(1) calculate the quantity of earth work in cutting & banking for a portion of road for 120m length with the following data.

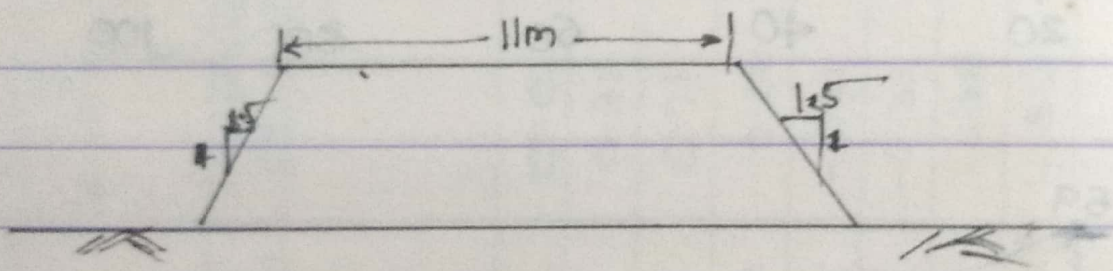
chainage(m)	0	20	40	60	80	100	120
G.L(m)	161.5	160.95	160.55	161.35	161.85	162.25	162.35

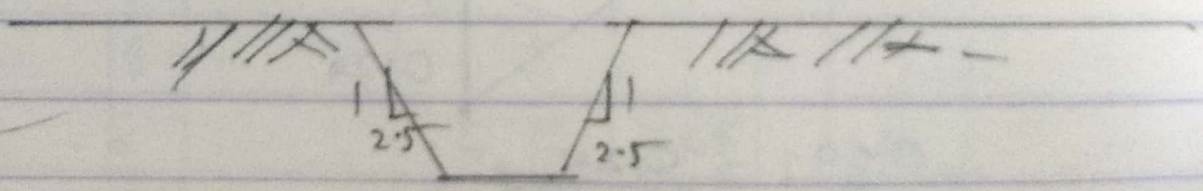
Formation width of road = 11m

Formatn width of starting chainage = 161.6 m.

The road surface shall be given falling gradient 1 in 110. side slopes are 2 in 3 (V:H) in banking & 1 in 2.5 (V:H) in cutting.

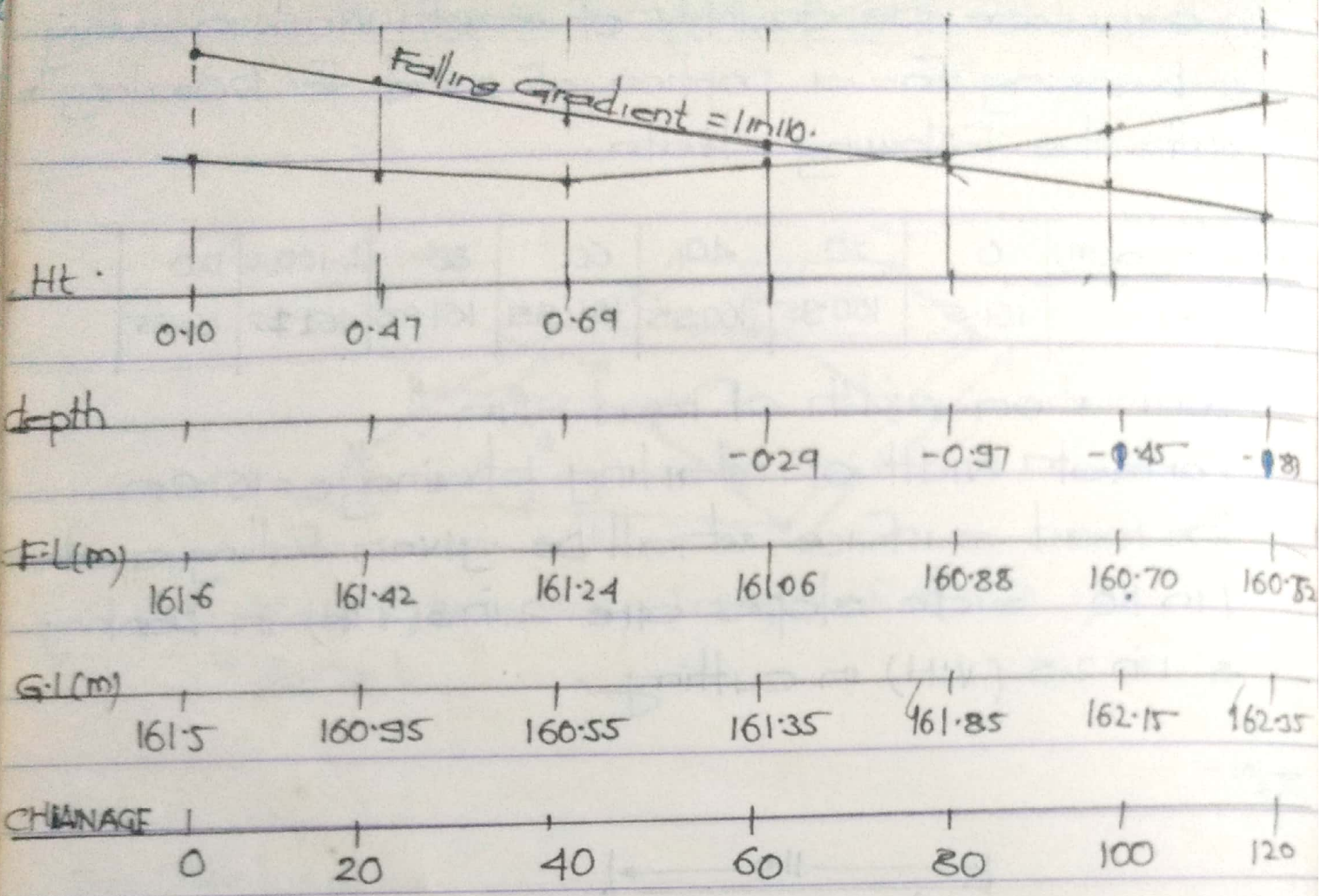
Sol(n):-

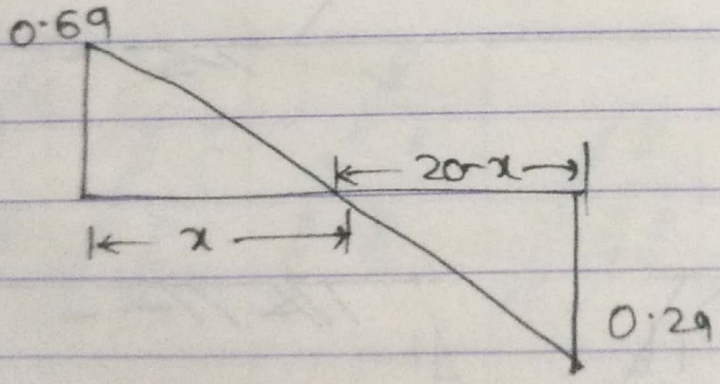




Falling Gradient of road = 1 in 110.

