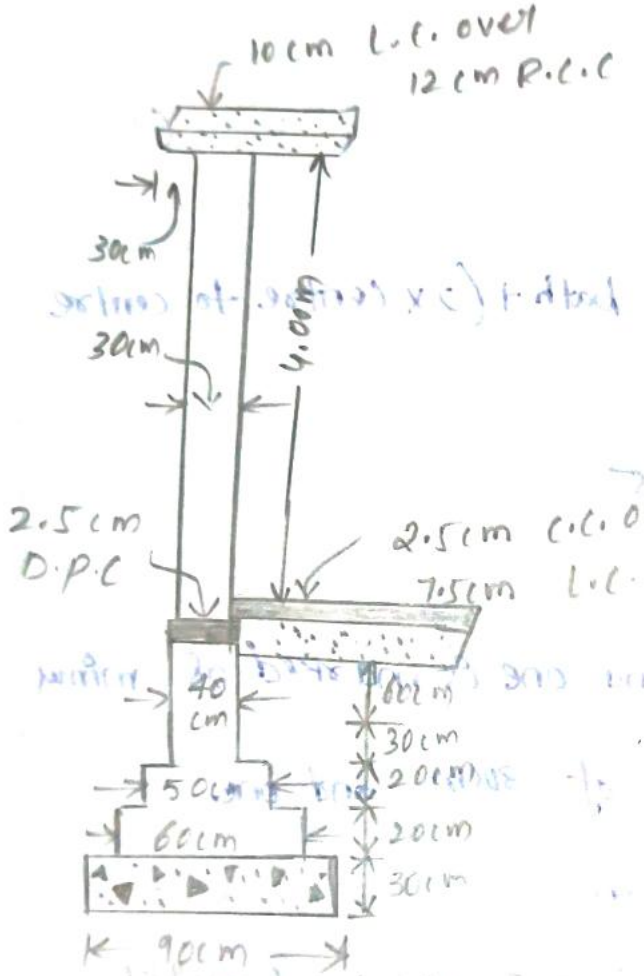
$= 9.65 + 2.25 + 9.65 + 2 \times 2.75$

$= 27.05m$

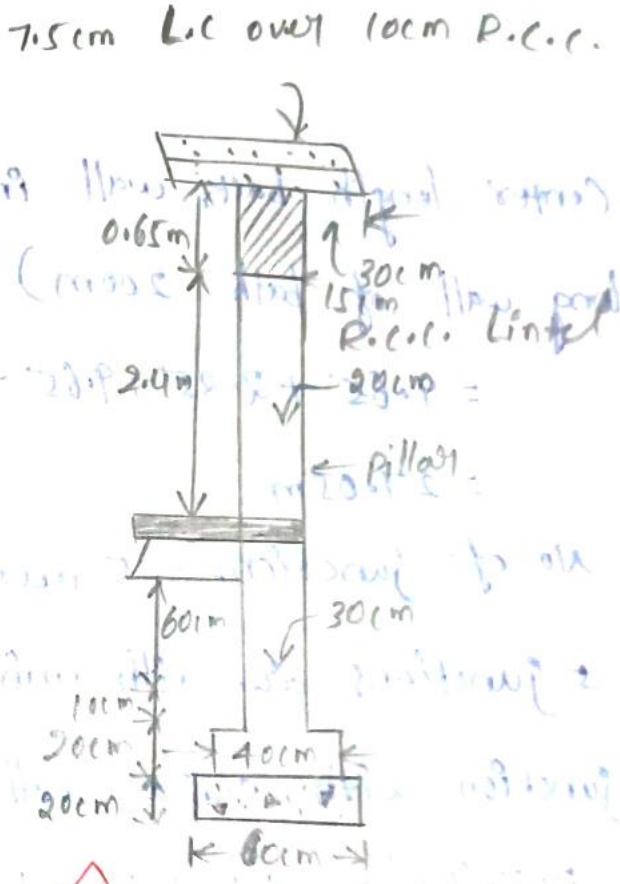
∴ No. of junctions = 5 marked + and one is marked as minus

5 junctions are with main walls of 30cm and one junction with similar wall of 20cm.

