

Estimating & Costing

Estimating 10/10/18

30 09 18

Basic Conversion :-

- ① $1M = 1000mm$ $1M = 328FT$
 $1M = 100CM$ $1M^2 = 10.765sq. FT$
- ② $1inch = 25.4mm$ $25mm = 0.025M$
- ③ $1Feet = 304.8mm = 0.304M = 300mm$
- ④ $1Gunta = 33FT \times 33FT = 1089FT^2 = 101.17m^2 = 100m^2$
- ⑤ $1Acre = 40Gunta = 1089 \times 40 = 43,560sq. FT$
 $= 4046.85m^2$
- ⑥ $1hector = 2.5Acre$
 $1hector = 2.5 \times 4046.85$
 $= 10117.1m^2 = 10000m^2$

1Acr	1Acr	0.5Acr
/	/	/

} 1 hector.
- ⑦ $1yard = 3Feet$
- ⑧ $1mile = 1.60km$
- ⑨ $1brass = 10FT \times 10FT = 100sq. FT \text{ or } FT^2 \approx 2.80m^3$
 $= 10FT \times 10FT \times 1FT = 100sq. FT = 2.80m^3$
- ⑩ $1pound = 454gm$
- ⑪ $1Gallon = 3.785lit$
- ⑫ $1m^3 = 1000lit$
- ⑬ $1Million = 10lakh$
- ⑭ $1billion = 100Acres$

① convert 7' 3" into Meter $\rightarrow (7 \times 0.304) + (3 \times 0.25)$
 $= 2.128 + 0.762$
 $= 2.89 \text{ M}$

② convert 8' 4" into meter $\rightarrow 2.5 \text{ M}$

③ convert 10' into M $\rightarrow 3 \text{ M}$

④ 4M \rightarrow ft 8 in = 13' 4"

13	4000	4	100
300	3900	200	100
	100		0

⑥ 1 brass to m²

$= (0.304 \times 10) + (0.304 \times 10) + (0.304 \times 1) = 2.80 \text{ m}^2$

9' 12" \Rightarrow 1.8 m

$5' \times 0.304 + 11.5 \times 0.25$
 $1.52 + 2.875$

$\frac{1.520}{0.9}$
 $\frac{1.520}{0.9} = 1.688$

$5' \left(\frac{11 \frac{1}{2}}{2} \right)'' \Rightarrow 5 * 0.3048 \oplus 11.5 * 0.254$

$\Rightarrow 1.524 \oplus 2.921$

5 feet 11 1/2 inch \Rightarrow 1.8161 m \approx 181 cm	✓
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Estimating :- Estimate is the probable cost of work is usually prepared before the construction of work.

costing :- To Finding cost per item of work is known as "costing".

Purpose of Estimate :-

- 1) To Find approximate cost of work. -
- 2) To Find approximate quantities of material required.
- 3) To Find tools & plants in advance. -
- 4) To Fixed period of a construction.

Types of Estimate :-

- | | |
|--------------------------|--------------------------|
| ① Detailed Estimate | ② Approximate Esti. |
| → Revised | i) plinth Area method. |
| → Supplementry | ii) cubic content method |
| → Revised & supplementry | iii) Service unit method |
| → Repair & maintenance. | iv) Typical boy method |

① Detailed Estimate

A Revised Estimate :- Revised Estimate is prepared under following condition.

- i) When $\pm 5\%$ Material deviation is expected.
- ii) When original expenditure works is likely to exceed 10% of Administrative Approval.

B Supplymentry Estimate :- This is prepared when the additional work is required for original construction work.

c] Revised & supplementary Estimate :- When there are material deviation and change in design deviation work plus any additional work of this estimate is prepared.

D] Repair and Maintenance :-
→ This estimate is prepared to maintain the structure or work in proper order & safe condition.

2] Approximate Estimate :-

A] Plinth Area Method :- This estimate is prepared on basis of plinth area of a building in which plinth area is multiply by plinth area rate.

Note → courtyard and plinth offset should not consider in plinth area method.

Courtyard Area :- Area open to sky - open duct [H]

B] Cubic Rate Method :- This estimate is prepared on basis of cubic content of a building (B x L x H) and multiply by the cubic rate.

C] Service unit Method :- In this method service unit for particular item is consider, such as

i) School building → per bench

ii) Hospital → per bed

iii) water tank → per lit.

D] Typical Bay Method :- In this method cost per bay is calculated.

e.g. → major platform of Railway, Industrial shed and Building frame.

Some important definition :-

- 1] Contingencies :- IT IS THE INCIDENTAL EXPENSES OF MISCELLANEOUS CHARACTER WHICH CAN'T CLASSIFIED IN ANY ITEM OF WORK.
- provision 3 to 5% OF ESTIMATED COST IS PROVIDED IN ESTIMATE
- 2] Work-charge establishment :- IT IS THE ESTABLISHMENT WHICH IS CHARGE TO WORK DIRECTLY.
- Generally 1.5 to 2% OF ESTIMATED COST IS PROVIDED. SUCH AS WORK SUPERVISOR, CHAUDHAR.
- 3] Administrative Approval :- The Administrative Approval denotes the formal acceptance by the administrative dept.
For pune \rightarrow (PMC)
- 4] Technical Sanction :- IT MEANS TO SANCTION AND ORDER BY THE COMPETENT AUTHORITY OF ENGG. DEPT.
Such as design cal, estimate etc.
- 5] Provisional Sum :- IT IS A MONEY KEPT ASIDE FOR SUCH ITEM WHOSE ESTIMATE IS NOT LIKELY TO BE PREPARED (ITEM DETAILS ARE NOT KNOWN) SUCH AS PROVISION OF LIFT, WATER LINE, SEWER LINE. ETC.
- 6] Centage charge :- WHEN ENGG. DEPT TAKE SOME WORK ON OTHER DEPT. A PERCENTAGE AMOUNT OF 10 TO 15% OF ESTIMATED COST IS CHARGE. IS CALLED AS "CENTAGE CHARGE".
e.g PWD execute work of Road construction on dom.