∴ Gradient drop @ every 20 m interval = $\frac{20}{110}$ = 0.18m





$$\frac{0.69}{x} = \frac{0.29}{20-x}$$

$$13.80 - 0.69x = 0.29x$$

$$13.80 = 0.98x$$

$$\therefore x = 14.08 \quad \text{From L.H.S}$$

$$20 - 14.08 = 5.92 \quad \text{From R.H.S}$$

B = 11m
S in cutting = 2.5
S in Banking = 1.5

Chainages	H or depth d(m)	C/S area of C.P B x d (m^2)	Area of sides Sd^2 (m^2)	Total area A = Bd + Sd^2	Mean area $A_m = A_1 + A_2/2$	Dist bet'n cons L(m)	Quantity of earthwork $A_m \times L$ Banking	Cutting
0	-	1.1	0.02	1.12	—	—	—	—
20	0.47	5.17	0.33	5.50	3.31	20	66.20	—
40	0.69	7.59	0.71	8.30	6.90	20	138.00	—
PASSES	0.00	0.00	0.00	0.00	4.15	14.08	58.43	—
60	0.20	-3.19	-0.21	3.40	1.70	5.92		10.06
80	-0.97	-10.67	-2.35	13.02	8.21	20		164.20
100	-1.45	-15.95	-5.26	21.12	17.07	20		341.40
120	-1.83	-20.13	-8.37	28.50	24.81	20		496.20
							262.63	1011.86

PAGE No.
DATE

(2) Calculate the quantity of earth work in cutting & banking for a portion of road of 240m length with following data

chainges (m)	0	40	80	120	160	200	240
G.L (m)	50.50	50.80	50.60	50.70	51.20	51.40	51.30

Formation level = 10m.

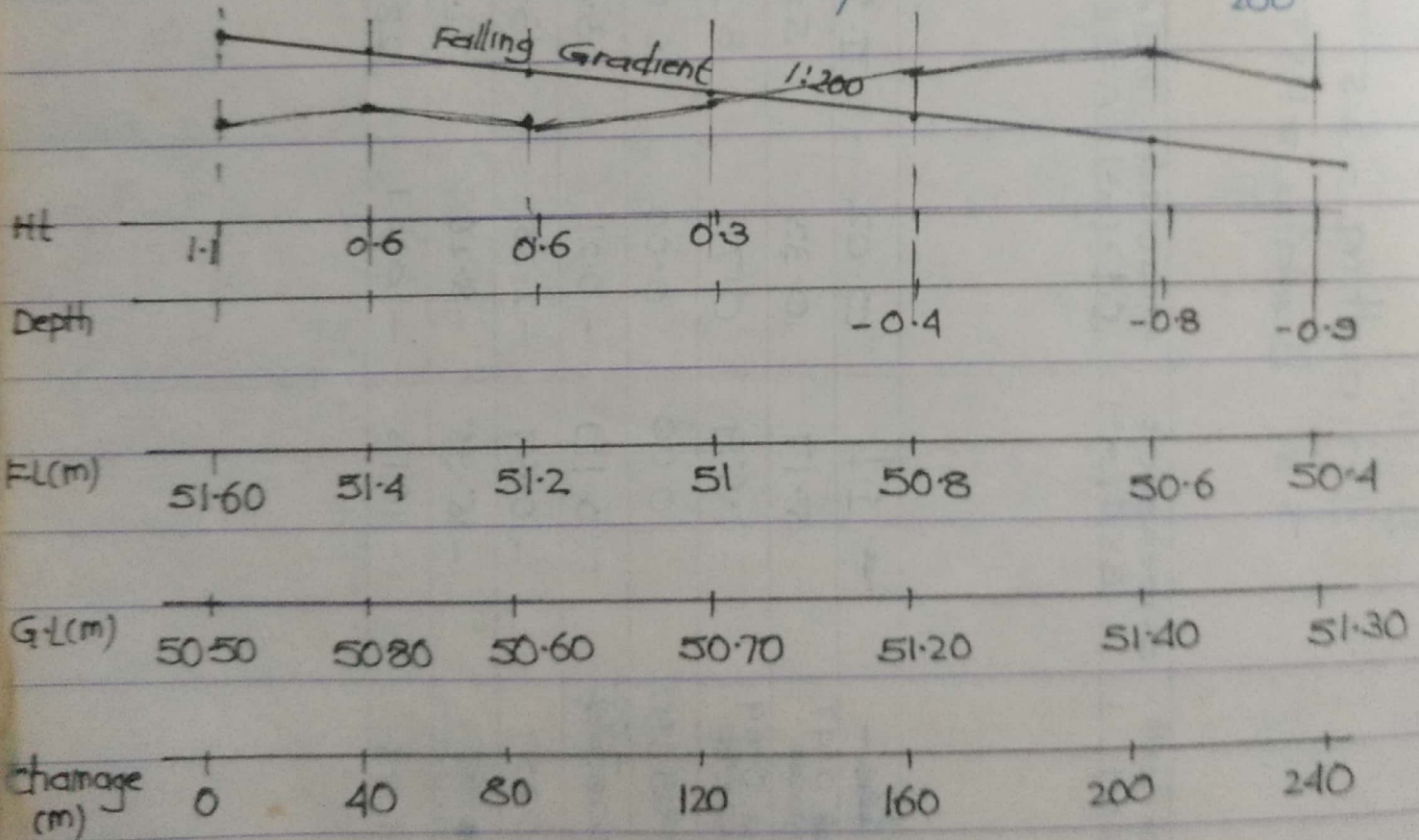
—"— of starting chainage = 51.60m.

