LECTURE NOTE

ON

ESTIMATION AND COST EVALUATION-I (TH.4)

3RD SEMESTER IN CIVIL ENGG.

PREPARED BY

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ESTIMATION & COST EVALUATION -(I

Estimate

Definition

→ An estimate is the probable cost of a work (building project) is usually prepared before the Construction

→ Estimate is prepare by calculating the quantities required and then calculating the cost at suitable rate. The primary object of an estimate is to know the cost of the construction work before Construct

Types Of Estimate

1) Preliminary / Rough cost / Approximate Estimate.
2) Plinth Area Estimate.
3) Cube rate Estimate.
4) Detailed Estimate.
5) Revised Estimate
6) Annual Repair / annual maintenance Estimate.
7) Supplementary Estimate
8) Quantity Estimate

1) Preliminary / Rough Cost / Approximate Estimate

This is an Estimate to found out and approximate cost in short time. This type of Estimate is prepared to beside the financial aspect and policy matter, Giving an idea of the cost by proposal after taking into consideration the requirements of the department concerned.

→ The rough cost Estimate is accompanied by :

i) A detailed report

ii) Brief Specification

iii) Site plan / layout plan showing the proposal in hand.

iv) Line plant showing the North line On it.

v) The brief idea of rates for different items.

2) Plinth Area Estimate

→ The Estimate is an approximate which consist of working out the plinth area of a building which is multiplied by plinth area rate to gate an Estimate for that building.

→ The plinth area should be calculated for the roofed area of a building by taking external dimentions excluding the plinth Obsaids, The area of Courtyard.

3) Cube Area Estimate

→ This estimate is also known as approximate Estimate it is based on cubical contents of proposed building to be constructed and then applying to it the rate per cubic metre (Plinth Area of the building x height x Cubic Content rate)

1) Detailed Estimate

This Estimate Consist of the detailed particulars for the quantities, rate and cost of all items involved for Satisfa

Detailed Estimate is accompany by:-

a) Detail Report
b) Detail Specification
c) Detail Drawings (plan, elevation, section)
d) Calculation and design various items like beams, columns, slabs etc
e) Schedule of rate
f) Analysis of rate

5) Revised Estimate

It is also a detailed estimate and is prepared afresh, when the Original Sanctioned detailed estimate exceed by 5% or more, either due to the rate being found in or due to some other regions.

6) Annual Repair / Annual Maintenance Estimate

→ To keep the building or any construction work in proper condition annual repairs are carried out for which and estimate is prepared.

→ For buildings it includs whitewashing, painting, colour washing, etc. Certain petty works like repair of force, patch repair to cement plaster of wall replacement of glass panes etc

The Annual repair amount should not be more than $1\frac{1}{2}$ % of the capital cost of the wall.

7) Supplementary Estimate

When Sum additions are done to the Original Work afresh detailed estimate is prepared to Supplement the Original work. This estimate is known as Supplementary Estimate.

8) Quantity Estimate

This is a Complete estimate of quantities for all items of work requaired to Complete a project. the quantity of individual items of different work is calculated from the respective dimensions on the drawing. Then Cost of is individual item, is obtained by multiplying the quantity with the rate per unit of that item.

Definition plinth Area

The built-up covered area of a building measured at floor level of any storey is called plinth area. It is calculated for the roofed area of a building by taking external dimensions excluding the plinth offset. The area of courtyard Open area, balconies and Cantilever projections, etc should not be included in it.

Floor Area

Total area of floor in between walls that is area of floor of all rooms, verandahs, Corridors, passages entrance halls, staircase room, kitchen

Stores, bath and latrines, etc is called floor area
Floor area is equals to plinth area minus area occuped by walls which should include the area of door and other openings, intermediate pillars and supports 50% Area of the balconies shall be consider in the floor.

Carpet Area

It is the liveable area of a building at any floors. It is total floor area minus the circulation area and other inclusive such as bathrooms, water closthes, air conditining rooms, etc. It should exclude the kitchen, factrie, stores and similar other rooms which are not used for living purpose in residensial building.