For Estimate \rightarrow 191200 is used

2.1.1.1			
2.1.1.2			

7] Tools and plants :- In a big project, a percentage of 1 to 1.5% of estimated cost is provided for purchase of tools and plants.

Principle of Unit For Measurement.

✓ 1) Mass, voluminous & thick work \rightarrow M³

✓ 2) Shallow and thin work \rightarrow M²

✓ 3) Long and thin work \rightarrow M

✓ 4) piece work or jobwork \rightarrow No's.

Limits of Measurements and degree of accuracy

As per \rightarrow SP-27

1) Dimension shall be measure upto = 0.01m.

2) Area shall be measured upto = 0.01m²

3) cubic content shall be measured upto = 0.01m³

4) weight shall be measured upto = 1kg.

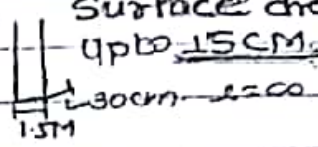
Format of Measurement sheet :-

Sr No	Description	No	L	B	H	Quantity	Total quantity

Format of Abstract sheet :-

Sr NO	Description	Quantity	Unit	Rate/Unit	Amount	Total	Remarks

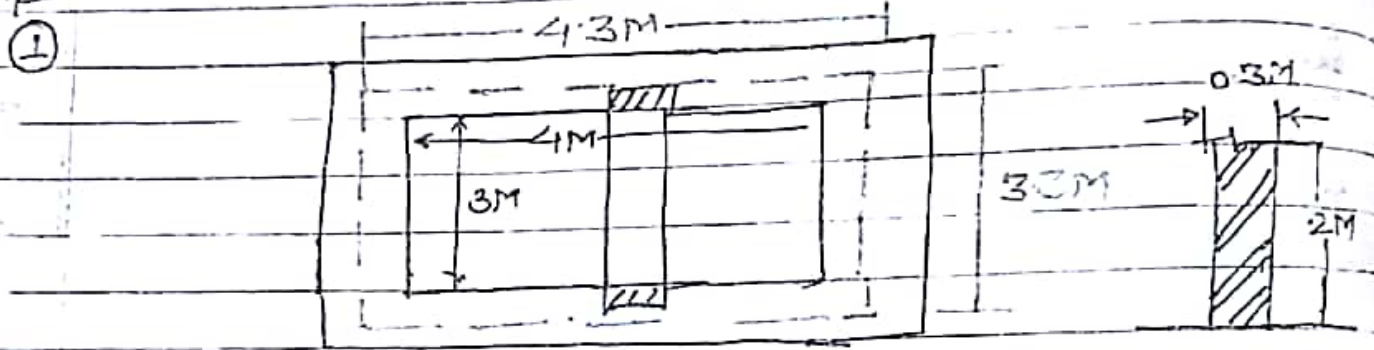
Unit of Measurement of Work :-

#	Name	Unit	Unit	Remark
1	Excavation	M ³	M ³	Surface dressing upto <u>15 CM.</u> 
		M ²	M ²	
2	P.C.C.	M ³		
3	D.P.C	M ²		
4	Brickwork	M ³ M ² →		Bricks on edge Half brick thick (upto 1.0m)
5	R.C.C	M ³		
6	Flooring	M ² M ³ →		IF thick is more than 75
7	Skirting / dado work →	R.M.E M ² →		When dept is more than <u>15 CM.</u>
8	plaster →	M ²		
9	wood work →	M ² → M ³ →		Door shutter or window Door frame.
10	steel work →	Kg. M ²		→ Steel Grill or ✓ Steel shutter ✓

Method of Estimate :-

- 1] Long wall and short wall Method :-
[In to In and out-out Method OR PWD Method]
- 2] Centre line Method
- 3] English Method → MES :- Military Engg. Services

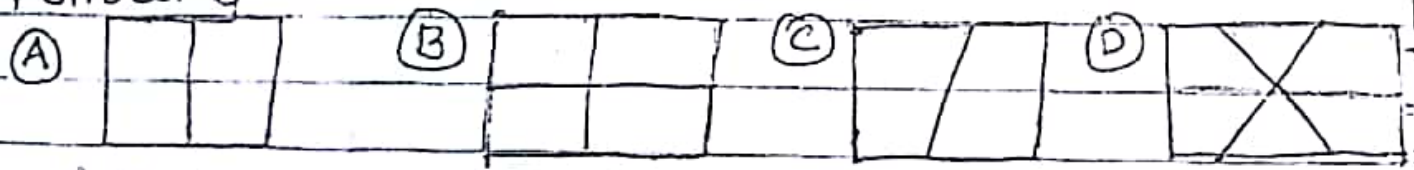
Example



Description.	L	B	H	Quantity
$L = (4.3 \times 2) + (3.3 \times 2) = 18.5m$	18.2M	0.3	2	$L \times B \times H$
$CL = L - \frac{B}{2} \times \text{NO. OF JUNCTION}$				$= 1.09213$
$= 18.5 - \frac{0.3}{2} \times 2$				
$= 18.2M$				

Note → (i) For the L-junction [] NO Deduction.
(ii) For T-junction → $(\frac{B}{2} \times \text{NO. OF T-junction})$ deduct

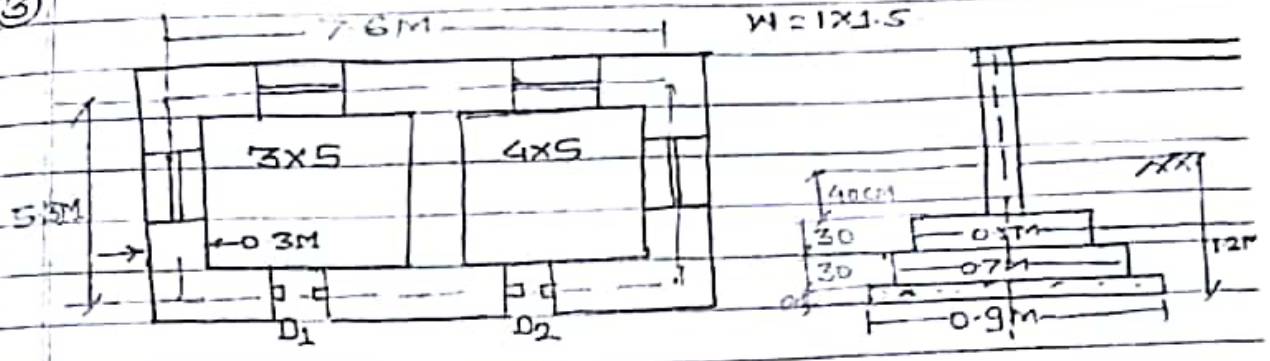
(2) Find the NO. OF JUNCTION for deduction for the following