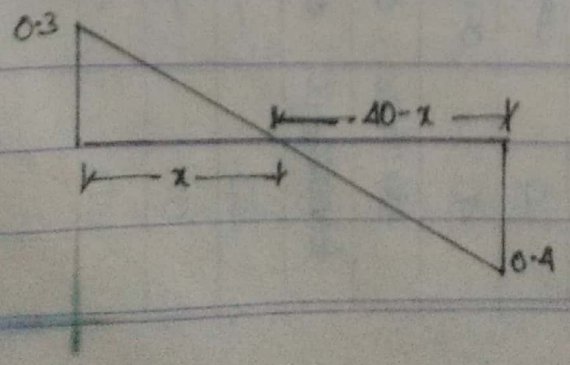
Falling Gradient 1 in 200.

side slop Banking (2:1) & cutting (1.5:1)

Soln:- Falling Gradient = 1 in 200

∴ Gradient drop @ every 40m interval = $\frac{40}{200}$ = 0.2m





$\frac{0.3}{x} = \frac{0.4}{40-x}$

$12 - 0.3x = 0.4x$

$\therefore x = 17.14$ m.

& $40 - x = 22.85$m

B = 10m.
S in Banking = 2 S in cutting = 1.5

Chainage (m)	Ht/depth (m) (d)	Bxd (m^2)	sd^2 (m^2)	$A = Bd + sd^2$ (m^2)	$Am = L_1 + L_2/2$	L(m)	Qty of earth work.	
							BANKING	CUTTING
0	1.1	11.00	2.42	13.42	—	—	—	—
40	0.6	6.00	0.72	6.72	10.07	40	402.80	—
80	0.6	6.00	0.72	6.72	6.72	40	268.80	—
120	0.3	3.00	0.18	3.18	4.95	40	198.00	—
PASSES	0.00	0.00	0.00	0.00	1.59	17.14	27.25	—
160	-0.4	-4.00	0.24	4.24	2.12	22.85	—	48.44
200	-0.8	-8.00	0.96	8.96	6.60	40	—	264.00
240	-0.9	-9.00	1.22	10.22	9.59	40	—	383.60
				Total qty of earthwork.			896.85	696.04

Trapezoidal formula

$$Q = \frac{L}{2}\left[\text{First area} + \text{last area} + 2\left[\text{sum of middle area}\right]\right.$$

$$= \frac{L}{2}\left[A_1 + A_n + 2\left[A_2 + A_3 + \cdots + A_{n-1}\right]\right.$$

chainage	d(m)	Bd(m^2)	sd^2(m^2)	$A = Bd + sd^2$(m^2)

(1) calculate the quantity of earth work for construction of a percolation tank with following data.

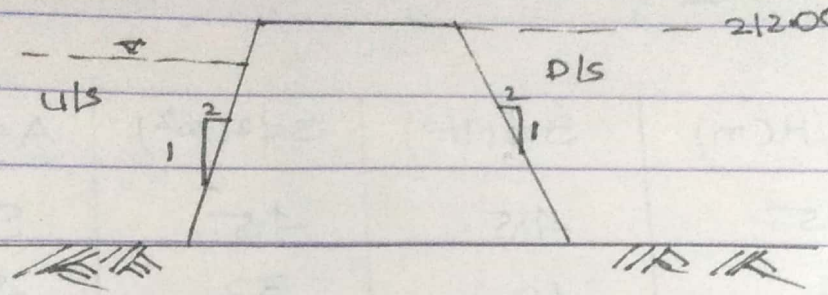
(i) Top width = 3m

(ii) R.L at top of embankment = 212.0m.

(iii) side slope 2H : 1V for upstream & down stream side

(iv) G.L with chainage.

chainages	0	30	60	90	120	150	180
G.L	210.5	208.0	205.5	205.0	206.0	207.0	209.75



Ht (m)	1.5	4	6.5	7	6	5	2.25
depth (m)							
F.L	212.0	212.0	212.0	212.0	212.0	212.0	212.0
G.L	210.5	208.0	205.5	205.0	206.0	207.0	209.75
CHAINGE	0	30	60	90	120	150	180

B = 3m.
S = 2.

Chainage	d/H(m)	Bd(m²)	Sd²(m²)	A = Bd + Sd²(m²)
0	1.5	4.5	4.5	9
30	4	12	32	44
60	6.5	19.5	84.50	104
90	7	21	98	119
120	6	18	72	90
150	5	15	50	65
180	2.25	6.75	10.13	16.88

$A_1 = 9m^2$ $\quad L = 30m$.

$A_n = 16.88m^2$.

$$Q = \frac{L}{2}\left(A_1 + A_n + 2(A_2 + A_3 + \cdots + A_n)\right)$$

$$= \frac{30}{2}\left[9 + 16.88 + 2(44 + 104 + 119 + 90 + 65)\right]$$

$$= 15\left[25.88 + 2(422)\right]$$

$$= 15\left[25.88 + 844\right]$$

$$= 15\,(869.88)$$

$$\boxed{Q = 13.04 \times 10^3\ m^3}$$

∴ Qty of earth work in embankment $= 13.04 \times 10^3 m^3$

RATE ANALYSIS

Market rate

(1) Brick (Ist class, IInd class)
(2) Stones (Rubble)
(3) cement
(4) sand
(5) Aggregate (2½, 1½, 0.75, 1, ½) inches
(6) steel rate (Fe250, Fe415)
(7) Door window frame (T.W)
(8) Distemer, snowcem (water bound, oil bound)
(9) Tiles (Marble, cota stones, Glazed tile, manolyes, ridges rate)
(10) centring with material charges
(11) Mason rate. (Cubic
(12) Painter —"—
(13) Bar bender —"—
(14) Carpenter, centering —"—
(15) Tile labours.
(16) Plumbers —"—
(17) Head Mason —"—
(18) Bisti
(19) Male Kalis.
(20) Female —"—

1m = 3.28 feet

$1m^2 = 10.758$ sq feet

$1m^3 = (3.28)^3 = 35.28$ cubic Feet

PAGE No. :

DATE : 12 / 8 / 63

Market rates

Rs:- 1200/- per 1000 bricks

Rs:- 1500/- per Truck. :- 250/- per cubic meter

Rs:- 120/- per bags. :-

Rs:- 1800/- per truck. :- 300/- per m^3

Rs:- 2800/- per truck. ~~46~~ 475/- per m^3

Rs:- 18/50/- per kg. 1850/- per quintal

Rs:- 1250/ per sqm.