S No	Description	No	Length	Breadth	Height	Quantity	Remarks
1.	Earthwork in excavation in foundation wall of main room (six junction)	1	63.2	0.9	1.00	56.88	$L = 65.9 - 6 \times \frac{0.9}{2}$ $= 63.2$
	wall of Verandah including bath	1	24.5	0.6	0.5	7.35	$L = 27.05 - 5 \times \frac{0.9}{2}$ $1 \times \frac{0.6}{2} = 24.5$
					Total	$64.23m^3$	
2.	Lime concrete in foundation wall of main room	1	63.2	0.9	0.3	17.064	1 same as excavation work



c/c of main walls



c/c of AIS

No	Description	No	Length	Breadth	Height	Quantity	Remarks
	wall of verandah	1	25.5	0.6	0.2	3.06	$L = 27.05 - 5 \times \frac{0.5}{2} - 1 \times \frac{0.6}{2} = 25.5m$
3	1st class brick work in foundation and plinth 1:6 cement mortar						
	wall of mainroom						
	1st footing	1	64.1	0.6	0.2	7.69	$L = 65.9 - 6 \times \frac{0.6}{2} = 64.1$
	2nd footing	1	64.4	0.5	0.2	6.44	$L = 65.9 - 6 \times \frac{0.5}{2} = 64.4$
	Plinth wall	1	64.7	0.4	0.9	23.29	$L = 65.9 - 6 \times \frac{0.4}{2} = 64.7$
	wall of verandah						
	1st footing	1	25.85	0.4	0.2	2.07	$L = 27.05 - 5 \times \frac{0.4}{2} - 1 \times \frac{0.4}{2} = 25.85m$
	Plinth wall above footing	1	25.9	0.3	0.7	5.44	$L = 27.65 - 5 \times \frac{0.4}{2} - 1 \times \frac{0.5}{2} = 25.09m$
						44.93m³	

S/No	Description	No	length	breadth	Height	quantity	Remarks
4	2.5cm Damp proof course						
	walls of mainroom	1	64.7	0.110	–	25.88	L same as plinth wall
	verandah pillars	11	0.5	0.3	–	0.6	
	Bathroom (total of 3 walls)	1	7.3	0.3	–	2.19	
	Deduct door walls		Same as per Individual method			3.91	
					Total	24.76 m^2	
5	1st class brick work in Superstructure						
	walls of main room	1	65	0.3	4	78.00	$L = 65.9 - 6 \times \frac{0.3}{2} = 65$
	walls of verandah and bath	1	26.2	0.2	30.05	15.98	$L = 27.05 - 5 \times \frac{0.3}{2} - 1 \times \frac{0.}{2}$
					Total	98.98 m^3	$= 26.20$ m
	Deduct openings and lintels		Same as per detail In Individual method			27.40	
						66.58 m^3	

preparation of Abstract Estimation work of given plan

Exp. No. : 8
Date : 4/10/24

Estimate the quantities of the following items of a residential building from the given plan & section. To find out the rate analysis of exercise 5.

1. Earthwork in excavation in foundation
2. Lime concrete in foundation
3. ~~2~~ first class brickwork in cement mortar 1:6 in foundation & ~~brick~~ plinth
4. 2.5cm damp proof course
5. First class brickwork in lime mortar in superstructure.

S No	Particulars Item of work	Quantity	Units	Rate Rs. P	per	Amount Rs P
1.	Earthwork excavation in foundation	64.23	m^3	450	1 of m^3	$64.23 \times 450 = \frac{28903.5}{100} = 289.03$
2.	Lime concrete in foundation	20.11	m^3	320	1 m^3	$\frac{6435.2}{100} = 64.35$ RS
3.	First class brick work in cement mortar 1:6 in foundation & plinth	44.95	m^3	400	1 m^3	179.8 RS

4	2.5cm DPC	24.76	m^2	30	% m^2	7.428 RS
5	Super structure	66.59	m^3	420	% m^3	279.678 RS

Add 3% for Contractor $= 820.28 \times \frac{3}{100}$

$= 24.60$

Add 2% for works charged establish $= 820.28 \times \frac{2}{100}$

$= 16.40$

Total $= 820.28 + 24.6 + 16.4$

$= 861.28$ RS.