UNITS OF MEASUREMENT

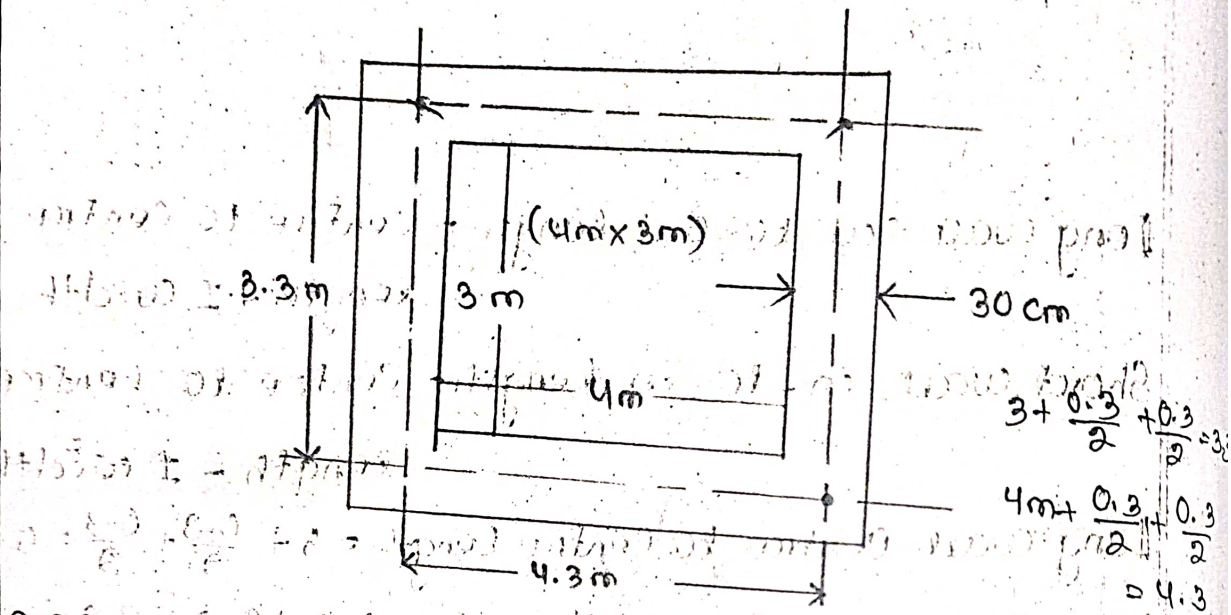
i) Earthwork excavation ——→ Cum.
ii) Cement concrete (PCC) ——→ Cum.
iii) Brickwork ——→ Cum.
iv) DPC (Damp proof course) ——→ Sqm.
v) Steel work ——→ quintal
vi) plastering, painting ——→ Sqm

METHOD OF ESTIMATION

i) Long Wall - Shortwall method
ii) Centerline method

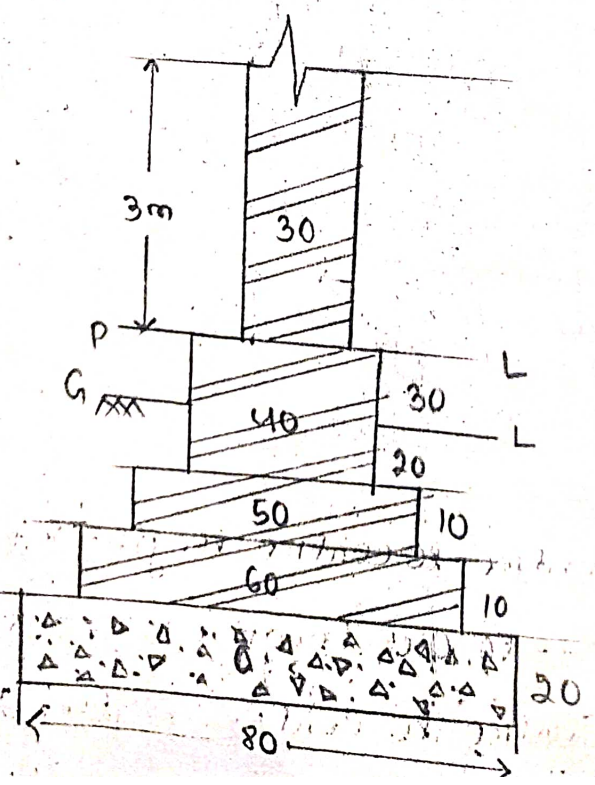
Center Line Method

In this Method total Center Line length of wall in a building is calculated and the value is multiplied with breadth and depth of the respective items to get the total quantity of the item.