Rs:- 400/- per sq feet. 4304 ~~35/-~~ Rupees/per m^2

(6700 Rupees/m^2) Marble :- 65/- per sq feet, cota 18/- per sq feet (195 Rs/m^2)

Glazed tile:- 16/- per sq feet Marble 3/50/- sq feet.

(172 Rupees/m^2) (55 Rs per m^2) Centering 5/- per Wood. & 7/- per ply wood (30 Rupees/m^2)

Rs :- 100/- to 180/- per sq feet

Rs:- 60/- to 80/- —"—

Rs:- 2/60, 2/50 per sq feet.

Rs:- 100/180/ per —"—

Rs :- 4/50 —"—

Rs :- 80 to 150 per —"—

Rs :- 80 to 150 per —"—

Rs:- 60/- per day. —"—

Rs:- 70/- per day } 8 hrs

Rs:- 50/- per day }

Rate analysis:—

The method of determing the rate of particular item of work considering the quantities & cost of material & labour required is called rate analysis

Purpose:—

(1) To determine current rate per unit an item
(2) To examine the viability of rate offered by contractor.
(3) To calculate quantity of material & labour require for project planning.
(4) To fix up the labour contractor rate.

Factor affecting rate analysis:—

(1) Major factor:— (1) Material (50 % to 60 %) Total cost of work
(2) Labour (25 % to 30 %)

(2) Minor factors:— (1) Tools & plant (1.5 to 2 %)
(2) water charges (2 to 5 %)
(3) overhead charges (2.5 % - 5 %)
(4) contractors profit (10 %)

Task work:—

The quantity of work that can be done by labo in one day (i.e 8 hrs) is called task work.

Factors affecting task work.

(1) output of an individual worker varies considerably as per their skill.

(2) The task work were varies from place to place as per climatic condition & environment of place.

(3) Faulty work organization & ill planning.

(4) Peculiarities of job & site condition may have some effect on task work.

Importance of rate analysis & requirement:—

It gives a clear picture of various type of labour & material required for completing a particular job.

Requirment:—

(1) current market rate of material.

(2) current market rate of various categories of

(3) Task work.

(4) Hire charges & information of various types of plants required for the work.

(5) upto date knowledge of construction work.

Resources affect rate analysis:

(1) specification.
(2) Quality of material
(3) location of site.
(4) Availability of tools & plant of work site.
(5) Profit & overhead expenses of contractor.

SR NO	Name of works	Task work
(1)	Excavation in black cotton soil	$3m^3$/ Mazdoor.
(2)	Excavation in Murum	$2m^3$/ Mazdoor.
(3)	Excavation in Rocky soil	$1m^3$/ Mazdoor
(4)	Brick work in foundat^n & plinth	$20m^3$/ Head Mason
		$1.25m^3$/ Mason.
		$1.25m^3$/ Male coolie
		$1.25m^3$/ Female-"
		$5m^3$/ Bhisti
(5)	Brick work in superstructure	$20m^3$/ Head Mason
		$1.0m^3$/ Mason
		$1.0m^3$/ Male coolie
		$1.0m^3$/ Female-"
		$5.0m^3$/ Bhisti
(6)	Half brick work. (partition wall) $100m^2$	$5m^2$/ Mason
		$5m^2$/ Male coolie
		$5m^2$/ Female
		$30m^2$/ Bhisti

S.No	Name of work	Task work
(7)	1:4:8 Masonary in plinth & foundation in C.M.	20m³ / H.M 1m³ / M 1.1 m³ / Mc 1.1 m³ / FC 6.67m³ / Bhisti
(8)	C.R.M in plinth & foundation	20 m³ / HM 0.8m³ / M 1.1 m³ / M.C 1.1 m³ / F.C 6.67 m³ / Bhisti
(9)	1:CRM in super structure	20m³ / HM 0.83m³ / M 1m³ / MC 1m³ / FC 6.67 m³ / Bhisti
(10)	CRM in super structure	20m³ / H.M 0.70 m³ / M 0.90m³ / Mc 0.90m³ / FC 6.67m³ / Bhisti
(11)	Ashlar masonary	20 m³ / HM 0.4 m³ / M 0.6 m³ / Mc 0.6 m³ / FC 6.67 m³ / Bhisti

SNO	Name of Work	Task Work
(12)	P.C.C in foundation	40 m^3 / H.M 5 m^3 / M 2 m^3 / MC, 2 m^2 / FC 5 m^3 / Bhisti.
(13)	Concrete ~~P.C.C~~ for R.C.C Work	20 m^3 / H.M 3 m^3 / M 1.10 m^3 / M.C 1.10 m^3 / F.C 2.5 m^3 / Bhisti.
(14)	25mm th cement concrete DPC	200 m^2 / H.M 12.5 m^2 / M 12.5 m^2 / Majdoor 100 m^2 / Bhisti.
(15)	25mm th ~~P.C.C~~ cement concrete flooring	200 m^2 / HM 12.5 m^2 / M 8 m^2 / majdoor 50 m^2 / Bhisti
(16)	12mm th cement plaster	200 m^2 / HM 10 m^2 / M 7 m^2 / majdoor 100 m^2 / Bhisti
(17)	Pointing	200 m^2 / HM 10 m^2 / M 10 m^2 / majdoor 100 m^2 / Bhisti

SNO	Name of work.	Task Work.
(18)	centering & shuttering.	3.25 m^2 / carpenter 2.50 m^2 / coolie.
(19)	Reinforcement	1 qunit / Bar bender 1 qunit / helper.
(20)	White wash or colour wash (3 coats)	200 m^2 / painter 200 m^2 / coolie.
(21)	Distemper	40 m^2 / painter 40 m^2 / coolie.
(22)	Lime punning	10 m^2 / M. 5 m^2 / coolie.
(23)	Manglore type roofing with battens	10 m^2 / carpenter 6 m^2 / tile layer 5 m^2 / coolie.