→ Ans = 12 Ans = 6 Ans = 2 Ans = 8 + 2 = 10

②
③

D₁ = 1.2 x 2.1
W = 1 x 1.5



Sl.	Description	No	L	B	H	Quantity	Total	Remarks
1	Excavation. L = (7.6 x 2) + (5.3 x 8) L = 31.1M deduction → $31.1 - \frac{0.9 \times 2}{2}$ = 30.2		30.2	0.9	1.2	32.4		
2	P.C.C. ded ⁿ = 30.2		30.2	0.9	0.2	54		
3	I st step deduction $31.1 - \frac{0.7 \times 2}{2}$ = 30.4		30.4	0.7	0.3	6.384		
4	II nd step D = $31.1 - \frac{0.5 \times 2}{2}$ = 30.6		30.6	0.5	0.3	4.59		
5	Brick Masonry. D = $31.1 - \frac{0.3 \times 2}{2}$ = 30.8M		30.8	0.3	3	27	27 - 1.512 - 1.8 = 23.68 m ³	
6	Door Door Window D = 8 ft →	2 4	1.2 1	0.3 0.3	2.1 1.5	1.512 1.8		

Rules For Deduction of plastering & painting

- ① opening at $0.5m^2 \rightarrow$ No deduction.
- ② opening between 0.5 to $3m^2 \rightarrow$ one face deduction
- ③ open above $3m^2 \rightarrow$ Both face deduction.

Deduction of Masonry

- ① Area upto $0.1m^2 \rightarrow$ No deduction
- ② No. deduction For Jambes and lintel offset.

standard size of Brick :- $19cm \times 9cm \times 9cm$.

size of frog :- $10cm \times 4cm \times 1cm$.

Modular brick :-

Traditional / size of brick :- $22.9cm \times 11.4cm \times 7.6cm$

size of frog :- $14cm \times 5cm \times 1cm$

Size of Brick with Mortar = $20cm \times 10cm \times 10cm$

Rate Analysis

(Analysis For Brick and cement)

01/10/17

Brick Analysis:

$$\text{Volume of 1 brick with mortar} = 0.2 \times 0.1 \times 0.1 \text{ m}$$



$V = 1 \text{ m}^3$

$$\therefore \text{NO. OF brick} = \frac{1 \text{ m}^3}{0.2 \times 0.1 \times 0.1}$$

$$\therefore \text{NO. OF brick with mortar} = 500 \text{ NO.}$$

$$\therefore \text{Total volume} = \text{Vol}^m \text{ of brick} + \text{Vol}^m \text{ of mortar.}$$

Cement Analysis:

$$W = V \times \gamma$$

$$50 \text{ kg} = V \times 1440 \text{ kg/m}^3$$

$$V = 0.035 \text{ m}^3$$

$$1 \text{ Bag} \rightarrow 0.035 \text{ m}^3$$

$$x \rightarrow 1 \text{ m}^3$$

$$\therefore x = 29 \text{ bag}$$

Sp. gravity of cement = 1.5

density of cement = 1440 kg/m³

For 1 m³ cement, bag will be = 29 bag.

NO. OF brick for 1 m³ cement.

Task-Work :- capacity to do work by skilled labours in 8 hours of a day. Is known as "Task-work"

- Taskwork For Mason :-

Taskwork For Mason :-

1) P.C.C $\rightarrow 5 \text{ m}^3$

2) R.C.C $\rightarrow 3 \text{ m}^3$

3) Brick-work \rightarrow Plinth $\rightarrow 1.25 \text{ m}^2$

\rightarrow Superstructure $\rightarrow 1.00 \text{ m}^2$

4) plastering $\rightarrow 8 \text{ mm}$ $\rightarrow 8 \text{ m}^2$
 $\rightarrow 10 \text{ mm}$

5) Rubble masonry $\rightarrow 1.00 \text{ m}^3$

Rate Analysis For Brick-work :-

1) prepare Rate Analysis for brick work in a super-structure for 10 m^3 proportion assuming proportions 1:4

\Rightarrow Total volume = vol^m of ^{Mortar} brick + vol^m Brick = 10 m^3

For $1 \text{ m}^3 = 500$ Nos brick

\therefore For $10 \text{ m}^3 = 5000$ brick.

$$\therefore 10 = 5000 \times (0.19 \times 0.09 \times 0.09) + \text{vol}^m \text{ of Mortar}$$

$$\therefore \text{Volume of wet Mortar} = 2.035 \text{ m}^3$$

For dry vol^m, Increase wet vol^m by $\begin{cases} 35\% \text{ wastage} \\ 20\% \text{ drying} \\ 55\% \end{cases}$

$$\therefore \text{Volume of dry Mortar} = 2.035 + \frac{55}{100} \times 2.035$$

$$\therefore \text{Vol}^m \text{ of dry Mortar} = 3.57 \text{ m}^3$$

For proportion (1:4)

$$\text{Cement} = \frac{1}{5} \times 3.57 = 0.714 \text{ m}^3$$

$$\therefore \text{No. of bag} = \frac{0.714}{0.035} = \underline{\underline{2.1 \text{ bag}}} \rightarrow \text{for } 10 \text{ m}^3$$

$$\text{Sand} = \frac{4}{5} \times 3.57 = 2.857 \text{ m}^3$$

∴ Cost of Material

① Bricks = $5000 \times 8 = 40,000/-$

② cement = $21 \times 300 = 6300/-$

③ Sand = $2.857 \times 2500 = 7142/-$

∴ Total = $53,442/-$

NO OF Labours :- (Rules):-

For 5 Mason → 1 Head Mason

$$\frac{\text{Task work for mason}}{(\text{No. of mason})} = \frac{10 \text{ m}^3}{1.00} = 10 \text{ NO'S}$$