Center to center length of long wall = inner length of room + one width of wall

Center to center length of short wall = inner breadth of room + one width of wall



Total Centre line length = (4.3)*2 + (3.3)*2

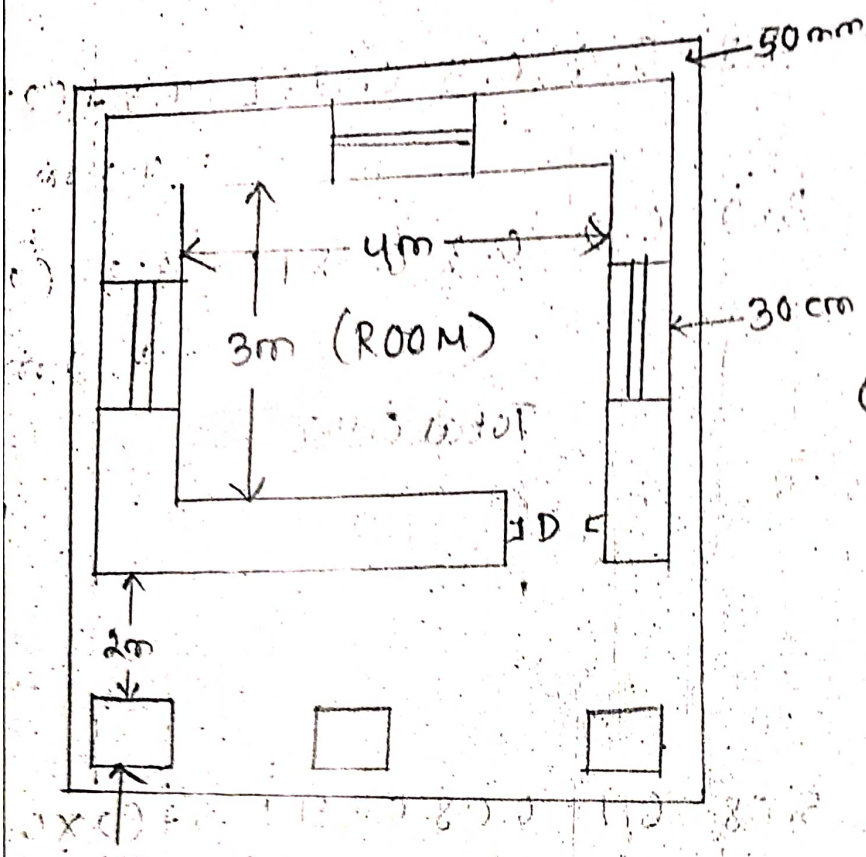
= 8.6 + 6.6

= 15.2 m

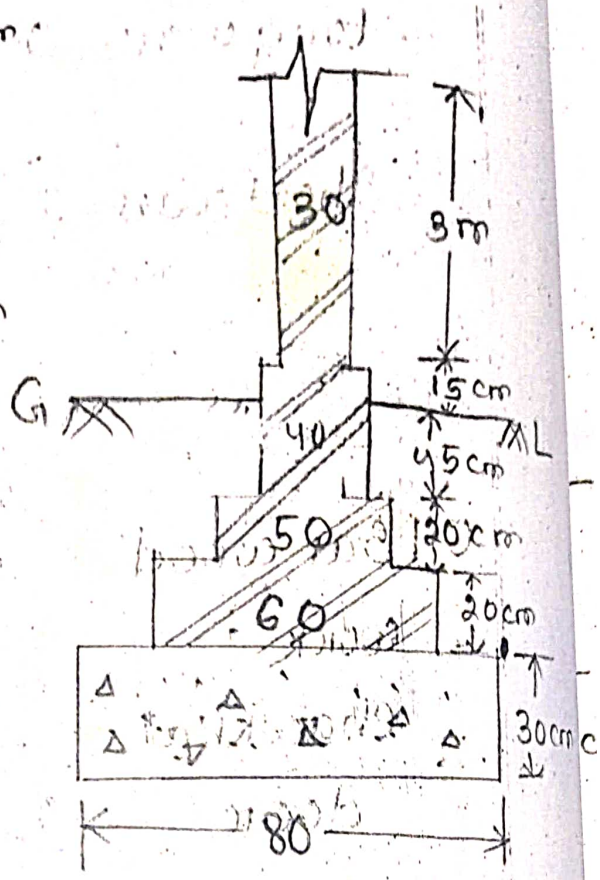
Quantity Estimate

Quantity = L X B X H

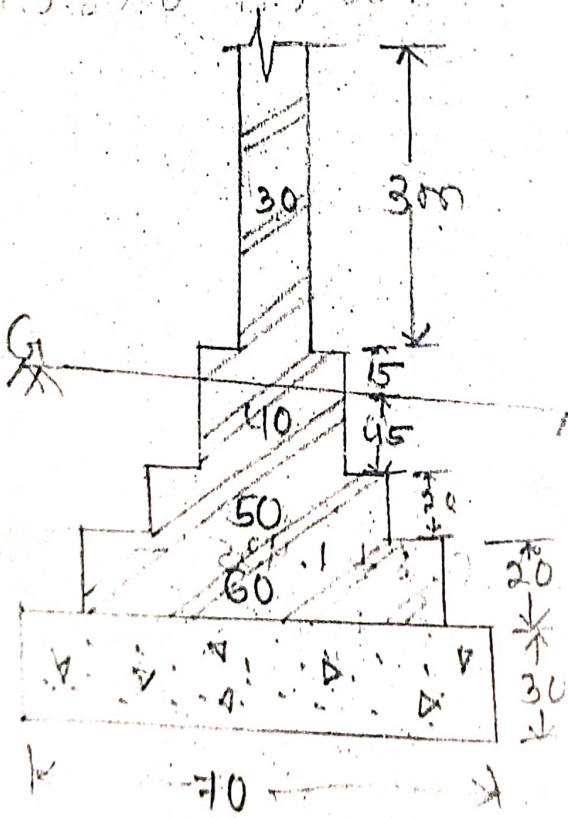
Item NO	Particulars Of Item	NOS	length (m)	breadth (m)	height (m)	Quantity (cum)	Explanatory Notes
01	Earthwork Excavation (Room)	1	15.2	0.8	0.6	7.296	
02	Cement Concrete in foundation (Room)	1	15.2	0.8	0.2	2.432	
03	Brickwork in foundation						
	1st footing	1	15.2	0.6	0.1	0.912	
	2nd footing	1	15.2	0.5	0.1	0.760	
	plinth wall	1	15.2	0.4	0.5	3.040	
04	DPC	1	15.2	0.4	—	4.712	
05	Brickwork in Super structure						