Material requirement for different C.E works:—

(1) Brick 500 nos/m^3.

(2) cement 30 bags/m^3 (vol^m of 1 bag - 0.035 m^3)

(3) Lime Running.

SNO	Item	Materials	Quantity
(1)	Brick	Brick	500 no/m^3
(2)	cement	cement	30 bags/m^3
(3)	lime punning	lime stone	1.8 kg/m^2
(4)	White wash.	lime stone	10 kg/100m^2
(5)	White wash 2 coats	lime stone	30 kg/100m^2
(6)	Distempering 1st coat. IInd coad	Distemper	12 kg/100m^2 7.5 kg/100m^2
(7)	Reinforcement	Binding wire	1kg/quintal of steel

Dry vol^n of lime = 44% of wet vol^n.

UCR Masonary :— Dry vol^n of CM = 42% of wet vol^n.

CR Masonary :— Dry vol^n of CM = 40% of wet vol^n

Ashlar Masonary :— Dry vol^n of CM = 25% of wet vol^n.

concrete :— Dry vol^n of CM = 52% of wet vol^n

Brick work :— Dry vol^n of CM = 30% to 35% —"—

pointing :— (a) Flush pointing :- Dry vol^n = 0.7m^3/100m^2

(b) Roled pointing :- Dry vol^n = 0.63m^3/100m^2

Vol^m — $1m^3 = 10m^3$

Area — $1m^2 = 100m^2$

PAGE No. :

DATE : / /

Rate analysis:—

(1) Material calculation

(2) labour calculation

(3) sundaries (including T&P)

SNO	Descriptn	Quantity	Rate.		per	Amount	
			Rs	pc	unit	Rs	pc.
					Total		

Q1) Prepare the rate analysis for excavation for foundation in B.C soil.

Soln:- Excavation for foundation in B.C soil:-
considered $10m^3$ of excavation

SNO	Description	Quantity	Rate Rs	Rate Pc	per unit	Amount Rs	Amount Pc
(1)	Labour :-						
	Male coolie	2 Nos	70	00	per day	140	00
	F. coolie	1 1/2 Nos	50	00	per day	75	00
(2)	sundaries :- (including hire charges)	Lumpsum	———	———	→	3	00
					Total	218	00
	Add contractor profit (10)%					21	80
				Grand	total	239	80

∴ The rate of excavation/m^3 = $\frac{239.80}{10}$

= 23.98

= 24 Rs/-

$2m^3 = 1$ [illegible]
$\therefore 10 = x$
$\therefore x = 5$

PAGE No. :
DATE : / /

Excavation for foundatn in Murum soil :-
considered $10m^2$ of excavatn :-

SNO	Description	Quantity	Rate	perunit	Amount
		Rs ps	Rs | ps		Rs | ps
(1)	labour				
	M·C	3 Nos	70-00	perday	210 - 00
	F·C	2 Nos	50 00	perday	100 - 00
(2)	sundaries (including firecharges) (1%)	Lumpsum	—	—	3 - 00

$\therefore$ Total = 313- 00

Add contractor profit (10)% 31 - 30

$\therefore$ Grand tota = 344 - 30

$\therefore$ The rate of excavatn/m^3 = $\frac{344.30}{10}$

= 34.43

$\cong$ 35.

(2) Prepare rate analysis of IInd class B.B masonry for plinth & foundation.

Sol:- IInd B.B Masonary in C.M(1:6) plinth & foundation considered 1cm² of B.B masonary :-

For dry vol^m of C.M increase wet vol^m by 35%

$$= 2.65 + \frac{35}{100} \times 2.65$$

$$= 3.58\ m^3$$

Dry vol^m $\cong$ 3.6 m^3.

$$\text{Cement} = \frac{\text{Total vol}^m}{\text{sum of ratio of CM}} \times \text{Representative of cement}$$

$$= \frac{3.6}{(1+6)} \times 1$$

CM (1:6)

$$= 0.51\ m^3$$

$$= 0.15 \times \text{Bag of cement}$$

$$= 0.15 \times 30$$

$$= 15.43$$

Cement $\cong$ 15 1/2 bags of cement

$$\text{Sand} = \frac{\text{Total dry vol}^m}{\text{sum of ratio CM}} \times 6$$

$$= \frac{3.6}{(1+6)} \times 6$$

$$= 3.09\ m^3$$

Sand $\cong$ 3 m^3

considered $10m^3$ unit cu.m

SNO	Description	Qty	Rate Rs	Rate Ps	per unit	Amount Rs	Amount Ps
(A)	**Materials:-**						
	(1) Bricks	5000 Nos	1200	00	per 1000 Nos	6000	00
	(2) cement	15 1/2	120	00	per bag	1860	00
	(3) sand	3	300	00	m^3	900	00
(B)	**Labour:-**						
	H.M	1/2 Nos	150	00	per day	75	00
	M	8 Nos	100	00	per day	800	00
	M.C	8 Nos	70	00	per day	560	00
	F.C	8 Nos	50	00	-"-	400	00
	Bhisti	2 Nos	60	00	-"-	120	00
(C)	**Sundaries:-**						
	(Including hire charges) Lumsum (3%) →					300	00
					Total =	11015	00
(d)	C.P Add 2% water charges					220	30
	Add 10% C.P					1101	50
					Grand total	12336	80

∴ Rate of IInd class B.B masonary per m^3

$$= \frac{12336.80}{10}$$

$$= 1233.68$$

Rs ≅ 1234.1— m^3/—

(3) Prepare a rate analysis of IInd class B.B masonry for superstructure.

soln:- considered $10m^3$ of B.B masonary.
second class B.B masonary in CM (1:3) for superstructure.

(1) Materials (a) Bricks:-

Nominal size = (0.19 x 0.09 x 0.09)

std size = (0.2 x 0.1 x 0.1)

∴ No of bricks = $\frac{10}{0.2 \times 0.1 \times 0.1}$

∴ No of bricks = 5000 Nos

(b) cement Mortar :- = 10 - (5000 x 0.19 x 0.09 x 0.09)

= $2.3m^3$.