→ Male Mazdoor = 1 Mason 1 Male

→ Female Mazdoor = 1 Mason 1 Female

cost

① No. of Mason = $10 \text{ m}^3 / 1.00 = 10 \text{ NO'S} = 10 \times 500 = 5000$

② Head-mason = 2 NO'S → $2 \times 800 = 1600/-$

③ Male Mazdoor = 10 NO. → $10 \times 300 = 3000/-$

④ Female Mazdoor = 10 NO. → $10 \times 250 = 2500/-$

⑤ Bhisti = 5 NO. → $5 \times 300 = 1500/-$

Total = $13600/-$

∴ Total cost = Material cost + labour cost

= $13600 + 53442$

$2,67,042/-$

Add 10% contractor profit
1.5% water charge.

$$\therefore \text{Final cost} = 67.042 + \frac{11.5}{100} \times 67.042$$

$$= 74.751 \rightarrow \text{For } 10 \text{ m}^3$$

For 1 m³ = 74.751 → For proportion (1:4)

2) prepare Rate Analysis For P.C.C. 1:2:4 proportion. ^{c-s-a}

→ For 10 m³ volume → wet vol^m

Increase vol^m by 50%. $\left\{ \begin{array}{l} 30\% \\ 20\% \end{array} \right.$

$$V_{\text{dry}} = 15 \text{ m}^3$$

$$\text{Cement} = \frac{1}{7} \times 15 = 2.14 \text{ m}^3$$

$$\rightarrow \text{No. of bag} = \frac{2.14}{0.035} = 62 \text{ bags}$$

$$\text{Sand} = \frac{2}{7} \times 15 = 4.28 \text{ m}^3$$

$$\text{Aggregate} = \frac{4}{7} \times 15 = 8.57$$

Cost of Material :-

$$\text{Cement} = 62 \times 300 = 18,600/-$$

$$\text{Sand} = 4.28 \times 2500 = 10,700/-$$

$$\text{Aggregate} = 8.57 \times 2000 = 17,140$$

$$\text{Total} = 46,440/-$$

No. of Labour :-

Cost

$$\text{Mason} = \frac{10}{5} = 2 \rightarrow 2 \times 500 = 1000$$

for 20 m³ → 1 mason

$$\text{Head Mason} = \frac{1}{2} \rightarrow \frac{1}{2} \times 800 = 400$$

$$\text{Male Mazdoor} = 2 \rightarrow 2 \times 300 = 600$$

Female Mazdoor = 2 → 2 × 250

Shsb = 2 → 2 × 300

Total = 3100/-

∴ Total cost = Material cost + Labour

= 46,440 + 3100

= 49,540/-

∴ Final cost = $49,540 \times \frac{115}{100} = 56,971$ ^{10% contract profit} ^{1.5% water charges} ^{11.5%} 55,237 /- m^3

3] prepare Rate Analysis For R.C.C. (1:2:4) For 10 m^3 assuming steel 1%

→ Wet = 10 m^3 , Dry = 15 m^3

cement = $\frac{1}{7} \times 15 = 2.14 \text{ m}^3$

Sand = $\frac{2}{7} \times 15 = 4.28 \text{ m}^3$

Aggregate = $\frac{4}{7} \times 15 = 8.57$

steel = $\frac{1}{100} \times 10 = 0.1 \text{ m}^3$

∴ steel = kg = $V \times Y$

= 0.1×7850 — density of steel in kg/m^3

= 785 kg = 0.785 ton

Binding wire 100 kg → 1 kg.

∴ Binding wire = 7.85 kg

∴ Total steel = 792.85 kg. = 0.792 ton

Total cost of material = 46,448/-

cost of steel = $0.792 \times 60,000$ /-

= 47,520 /-

Total = 93,968 /-

No of labour's. cost
Mason = $\frac{10}{3} = 4\frac{2}{3}$ → $4 \times 500 = 2000/-$ (2)

Head mason = 1. → $1 \times 800 = 800/-$ (3)

Male Mazdoor = 4 → $4 \times 300 = 1200/-$

Female = 4 → $4 \times 200 = 800/-$ *

Blister = 2 → $2 \times 300 = 600/-$
Total = 5600

∴ Total cost = $93960 + 5600 = 99560/-$

Add = 11.5% — include profit

∴ Final cost = $99560 + \frac{11.5}{100} \times 99560$

For $10m^3 = 111,100/-$

$1m^3 = 11,100 (m^3)$

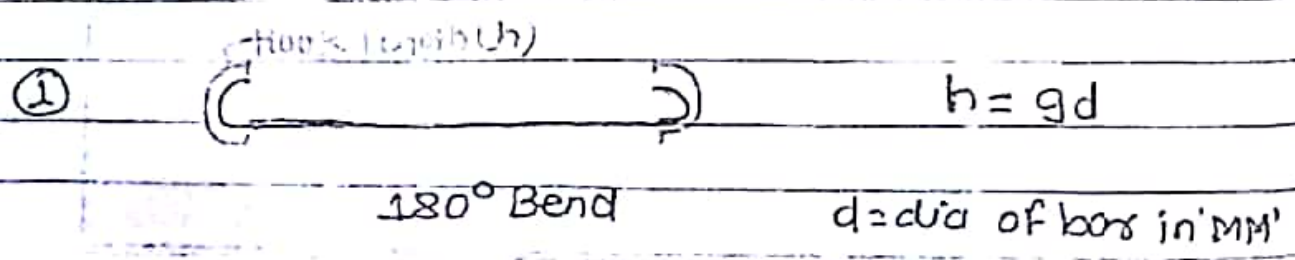
M15 → 1:2:4

M20 → 1:1.5:3

M25 → 1:1:2.