9/11/24

Analysis of Rates

Exp. No. : 9
Date : 18/10/2024

The determination of rate per unit of a particular item of work from the cost of quantities of materials, the cost of labourers and other miscellaneous petty expenses require for its completion is known as the analysis of rate. A reasonable profit, usually 10% for the contractor is also included in the analysis of rate. Rates of materials are usually taken as the delivered at the site of work and include the first cost (cost at origin), cost of transport, railway freight if any, taxes etc. If the materials are to be carried from a distant place, more than 8 kms (5 miles), then cost of transport is also added. The rates of materials and labour vary from place to place and therefore, the rates of different items of work also vary from place to place.

For the purpose of analysis, the details about all the operations involved in carrying out the work should be available, the quantities of materials required and their costs should be known and the number of different categories of labourers required and the capacity of doing work per labourer and their wages per day

should be known. These can be known only from experience of practical works.

The rates of a particular item of work depends on the following.

(i) Specifications of works and materials, quality of materials, proportion of mortar method of constructional operation etc.

(ii) Quantities of materials and their rates, number of different types of labourers and their rates.

(iii) Location of the site of work and its distances from the sources of materials and the rate of transport, availability of water.

(iv) profits and miscellaneous and over head expenses of contractor.

Over head costs:

Over head costs include general office expenses, Rents, taxes, supervision and other costs which are indirect expenses and not productive expenses on the job. The miscellaneous expenses on overheads may be under the following heads.

A - General - overheads:

i) Establishment (office staff)

ii) Stationary, printing, postages, etc.

iii) Travelling expenses

iv) Telephone

v) Rent and taxes.

B) Job overheads

a) Supervision (salary of engineers, overseers, supervision, etc.,)

b) Handling of materials

c) Repairs, Carriage and depreciation of T and P.

d) Amenities of labour

e) workmen's compensation, insurance, etc.

f) Interest on investment

g) Losses on advances.

The contractor may be allowed a net profit of 6 to 8 percent, and the miscellaneous over head expenses may come to about 5 to 10 percent. For overhead expenses and contractors profit 15% of the actual cost may be reasonable amou

but it is usual practice to add 10 percent for all these under the head profit. For small works overhead cost may be very little.

The analysis of rate is usually worked out for the unit of payment of the particulars item of work under two heads.

(i) Materials and

(ii) Labour

and their costs added together give the cost of the items of work. The costs of materials are taken as delivered at site inclusive of the transport, local taxes and other charges for tools and plants (T and P) and miscellaneous petty items (Sundries) which can not be accounted in details lumi-sum provision is made. A provision of water charges @ 1 ½ % of the total cost is made in the rat Adding 10% to this cost as contractor's profit the rate per unit of the item of work is obtained. If transport of materials is to be done from a distant place more th 8m (5 miles) analysis of transport work may be done

eperately.

If cement and steel are supplied by the department and the contractor is not to invest any money ~~and the contractor~~ on these, 10% profit is not allowed on cement and steel. The cost of carriage of cement and steel from the godown to the site of work should be allowed to the contractor. But if cement and steel are to be arranged by the contractor the 10% should be added as profit on these materials also 10% profit may be added over the whole cost of labour and materials including cement and steel, if it is not specified that these will be supplied departmentally.

9/11/24

10

Estimate of Abstract cost of given work

Exercise – 7

Exp. No. : 10

Date : 25/10/2024

Lime concrete foundation with 40mm guage brick blast unit $1m^3$ take $10m^3$ and with white lime and suki 1:2

Proportion – 16:32:100

= 1:2:6

Particulars	Quantity	Rate	cost
1. Material			
Brick blast I class 40 mm guage	$10 m^3$	850.00	8500
White lime	$1.6 m^3$	1000.00	1600
Suki	$3.2 m^3$	700.00	2240.00
			12340.00
2. Labour	Half member	800	400
Mason	1	700	700
Mazdoor	12	600	7200

Men (or) Women labours	12	400	4800
Watermen	2	300	600
Miscllenious charges		200	200
			13900.00
		Total	26240.00

To add 1.5% of water charges $= 26240 \times \frac{1.5}{100}$

$= 393.60$

To add 10% of Contractor profit $= 26240 \times \frac{10}{100}$

$= 2624.00$

Grand Total $= 26240 + 393.6 + 2624$

$= \frac{29257.6}{10}$

$= 2925.76$ per cum.