Increase 15% of wet vol^m for frog filling & other wastage

= $2.3 + \frac{15}{100} \times 2.3$

= $2.65m^3$

For dry vol^m of CM increase wet vol^m by 35%

= $2.65 + \frac{35}{100} \times 2.65 = 3.6m^3$

(3) cement :- $\frac{3.6}{1+3} * 1 = 0.9m^3$

$= 0.9 \times 30$

= 27 bags of cement.

(4) sand :- $\frac{3.6}{1+3} \times 3 = 2.7m^3$

DATE : / /

considered $10 m^3$ in cum

SNO	Description	Qty	Rate Rs	Rate Paise	Per unit	Amount Rs	Amount Paise
(1)	Materials:-						
	(a) Bricks	5000	1200	00	Per 10^3 Nos	6000	00
	(b) cement	27	120	00	per bags	3240	00
	(c) sand	2.7	300	00	m^3	810	00
(2)	Labours:-						
	H.M	1/2 Nos	150	00	Per day	75	00
	M	10 Nos	100	00	—"—	1000	00
	M.C	10 Nos	70	00	—"—	700	00
	F.C	10 Nos	50	00	—"—	500	00
	B	2 Nos	60	00	—"—	120	00
(3)	Sundaries (Including hire charges) lumsum (3%)					300	00
					Total	12745	00
(4)	Add 2% of water charges					254	90
	Add 10% of CP					1274	50
					GRAND Total =	14274	40

∴ Rate of IInd class B.B Masonary for super structure per m^3 = 14274.40/10 = 1427.44 ∴ Rs = 1428 /-

(4) Prepared a rate analysis for half brick work.

Sol^{n}:- considered $10m^3$ of partition wall.

Materials:- (a) Bricks = 5000 Nos.

(b) cement = 27 bags of cement.

(c) sand = $2.7m^3$.

SNO	Description	Qty	Rate. Rs	Rate. Ps	per unit	Amount. Rs	Amount. Ps
(1)	Materials						
	Bricks	5000	1200	00	per 1000 Nos	6000	00
	cement	27	120	00	per bag	3240	00
	sand	2.7	300	00	per m^3	810	00
(2)	Labours						
	M	2 Nos	100	00	per day	200	00
	MC	2 Nos	700	00	〃	1400	00
	FC	2 Nos	50	00	〃	100	00
	B	1/3 Nos	60	00	〃	20	00
(3)	sundaries (Add 1% (2%) of Hire charg					240	00
					Total	12010	00
	Add 2% of water charges				=	240	20
	Add 10% of CP				=	1201	00
					GRAND TOTAL	13451	20

∴ Rate of partition wall in / m^3 = $\frac{13451.20}{10}$ ≈ 1346/-

(5) Prepare a rate analysis for Ashlar masonary in foundation in CM(1:6)

Sol:- considered $10m^3$ of Ashlar masonary.

Materials:- (i) Ashlar masonary = $12.5m^3$

(ii) cement = 11 bags.

(iii) sand = $2.14 m^3$

SNO	Descriptn	Qty	Rate		perunit	Amount	
			Rs	Ps		Rs	Ps.
(1)	Materials						
	Ashlar masonry	12.5	1250	00	per m^3	3125	00
	cement	11	120	00	per bags	1320	00
	Sand	2.14	300	00	per m^3	642	00
(2)	Labour						
	H.M	1/2 Nos	150	00	per day	75	00
	M	25 Nos	100	00	—11—	2500	00
	MC	17 Nos	70	00	—11—	1190	00
	FC	17 Nos	50	00	—11—	850	00
	B	1 1/2 Nos	60	00	—11—	90	00
(3)	sudaries (Add 3%)					293	76
					Total =	10085	76
	Add 2% of water charges				=	201	71
	Add 10% of CP				=	1008	57
					GRAND TOTAL	11296.	04

∴ Rate of Ashlar masonary in foundatn / m^3 = $\frac{11296.04}{10}$ = Rs = 11296/-

(5) Prepare a rate analysis for U.C.R masonary in foundation in CM(1:6)

Soln:- considered $10m^3$ of U.C.R Masonary

Materials:—

(1) Rubble / stone

Qty of stone $= 10m^3$.

Add 25% for wastage.

$\therefore$ Qty required $= 10 + \frac{15}{100} \times 10$

$= 12.5m^3$

(2) cement mortar :—

Dry of CM required = 42% of volm considered

$= \frac{42}{100} \times 10$

$= 4.2m^3$

(3) cement $= \frac{4.2}{1+6} \times 1$

$= 0.6m^3$

$\therefore$ No of bags $= 0.6 \times 30$

$= 18$ bags.

(4) Sand $= \frac{4.2}{1+6} \times 6 = 3.6m^3$.

SNO	Description	Qty	Rate		per unit	Amount	
			Rs	Pise.		Rs	Ps
(1)	Materials.						
(a)	Rubble stone	12.5	250	00	per m^3	3125	00
(b)	cement	18	120	00	per bags	2160	00
(c)	sand	3.6	300	00	per m^3	1080	00
(2)	labours:-						
	H.M	1/2 Nos	150	00	per day	75	00
	M	10 Nos	100	00	—11—	1000	00
	M.C	9 Nos	70	00	—11—	630	00
	F.C	9 Nos	50	00	—11—	450	00
	B	1.5 Nos	60	00	—11—	90	00
(3)	sundaries (including hire charges)	Lumsum			3%	210	00
					Total	7161	- 00
(4)	Add 1.5% of water charges =					107	- 41
	Add 10% of CP					716	- 10
					Total	7984	- 51

∴ Rate of U.C.R Masonary for plinth & foundatn per m^3 $= \frac{7984.51}{10} = 800$

[Rs = 800/m^3]

DATE / /

(6) Prepaire a rate analysis for P.C.C (1:4:8) in foundn.

Soln:- Considered $1m^3$ for P.C.C (1:4:8) in foundn.

Materials:-

(1) concrete:-

wet volm of concrete = $10m^3$

For dry volm increase volm by 52%.

∴ Dry volm of concrete = $10 + \frac{52}{100} \times 10$

$= 15.2 m^3$.

(2) cement = $\frac{15.2}{1+4+8} \times 1$

$= 1.16 m^3$

∴ No of bags = 1.16×30

= 35 bages.