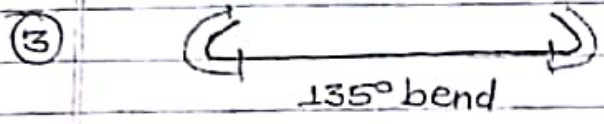
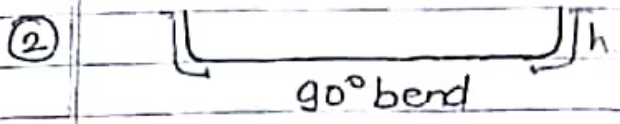
Rate Analysis For R.C.C. (Steel) work...

Standard Hook Length :-

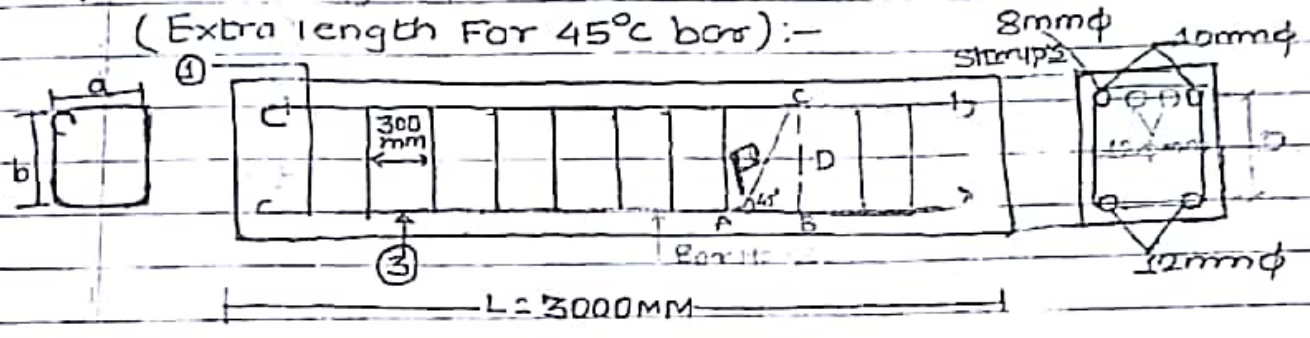


Extra length
 For 45° → 0.42D
 For 30° → 0.27D

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★ Extra length provided for 45° bent-up bar.
 (Extra length for 45° bar):-



length of Anchor bar ① = $l - 2 \times \text{cover} + 2 \times 9d$
 $= 3000 - (2 \times 20) + (2 \times 9 \times 10)$
 $= 3140 \text{ mm}$

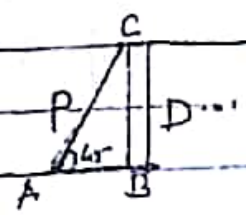
length of main bar ③ = $l - 2 \times \text{cover} + 2 \times 9d$
 $= 3000 - (2 \times 20) + (2 \times 9 \times 12)$
 $= 3176 \text{ mm}$

length of bent-up bar ② = $l - 2 \times \text{cover} + 2 \times (0.42D)$
Extra length

Extra length = $AC - AB$
 $= 1.42D - D$
 $= 0.42D$

$\sin 45 = \frac{D}{AC}$

$AC = 1.42D$ $AC = AC$



$\tan 45 = \frac{D}{AB}$

0.57 10

$\therefore AB = D$

Calculation Stirrups

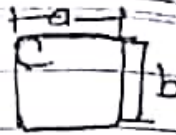
$$a = 230 - 2 \times \text{cover}$$

$$= 230 - 2 \times 20$$

$$= 190 \text{ mm}$$

$$b = 400 - 2 \times 20$$

$$= 360 \text{ mm}$$



$$\text{length of stirrups} = 2a + 2b + 2 \times 12d$$

$$= (2 \times 190) + (2 \times 360) + (2 \times 12 \times 8)$$

$$= 1292 \text{ mm}$$

$$\text{Length of bent up bar} = L - 2 \times \text{cover} + 2 \times 9d + 0.42D$$

$$= 3000 - (2 \times 20) + (2 \times 9 \times 12) + 0.42 \times 360$$

$$= 3327.2 \text{ mm}$$

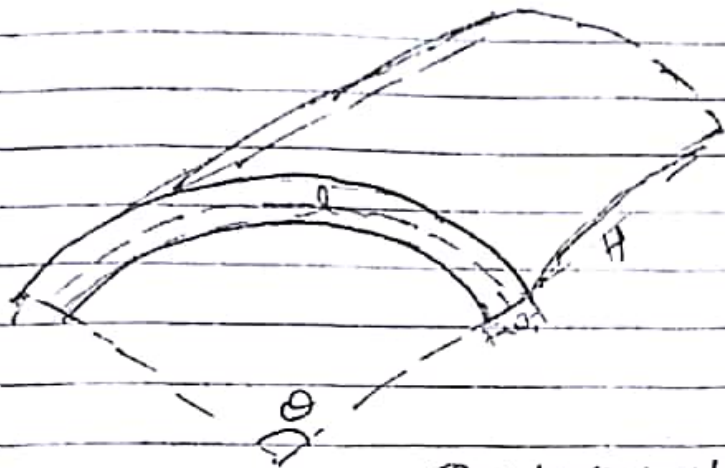
$$\text{No. of stirrups} = \frac{L}{\text{Spacing}} + 1$$

$$= \frac{3000}{300} + 1$$

$$= 11 \text{ Nos}$$

	Description	bar No	No	Length (m)	Dia (mm)	Weight $\frac{d^2}{162} \times \text{len}$	Total Wt
1.	Anchor Bar	1	2	3.140	10	0.617×3.140 $= 1.92 / \text{bar}$	1.92×2 $= 3.84$
2.	Main bar	3	2	3.176	12	0.88×3.176 $= 2.79$	2.79×2 $= 5.58$
3.	Bent-up bar	2	2	3.327	12	0.88×3.327 $= 2.927$	2.927×2 $= 5.854$
4.	Stirrups		11	1.292	8	0.395×1.292 $= 0.510$	0.510×11 $= 5.61$

★ quantity of Arch masonry For Given 'θ' :-



$$360^\circ \rightarrow 2\pi r$$
$$\theta \rightarrow r = 1$$

$$\therefore Q = \frac{\theta}{360} \times 2\pi r$$

$$Q = L \times W \times H$$
$$Q = \left(\frac{\theta}{360} \times 2\pi r \right) \times W + H$$

3 - Earth-Work Calculation

Lead → Lead shall be horizontal straight practicable distance through which earth can be carried.