	wall	1	15.2	0.3	3	13.68	
	Total Brick					Total	18.392



30 cm X 30 cm
(pillar)



(ROOM WALL CROSS-SECTION)



(PILLER CROSS SECTION)

Longwall C/C length $= \frac{0.3}{2} + 4 + \frac{0.3}{2} = 4.3$ m

Shortwall C/C length $= \frac{0.3}{2} + 3 + \frac{0.3}{2} = 3.3$ m

Item NO	particular of item	NOs	length (m)	breadth (m)	height (m)	Quantity (Cum)	Explanatory notes
01	Earthwork Excavation (Room)	~~2~~	~~5.1~~	~~0.8~~			L=4.3+0.8 = 5.1 m
	Longwall	2	5.1	0.8	1.15	9.384	
	Shortwall	2	2.5	0.8	1.15	4.600	L=3.3-0.8 = 2.5m
	Verandah pillars	3	0.7	0.7	1.15	1.690	
					Total	15.674	
02	Cement Concrete in foundation (Room)						
	longwall	2	5.1	0.8	0.3	2.448	
	Shortwall	2	2.5	0.8	0.3	1.200	
	Verandah pillars	3	0.7	0.7	0.3	0.441	
					Total	4.089	
03	Brickwork in foundation and plinth, Room long wall						