(3) Sand = $\frac{15.2}{1+4+8} \times 4$

$= 4.67 m^3$

(4) Agg = $\frac{15.2}{13} \times 8$

$= 9.35 m^3$

SNO	Description	Qty	Rate Rs	Rate Ps	per unit	Amount Rs	Amount Ps
(1)	Materials						
(a)	~~Concrete~~ cement	~~Rate~~ 35	120	00	per bags	4200	00
(b)	sand	4·67	300	00	per m³	1401	00
(c)	Agg	9·35	475	00	per m³	4441	25
(2)	labour						
	H·M	1/4 No	150	00	per day	37·	50
	M	2 No	100	00	—11—	200	00
	B	2 No	60	00	—11—	120	00
	M·C	5 No	70	00	—11—	350	00
	F·C	5 No	50	00	—11—	250	00
(3)	sundaries	(Add 4%)				450	00
					Total	11449	75
(4)	Add 2% of WC					228	99
(5)	Add 10% of CP					1144	97
					Grand total	12823	71

∴ Rate of P·C·C (1:4:8) in foundation in /m³ = $\frac{12823 \cdot 71}{10}$

Rs = 12823/-

(7) Prepaire a rate analysis for R.C.C for slab (1:2:4)

Sol^{n}:- considered $10m^3$ for R.C.C for slab (1:2:4)

Materials :-

(1) concreting :- Wet vol^{m} of conct $= 10m^3$

For dry vol^{m} increase vol^{m} by $= 52\%$.

$\therefore \quad = 15.2m^3$.

(2) cement $= \frac{15.2}{(1+2+4)} \times 1 = 2.17 \times 30 = 65$ bags.

(3) sand $= \frac{15.2}{(1+2+4)} \times 2 = 4.34m^3$

(4) Agg $= \frac{15.2}{(1+2+4)} \times 4 = 8.68m^3$.

(5) Reinforcement $=$ 1% of wet vol^{m} of concrete

$= \frac{1}{100} \times 10 \times 78.5$

$= 7.85$ Quintals.

(6) Binding wires $= 8kg$

(7) centering $= 100m^2$.

considered $10m^3$.

SNO	Descriptn	Qty	Rate Rs	Ps	per unit	Amount Rs	Ps
(1)	**Materials:**						
	cement	65	120	00	per bag	7800	00
	sand	4.34	300	00	per m^3	1302	00
	Agg.	8.68	475	00	per m^3	4123	00
	Reinforcement	7.85	1850	00	per Qtls.	14522	50
	Binding wires	8	30	00	per kg	240	00
	centering	100	30	00	per m^2	3000	00
(2)	Labours for concrete	0.5 Nos	150	00	per day	75	00
	H.M	~~1 Nos~~					
	M.	3.5 Nos	100	00	per day	350	00
	M.C						
	F.C	9 Nos	70	00	per day	630	00
	Bhisti	3 Nos	50	00	per day	150	00
(3)	Labour for centring	4 Nos	60	00	per day	240	00
	Carpenter	30 Nos	100	00	per day	3000	00
	~~Barbender~~						
	coolie.	40 No	70	00	per day	2800	00
(4)	Labour for Reinfo						
	Barbender	8	120	00	per day	960	00
	helper	8	70	00	per day	560	00

PAGE No. :
DATE : / /

(c) sundaries (Add 5%) ⟶ 4005 2 | 50
2002 | 60

Total = 42054 50

∴ Add water charges (1·5%) = 630 · 81

Add C·P 10 % = 4205 · 45

GRAND Total = 46890 · 76

∴ Rate of R·C·C for slab (1:2:4) /m² = $\frac{46890 \cdot 76}{10}$

Rs = 4689/-

Rs ≃ 4700/-

(8) Prepair a Rate analysis for D.P.C (1:2:4)

Soln:- considered $100m^2$.

∴ wet volm of concrete = Area x thickness

$= 100 \times 0.025$

$= 2.5 m^3$

∴ Dry volm by 52% Add = $2.5 + \frac{52}{100} \times 2.5$

$= 3.8 m^3$

(a) ∴ cement = $\frac{3.8}{(1+2+4)} \times 1$

= 16 bags

(b) sand = $\frac{3.8}{7} \times 2$

$= 1.08 m^3$

(c) Agg = $\frac{3.8}{7} \times 4$

$= 2.17 m^3$

(d) water proofing compound = 2 to 3% by wt of cement

$= \frac{2}{100} \times (\text{No of C.B} \times \text{wt of one CB})$

$= \frac{2}{100} \times (16 \times 50)$

= 16 kg.

(9) Prepared a rate analysis for 25mm thick cement concrete flooring (1:2:4)

soln:— considered $100m^2$

∴ Wet volm of concrete = Area x thickness

$= 100 \times 0.025$

$= 2.5m^3$

increase dry volm by 52%

$= 2.5 + \frac{52}{100} \times 2.5$

$= 3.8m^3$

(a) cement :— $\frac{3.8}{(1+2+4)} \times 1$

$= 16$ bags.

(b) sand :— $\frac{3.8}{(1+2+4)} \times 2$

$= 1.08m^3$

(c) Agg = $\frac{3.8}{7} \times 4$

$= 2.17m^3$

considered $100m^2$

S.NO	Description	Qty	Rate Rs	Rate Ps	per	Amount Rs	Amount Ps
(1)	Materials						
	cement	16	120	00	per bags	1920	00
	Sand	1.08	300	00	per m^3	324	00
	Agg's	2.17	475	00	per m^3	1030	75
(2)	Labours						
	H.M	1/2 Nos	150	00	per day	75	00
	M	8 Nos	100	00	〃	800	00
	Maedoor						
(a)	M	5 Nos	70	00	〃	350	00
(b)	F	7½ Nos	50	00	〃	375	00
	B	2 Nos	60	00	〃	120	00
(3)	Sundaries	(Add 3%)			=	150	00
					Total =	5144	75
(4)	Add 2% of water charges					102	89
(5)	Add 10% of contractor profits					514	47
					GRAND TOTAL =	5762	11

∴ Rate of 25mm th cement concrete flooring / m^2 = $\frac{5762.11}{100}$ ≈ 57.62

(Q) Prepared a rate analysis for cement plaster 10 CM (1:4)

Sol^n:- considered $100 m^2$.