Note → std. 30M lead consider.

Distance	upto 500M	500--5KM	above 5KM
Lead	50M	500 M	1 KM

Lift :- vertical distance through which the excavated earth is lifted.

Note → std 1.5M lift consider

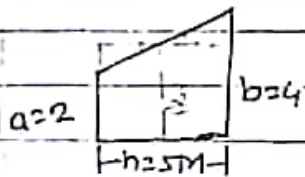
Measurement of volume :-

① Trapezoidal Formula.

② prismatical Formula → Simpson $\frac{1}{3}$ Rule
→ Simpson $\frac{3}{8}$ Rule

③ mid sectional formula

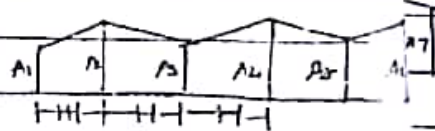
1] Trapezoidal Formula :-



$$= 3 \times 5$$

$$= \left(\frac{2+4}{2} \right) \times 5$$

$$= \left(\frac{a+b}{2} \right) \times h$$



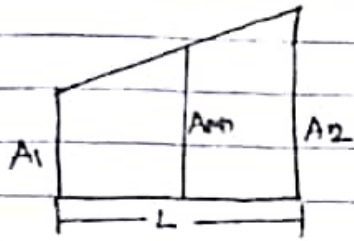
→ This method is based on Assumption that mid Area of a pyramid is a half avg. Area of the End's. and End sections are in parallel plane.

$$Q = \left(\frac{A_1 + A_2}{2} \times H \right) + \left(\frac{A_2 + A_3}{2} \times H \right) + \left(\frac{A_3 + A_4}{2} \times H \right) + \dots$$

Trapezoidal Formula

$$Q = \frac{H}{2} [A_1 + A_7 + 2(A_2 + A_3 + A_4 + A_5 + A_6)]$$

2] Prismoidal Formula.



$$A_m = \frac{A_1 + A_2}{2}$$

$$V = \frac{L}{6} [A_1 + 4A_m + A_2]$$

→ This Formula is based on Assumption that A_1 & A_2 are the Area at the ends and A_m is the area of a mid-section parallel to the ends

Note → This Formula is applicable for single strip only having 3 cross-sectional Area (odd-section)

→ prismoidal Formula to estimate volume of earthwork for more than 3 ds area of regular interval is

Given by . . .

$$i) \text{ Simpson's } \frac{1}{3} \text{ Rule} = \frac{L}{3} [A_1 + 4[A_2] + 2[A_3] + A_4]$$

$$ii) \text{ Simpson's } \frac{3}{8} \text{ Rule} = \frac{3L}{8} [A_1 + 3[A_2] + 2[A_3 + A_4] + A_5]$$

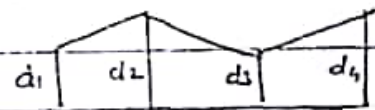
3] Mid-sectional Formula :-

→ In this Formula mean depth is to be calculated first.

i) By Avg. depth of two consecutive section.

$$d_{m1} = \frac{d_1 + d_2}{2}$$

$$d_{m2} = \frac{d_2 + d_3}{2}$$



$$A_1 = \frac{1}{2} \times S d_1 \times d_1 + B \times d_1 + \frac{1}{2} \times S d_1 \times d_1$$

$$\tan \alpha = \frac{1}{S}$$

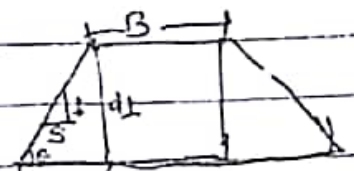
$$\therefore A_1 = B d_1 + S d_1^2$$

$$A_2 = B d_2 + S d_2^2$$

$$\tan \theta = \frac{d_1}{x}$$

$$A_3 = B d_3 + S d_3^2$$

$$[2 \times S d_1]$$



5. Contract

20/02/17

Contract :- An agreement enforceable by Law is known as "Contract."

Types of contract :-

- ✓ ① item rate contract ② unit price contract
- ✓ ② percentage rate contract.
- ③
 - i) cost plus percentage
 - ii) cost plus Fixed Fee
 - iii) cost plus variable fee
- ✓ ③ Lump-sum contract ④ fixed price contract.
- ✓ ④ Labour contract
- ✓ ⑤ Target contract
- ✓ ⑥ Negotiated contract
- ✓ ⑦ Turn key project
- ✓ ⑧ BOT (Built operate and transfer)

1 | Item rate contract :-

- i) This contract is also known as "Unit price or Schedule contract."
- ii) In this, contractor are Required to quote Rate For individual item of work
- iii) Rate quoted by contractor are inclusive of material, labour, tool's & plant
- iv) This method is suitable For PWD & Railway dept

2 | percentage rate contract :-

- i) It is a Modified form of Item Rate contract.
- ii) In this, contractor is asked to quote only percentage above or below as per rate shown in schedule.
- iii) Ring formation can be possible

iv

(A) cost plus percentage Rate contract :-
i) In this type of contract owner is agree to pay the actual cost of work plus agreed percentage of contract as his profit.
ii) It is suitable for private and Emergency work.

(B) cost plus Fixed Fee :-
i) In this type of contract owner is agree to pay actual cost plus fixed amount as fee.

(C) cost plus variable fee :-
i) In this contract, contractor percentage is link with cost of construction.
ii) It increases or decreases with the actual cost of construction.

3] Lump-Sum contract :-

i) In this contract, contractor under take the execution of a specific work to complete in all respect within specific time for a fixed amount.

ii) e.g. → construction of Engg. college within 2 year. For a fixed amount.

iii) The cost of project is more before completion of work. So contractor get more profit by proper planning.

iv) Dispute can occur between contractor & owner because of quality issue.

4] Labour contract :-

i) In this contractor quote rate only for labour and not for material.

ii) owner have to keep close watch on material.