	1st footing	2	4.9	0.6	0.2	1.176	L = 4.3 + 0.6 = 4.9
	2nd footing	2	4.8	0.5	0.2	0.960	L = 4.3 + 0.5 = 4.8
	plinth	2	4.7	0.4	0.6	2.256	L = 4.3 + 0.4 = 4.7
	Shorewall-						
	1st footing-	2	2.7	0.6	0.2	0.648	L = 3.3 - 0.6 = 2.7
	2nd footing-	2	2.8	0.5	0.2	0.560	L = 3.3 - 0.5 = 2.8
	plinth	2	2.9	0.4	0.6	1.392	L = 3.3 - 0.4 = 2.9
	Verandah pillar						
	1st footing	3	0.6	0.6	0.2	0.216	
	2nd footing	3	0.5	0.5	0.2	0.150	
	plinth -	3	0.4	0.4	0.6	0.288	
					Total	7.646	
04	Brickwork in Superc. Structure (Room)						
	Longwall	2	4.6	0.3	3	8.280	L = 4.3 + 0.3 = 4.6m
	Shorewall	2	3	0.3	3	5.400	L = 3.3 - 0.3 = 3m
	Verandah pillar -	3	0.3	0.3	3	0.810	
					Total	14.490	

Total Brickwork in foundation & Superstructure =

7.646
+ 14.490
22.136

	Deduction					
	for doore-	1	1	0.3	2	0.600
	window-	3	1	0.3	1.5	(+) 1.350
						1.950

Grand total Brickwork in foundation and Superstructure

22.136
(-) 1.95
20.186

Reinforced Cement Concrete Work (RCC)

RCC Work (Rein forced Cement Concrete)

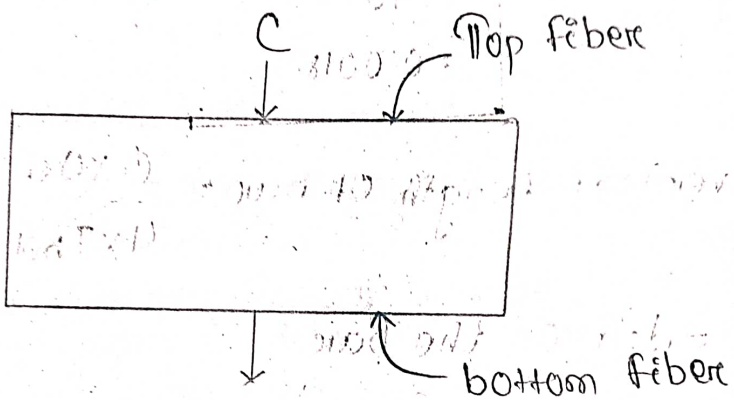
(Cement + Sand + Course aggregate + RCC)

PCC:- Plain Cement Concrete

(Cement + Sand + Course aggregate)

Pillar and Column = Vertical member

Beam = Horizontal member



C = Compressive load

T = Tensile load

RCC WORK

Steel reinforce Cement is Carculated in RCC roof Slabs, Lintels, Columns and beam from the detailed drawings including all over labs, hooks, Cranks, etc in quintals.

→ Sometimes Steel reinforce Cement is also calculated approximately on the percentage basic of Concrete the percentage for Steel or Concrete.

(c) Beam = 1% to 2%.