9/11/24 (10)

Estimate & Abstract cost of given work

Exercise NO-8

Exp. No. : 11

Date : 1/11/2024

R.C.C work in beam, column, slabs, etc----

1:2:4 – 1 m^3

Particulars	Quantity	Rate	cost
Materials			
Stone blast 20mm guage	8.8 m^3	2200	19360.00
Sand	4.4 m^3	1900	8360.00
Cement (64) bags	2.2	12000	26400.00
Steel, Mild steel bars at 1% @ 78.5q per m^3	7.85 m^3	7300	57305
Binding wire	1.5kg	125	187.5
			1,11,612.5
2. Labour			
Mason	1/2	800	400
Mazdoor	3	700	2100
Men (or) women (abours	12	600	7200
	20	400	8000

Watermen	6	300	1800
Miscllenuous charges		200	200
			19700.00
3. Bending, Trackling, binding and steel bars in position blak Smith	8	500	4000
Mazdoor	8	250	3600
sundriers		150	150
Centering, shuttering, timbers, plants, ballies	lumbson	3000	3000
carpenters	10	450	4500
Nails	10	450	4500
sundrlers	lumbson	500	500
		150	150
			20,400

To add 1.5% of water charges = $151712.5 \times \frac{1.5}{100}$

$= 2275.6875$

To add 10% of contractor profit = $151712.5 \times \frac{10}{100}$

$= 15171.25$

Grand Total = $151712.5 + 2275.6875 + 15171.25$

$= \frac{169159.43}{10}$

$= 16915.943$ per cum

9/11/24

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Exp. No. : 12
Date : 8/11/2024

Preparation of Bill

Prepare a first running bill of a contractor for the construction of a building from the following data.

Measurement of work done is recorded in the measurement book, and the abstract of quantities is prepared in the measurement book. The abstract of quantities with the rates of different items is given below:

1. Earthwork in excavation in foundation ... 35 cum @ Rs. 180.00 per cum
2. B. C lime concrete in foundation ... 14 cum @ Rs. 73.00 per cum
3. R.C.C work 1:2:4 including steel but including centering and shuttering ... 4 cum @ Rs 290.00 per cum
4. 2.5 cm C.C. 1:1½:3 damp proof course ... 20 Sqm @ Rs. 9.00 per Sqm
5. First class brickwork in 1:6 in cement mortar in foundation & plinth ... 30 cum @ Rs. 80 per cum

6. First class brick work in ... 20 cum @ RS. 84.00 per cum
lime mortar in Super structure

7. Mild steel work in Reinforcement .. 3q @ RS. 200.00 per q.

The details of materials issued to the contractor from government stock with their issue rates are as follows:-

(i) Cement – 60 ~~kgs~~ bags @ RS. 10.50 per kg.

(ii) 1st class bricks – 20,000 nos @ RS. 90.00 per 1000 nos.

(iii) Mild steel bars – 3 quintal @ RS. 160.00 per quintal.

10% of bill amount shall have to be deducted as security money.

First running account Bill

Unit	Quantity up to date	Items to work grouped under sub-heads	Rate	Amount up-to date Rs	P	Remark
1000 cum	35 cum	1. Earthwork in excavation in foundation	1800	63	00	
1 cum	14 cum	2. Lime concrete in foundation	73.00	1022	00	
1 cum	4 cum	3. R.C.C work 1:2:4 excluding steel but including centering & shuttering	290.00	1160	00	

1/cum	30 cum	5) first class brickwork in 1:6 cement mortar in foundation and plinth	80.00	2400.00
1/sqm	20 cum	4) 2.5 cm C.C 1:1½ damp proof course	9.00	180.00
1/cum	20 cum	6) First class brick work in lime mortar in super structure	84.00	1680.00
1/q	3q	7) Mild steel work in reinforcement	200.00	600.00

Total values of work done - 7105.00

Deduct 10% security money to be kept in deposit 710.5

Deduct value of material used:-

i) Cement 60 bags @ Rs. 10.50 per bag = Rs. 630.00

ii) 1st class brick 20,000 nos @ Rs. 90.00 per 1000 nos = 1800.00

iii) Mild steel bars 3 quintal @ Rs. 160.00 per q = 48000

Net amount of payment to be made to Contractor Rs. 3484.50/-