5] Target contract :-

i) This contract is a combination of cost plus percentage or cost plus variation fee

6] Negotiate contractor :-

i) when work is awarded in contract by mutual negotiation between two parties without called of a tender

ii) In such contract, there is no open competition and owner negotiate only selected contractor.

7] Turn key project :-

i) In this contract, owner is desired to deal with only one party in all aspect such as planning, designing and Execution.

8] Build operate and transfer (BOT) :-

i) In this contract, govt get work executed by the private contractor within certain period of time and permit to operate for a specified time.

ii) At the expiration of operation period, the infrastructure shall be transfer to govt. without any expences

iii) It saves time and money of Govt. and encourages private investment.

iv) Risk Factor in BOT is time over Run

Q. → What is departmental method :-

i) When no contractor is willing to accept the work due to small margin of profit then work is executed by emp departmently.

ii) Material is supplied by dept. in Schedule-A Form.

iii) Attendance of labour and their record is kept in Muster No-21 by concern engg.

6. Tender

Form of contractor :-

- 1] A1 → % Rate contract
- 2] A2 → Item Rate contract
- 3] B-1 → % Rate (For Regular contractor experience)
- 4] B-2 → Item Rate (experience contractor)
- 5] D → Supply of material.

* Essential of contractor :-

- i) It shall be made by party competent to contract
- ii) contract shall be made free consent of parties
- iii) There shall be definite proposal and acceptance

Tender and Tender document :-

① Tender :- Tender is a written of work submitted by the contractor for Notification given to execute a certain work under certain condition.

Types of Tender:

- ① Local tender
- ② Global tender

1] Local Tender :-

- i) This tender are invited for any type of work in our country.
- ii) Tender notice is circulated through local News paper.

2] Global tender :-

- i) For a big specialised job and design Global tender are invited
- ii) particulars and contents are same as that of ordinary tender notice, only Global tender Notice is written on Heading of Notice.

2) points to be included in tender notice

Tender Notice
(PWD Pune div-2)

Date

Sealed item rate method tender in B-2 form are invited by Executive Engg Pune div-2 for the following work.

Sl No	Name of Work	Estimated cost	EMD (100%)	SD (5000/-)	Time of completion
1	Work of	10000/-	5000/-	12 months

Blank Tender form can be obtained from PWD OFFICE 01/01/17 - 20/01/17 between 3-5pm and shall be submitted upto 30/01/17 upto 400pm and shall be open on same day at 600pm

SD/-
Executive Engg

★ Important points of tender Notice :-

- ① Seal item rate tender in B-2 Form
- ② Name of work
- ③ Estimated cost
- ④ Earnest Money deposit (EMD)
- ⑤ security deposit (SD)
- ⑥ Time of completion.
- ⑦ Tender form price
- ⑧ Submission date & opening date with time.

Earnest Money Deposite :-
i) Earnest Money is a guaranty from a contractor for

In case of tender is refused by him.

ii) This may be in cash or in-cashable in any time.

→ Normally $\frac{1}{2}$ to $\frac{2}{3}$ of estimated cost is consider.

iii) EMD will be return to contractor other than 1st, 2nd

and 3rd contractor within a week.

iv) For 2nd & 3rd contractor within 15 days EMD will be return.

Security Deposite :-

i) It varies from $\frac{5}{10}$ to $\frac{10}{10}$ of estimated cost

ii) After acceptance of tender of a particular

contractor he has to deposite certain amount

to dept. is known as "security deposite" and

Refunded to the contractor after 3 months of

date of final bill ~~or~~ After defect liability period

•) Defect liability period :- It is period within which

contractor is bound to do work repairs and

maintaince after completion period.

- usually, 1-year period is consider.

Some
Defination

Comigendum :- Tender form is extended under following condition

① Time period to prepared a tender for contractor is too short.

② When there is major change in design & drawing and specification.

③ IF sufficient blank form is not sold.

Liquidity Damage :- It is the amount of compensation payable by contractor to the owner in case of delay in construction having no relationship in the Real damage

Un-Liquidity Damage :- It is a known ordinary damage with actual damage done when contract has been broken.

- The party who has suffer will receive compensation

Escalation :-

The completion period of a big project is usually long hence cost of material and labour increases day by day. Escalation clause provided to contractor to work in better way without hampering quality of work

Retention Money :- Engg. incharge. In title to hold some money from security deposit till adjustment of any claim that amount is called "Retention Money"

→ Normally, 5% of amount is consider.

procedure For submitting

- opening process
- Envelope No-1 → EMD
 - Envelope No-2 → contractor details
 - En
- 1) Envelope - 4
 - 2) Envelope - 1
 - 3) Envelope - 2
 - 4) - 1 - 1 - 1
- i) Income tax.
 - ii) Bank solvency certificate
 - iii) List of material, equipment
 - iv) below tender Amount

Envelope No-3 → Tender Form

Envelope No-4 →

Tender for work
name
Envelope 1, 2, 3 put

- ★ Reason to reject particular tender :-
- ① When tender is not submitted in particular form.
 - ② EMD is not included in tender
 - ③ Tender is not sign by contractor
 - ④ contractor having inadequate experience & staff
 - ⑤ un-satisfactory reputation of contractor

- ★ Reason to reject All tenders :-
- ① When minimum PFB of tender are not receive.
 - ② When fraud is detected
 - ③ When Ring formation is detected
 - ④ When there is collision among the contractors.

Different types of Bill's :-

- 1] Intermediate or Running Bill
- 2] Running Bill and Final Bill
- 3] First and Final Bill
- 4]

1] Intermediate or Running bill :- This bill will prepared when construction work is in progress
 - Running Account is shortly known as RA-1, RA-2
 - Monthly payment is made in Form No-27

2] Running / Final bill :- After Giving some running account payment when contractor is completed the work. Last payment is running & Final bill

3] First and Final Bill

1) For small work or For supply of material, work payment is made as 1st and last is called as "First and Last Bill."

2) The bill form is Form No-54.

Page No.	
Date	

Schedule A → List of Material to be borrow from PW

Schedule B → Bill of Quantities

Schedule C → Specification

7 Valuation

Valuation :- The Art of Assessing a present Fair value of a property at stated time.