(a) Lintel and Slabs = 0.7% to 1%

(iii) Columns = 1% to 5%

$$\frac{1}{100} \times 0.18$$

$$= 1.8 \times 10^{-3}$$

$$= \frac{1.8}{10^3}$$

$$= 0.0018$$

(over) lap length of bar $= \frac{\phi \times \sigma_{st}}{4 \times T_{bd}}$

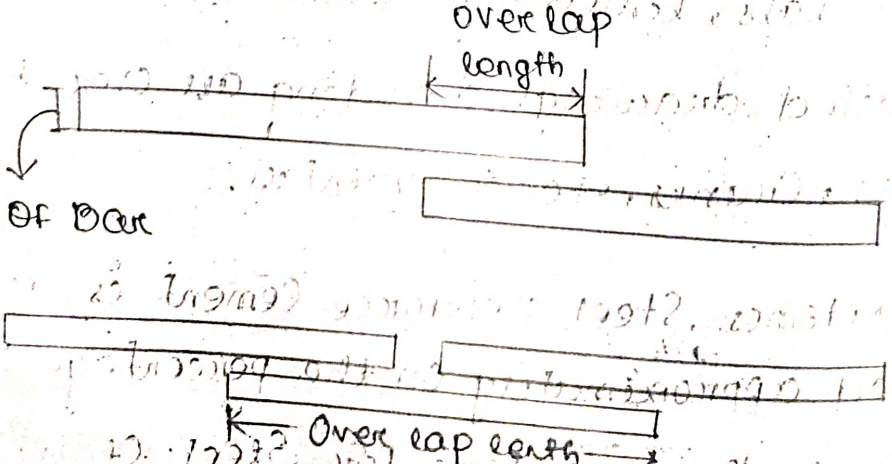
ϕ = dia of the bar

σ_{st} = Stress in Steel = 140 N / mm^2

T_{bd} = Sheare Stress = 0.6 N / mm^2

$\phi = 10$

$$L = \frac{10 \times 140}{4 \times 0.6} = 583.33 \text{ mm}$$



→ As per indian Standard Specification the lap length or Reinforcement shall not be less than.

(1) For tension bar = $\frac{\text{Bar dia} \times \text{Actual tensile Stress}}{\text{Four times the permissible average bond Stress}}$

Or

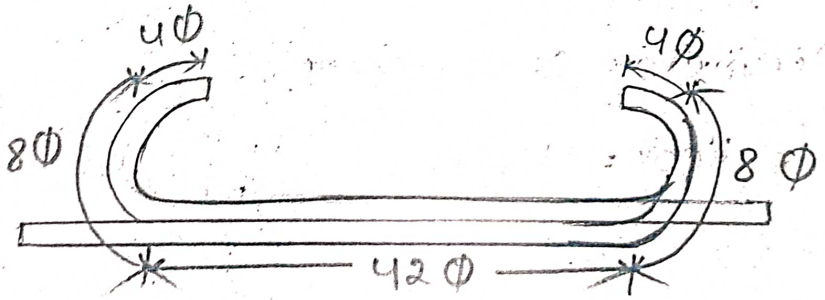
30 times the bar diameter which ever is greater.

(2) For Compression bar =

$\frac{\text{Bar diameter} \times \text{Actual Compressive Stress}}{\text{Five times the permissible average bond Stress}}$

Or

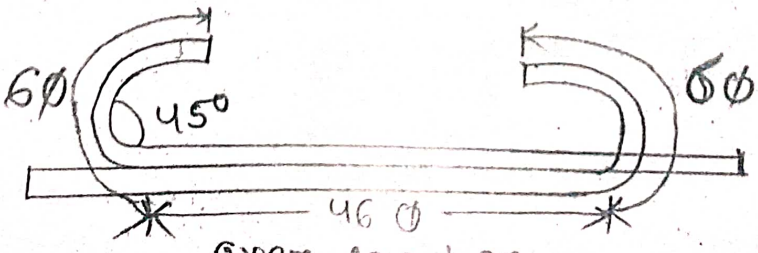
24 times the bar diameter which ever is greter



Over lap bar

Over lap length = 42 + 8 + 4 = 54 Ø (Semicircular)

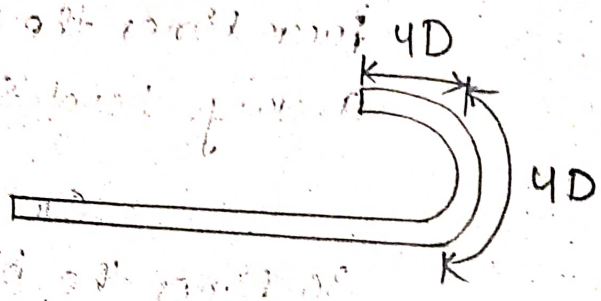
(for hook bar)