* Purpose of valuation :-

- ① For Rent Fixation.
- ② For taxation
- ③ Mortgage → अर्हण देवात For bank loan.
- ④ For Sale
- ⑤ For Insurance premium.
- ⑥ purchase

Some important Definition :-

- 1] Value :- value means utility it varies with time to time. value may be different at different place.
- 2] price :- It is an amount worked out adding cost of production, interest on investment and profit.
- 3] Gross Income :- It is the total income from all the sources without deducting outgoing.
- 4] Outgoing :- Outgoing are expenses to be made for maintaining the property such as tax, Repair, Insurance, sinking Fund.
- 5] Net Income :- Net income is equal to Gross Income minus outgoing.
$$\text{Net Income} = \text{Gross Income} - \text{outgoing.}$$
- 6] Assessed value :- It is the value of property recorded in register of municipalities in order to determine municipal tax.

7] Booked value :- It is the value of property showing account book in particular year

8] Market value :- It is the value at which property can be sold in a open market.

9] potential value :- When a property is capable of fetching more return due to its alternative used is called "potential value"

10] Sentimental value :- When a property is sold or purchase at a higher value than market value is called as "sentimental value"

11] Dis-stress value :- When a property is sold or purchase at a lower value than market value is called as "Dis-stress value"

- Reason:
- ① Financial Difficulties.
 - ② In-sufficient market knowledge.
 - ③ due to fear.

12] Speculative value :- ^[changes] purchase of a property at low price and selling at higher price is known as "speculative value"

13] Scrap value :- It is the value of dis-mental material of a property at the end of utility period.
- Normally, 10% of Estimated cost is consider.

14] Salvage value :- It is the value of a property without being dis-mental at the end of useful life.

15] Perpetual (दीर्घ) Income :- The income receivable for an indefinite period.

16] Deferred Income :- The income receivable after a certain period.

17] Sinking Fund :- It is an amount which has to be kept aside at a fixed interval of time out of gross income so that fund should be accumulated to the initial cost of property.

$$\text{Sinking Fund coefficient} = \frac{i}{(1+i)^n - 1}$$

i :- Interest Rate

$$\text{Sinking Fund} = \frac{i}{(1+i)^n - 1} \times \text{capital cost}$$

18] capital value :-

$$\text{capital value} = \text{Net Income} \times \text{Year purchase (Y.P.)}$$

19] Year purchase :- capital sum required to invest in order to receive net annual income of Rupees one

$$Y.P. = \frac{100}{i}$$

i :- Rate of Interest

20] Depreciation :- It is the loss in the value of property due to wear and tear.

21] Mortgage :- The owner of a property can raise loan on interest against the security of his property.

(511465)
22] Free hold property :- It is an absolute possession of its owner for indefinite duration.

23] Lease-hold property :- It is the physical possession of property for definite period under certain condⁿ.

24] obsole-scene :- It is the loss of value of property due to change in fashion, design etc.

25] Ease-ment :- It is non-possessionary right to use real property of another without possessing it.

26] Monopoly value :- The value of something in which a monopoly involved (Extra-value Earning with holding property for a longer time)

Method to Calculate Depreciation :-

- ① Straight line method ✓
- ② constant percentage method ✓
- ③ Sinking Fund method ✓

① Straight Line Method :- property is lose value by constant amount at every year.

$$\text{Annual Depreciation} = \frac{\text{Original cost} - \text{Scrap value / Salvage value}}{\text{life in year}}$$

$$\therefore \text{Annual Depreciation} = \frac{O - S}{n}$$

② constant percentage Method :- In this method, the property is assume to loose value annually at a constant percentage.

$$\text{Value of property in } n \text{ years} = C (1 - P)^n$$

$$P = 1 - \left(\frac{SC}{C}\right)^{1/n}$$

$SC = \text{scrap value}$
 $C = \text{original cost}$
 $n = \text{life in years}$

③ Sinking Fund Method :- Depreciation is assumed to be annually sinking fund plus interest of the accumulated sinking fund till that year

Example

① A concrete mixer was purchased at RS 8000/- assuming salvage value 800/- Find Depreciation for 3 years? and value of a property at 2nd year

$$\begin{aligned} \text{Annual Depreciation} &= C - S / n \\ &= 8000 - 800 / 3 \\ &= 2400/- \end{aligned}$$

Month/year	Price	Depreciation
Jun - 2017	8000	0
2018	5600	2400
2019	3200	2400
2000	800	2400

② Gross rent of property 20,000/- Allowing 10% of deduction for repair & maintenance. estimate capital value of property at the rate of interest 10%

$$\text{Capital Value} = \frac{100}{R} = \frac{100}{10} = 10$$

$$\text{Outgoing} = \frac{10}{100} \times 20,000 = 2000$$

$$\therefore \text{Net Income} = 20,000 - 2000 = 18000/-$$

$$\therefore \text{Capital Value} = 18000 \times \frac{100}{10} = 1,80,000/-$$

(27) Annuity :- Annuity is the net installment of a annual or periodic payment for a repayments of a capital amount.

$$\text{Annuity coefficient} = c = \frac{i (1+i)^n}{(1+i)^n - 1}$$

$$\therefore \text{Annuity} = c \times \text{Amount}$$

n = Loan amount in year

4. Specification

★ Important codes

1] cement

	Grade	
→ 33	→	IS-269
→ 43	→	IS-8112
→ 53	→	IS-12269 12269.

2] Sand

→	IS-383
→	IS-515

3] Aggregate → IS-383

4] Reinforcement → IS-432 (Mild tensile steel)

(SA) 1) b, 2) c, 3) c, 4) c → IS-1786 (Deformed bar)

5) c, 6) b, 7) b, 8) a, 9) c, 10) c, 11) d, 12) b, 13) d, 14) d, 15) c, 16) d

17) d, 18) d, 19) a, 20) a, 21) c, 22) c, 23) c, 24) b, 25) a, 26) c, 27) d, 28) a, 29) c, 30) a

31) b, 32) d, 33) e, 34) e, 35) e, 36) d, 37) d, 38) e, 39) — — —

40) a, 41) a, 42) a, 43) a