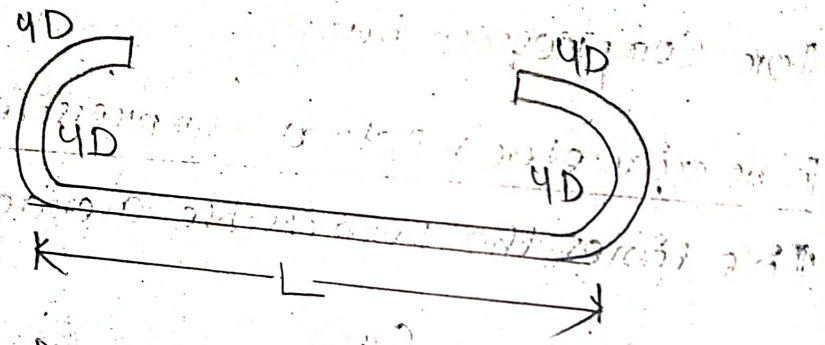
Over lap bar

Over lap length = 46 Φ + 6 Φ + 52 Φ (For 45° angle hooks)

Standard Hook



Double Hook

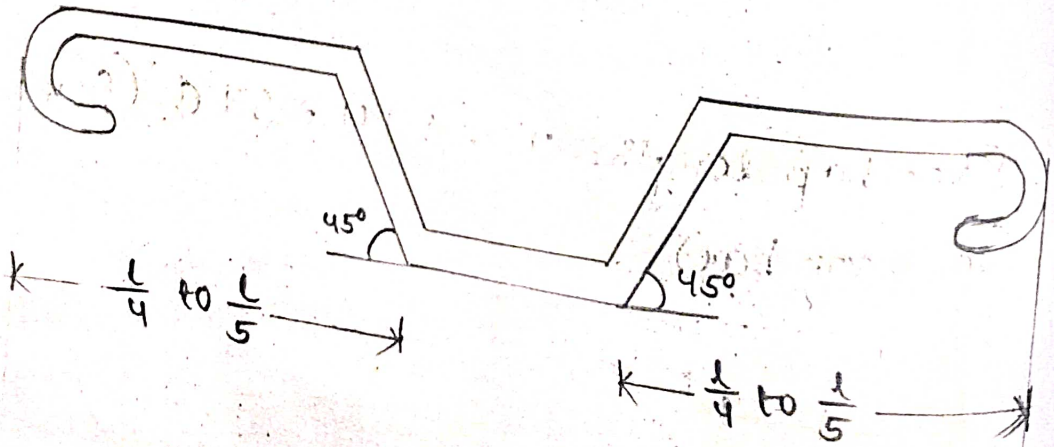


Total length of Bar = L + (9D + 9D) = (L + 18D)

L = length of beam or Slab - two end covers

D = Diameter of the bar

One Hook = 9D

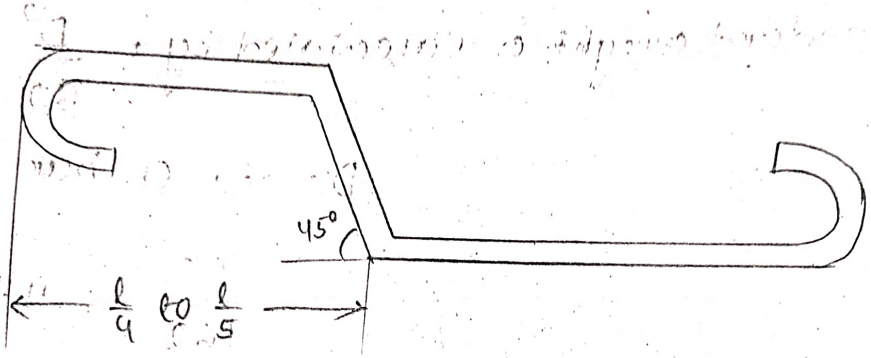


(Alternate bar bent up at both ends)

Alternate bar straight as above (top)

Or

every bar bent up



Addition length for bent up,

For one bent up additional length $= \left(\frac{d}{\sin 45} - d\right)$

$= d\left(\frac{1}{0.707} - 1\right)$

$= d(1.42 - 1)$

$= 0.42d$

For two bent up bars additional length $= 2 \times 0.42d$

$= 0.84d$

d = vertical distance centre to centre = Total depth of beam - top cover and bottom cover