Materials:-

Area of plaster = $100 m^2$

Qty of cement mortar = 100×0.012

$= 1.2 m^3$

increase wet vol^m by 20 to 25 % for uneven surface & wastage

Wet of C.M = $1.2 + \frac{20}{100} \times 1.2$

$= 1.44 m^3$

For dry vol^m of CM increasing wet vol^m by 35%

Dry vol^m of C.M = $1.44 + \frac{35}{100} \times 1.44$

$= 1.94 m^3$

$\approx 2 m^3$

Cement = $\frac{2}{(1+4)} \times 1$

$= 12$ bags

Sand = $\frac{2}{(1+4)} \times 4$

$= 1.6 m^3$

(1:4)

SNO	Description	Qty	Rate Rs	Rate ps	per	Amount Rs	Amount ps
(1)	Materials						
	cement	12	120	00	per bag	1440	00
	sand	1·6	300	00	per m³	480	00
(2)	labour						
	H·M	½ Nos	150	00	per day	75	00
	M	10 Nos	100	00	—"—	1000	00
	Maydoor	15 Nos	60	00	—"—	870	00
	Bhisti	1 Nos	60	00	—"—	60	00
(3)	sundaries (add 4%)					156	02
					Total	4082	00
	Add water charges (2%)				=	81	64
	Add C·P (10%)				=	408	2
					GRAND Total =	4571	84

∴ Rate of 12mm thick cement plaster/m² = $\frac{4571 \cdot 84}{1}$

Maydoor	15					
M	5	70			350	00
F.	10	50			500	
					15	
					4061	2

Water charges (2%) = 81.22

C.P (10%) = 406.12

4548.54

4549.

∴ Rate of cement plaster/m^2 = $\frac{4591}{100}$

= 45.49

≃ Rs 45.50

(Q) Prepair rate analysis for Neeru plaster in CM(1:4)

Soln:- considered $100m^2$

Materials:- Area of plaster = $100m^2$

Qty of cement M = 100×0.012

$= 1.2 m^3$

Wet vol^m of CM = $1.2 + \frac{20}{100} \times 1.2$

$= 1.44 m^3$

Dry vol^m of CM = $1.44 + \frac{35}{100} \times 1.44$

$= 1.94 m^3$

$\cong 2 m^3$

(1) Cement = $\frac{2}{1+4} \times 1$

$= 12$ bags.

(2) Sand = $\frac{2}{1+4} \times 4$

$= 1.6 m^3$

(Lime stone is $18 kg/m^2$).

(3) Lime = $1.8 \times 100 = 180 kg$.

SNO	Des	Qty	Rate Rs	Rate Ps	per	Amount Rs	Amount Ps
	Materials						
(1)	cement	12	120	00	per bags	1440	00
(2)	sand	1:6	300	00	per m^3	480	00
(3)	Lime	180	2	00	per kg	360	00
	Labours						
	H·M	1/2 No	150	00	Per day	75	00
	M	10 Nos	100	00	—11—	1000	00
	Mazdoor	15 No)			—11—		
(1)	M	5 NO	70	00	—11—	350	00
(2)	F	10 Nos	50	00	—11—	500	00
	For Lime						
	M	10 Nos	100	00	—11—	1000	00
	C	20 Nos	50	00	—11—	1000	00
	Bhisti	1 No)	60	00	—11—	60	00
					Sundry Add 4 (1/.)	250	60
						6515	60
					W·C (2%)	125	30
					Add (10)%	626	10
						7267.40	

Rs = 73/- m^3

(6) Prepare a rate analysis for painting in CM(1:2)

Sol:- considered $100m^2$.

Materials

C.M required $= 0.7m^3 / 100m^2$

cement $= \frac{0.7}{3} \times 1$

$= 7$ bags.

sand $= \frac{0.7}{3} \times 2$

$= 0.46m^3$.

SNO	Describtn	Qty	Rate.		per unit	Amount	
			Rs	Amount		Rs	Amount
(1)	Materials						
	cement	7	120	00	per bag	840	00
	sand	0.46	300	00	per m3	138	00
	Labour						
	H.M	1/2 NO	150	00	per day	75	00
	M	10 NO	100	00	—11—	1000	00
	Maedoor						
	M	4 NO	70	00	—11—	280	00
	F	6 NO	50	00	—11—	300	00
	Bhisti	1 NO	60			60	00
	sundaries (Add 1%)					27	00
						2720	00
	Add		(2%) Water charges			54	40
			C.P (10%)			272	00

GRAND TOTAL = 3046.4

$\therefore$ Rate of painting /m^2 = $\frac{3046.4}{100}$

Rs = 30.46

$\cong$ ~~30.00~~ /-

$\cong$ 30.50 /-

APPROXIMATE ESTIMATE

(1) What is an approximate estimate

Ans) It is a rough estimate prepared to know the approx cost of a work in very short time. This type of estimate are prepared on the basis of actual cost of similar existing structure. It required administrative approval of a project

Use of approx estimate

(1) To give rough idea of probable expenditure
(2) To obtain administrative approval of a new
(3) Used for valuation rent fixation.

Methods of approx estimate?

(1) service unit method
(2) cubical content —"—
(3) Approx quantity —"—
(4) plinth area —"—
(5) Typical bay —"—

service area method:

Every building is constructed to serve some purpose. Eg:- A hospital building is designed to accommodate certain no. of beds each bed in consideration as a service unit of hospital building.

this method is particularly used in large or complicated buildings. Whenever a building is constructed the engineer keep the record of place of construct, year of construct, No of service units actual cost of construct etc. The approx cost is found out by comparing the cost of proposed building with similar existing building.

$$\therefore \text{Approx cost of building} = \left[\begin{array}{l}\text{No of service unit}\\ \text{in proposed bldg}\end{array}\right] \times \left[\begin{array}{l}\text{cost per service}\\ \text{unit of existing}\\ \text{bldg}\end{array}\right]$$

plinth area method:-

This method also know as square metre metho. In this method the plinth area of proposed bldg is calculate & approx cost of bldg is worked out on the basis of cost of similar existing bldg.

$$\therefore \text{Approx cost of bld} = \left[\begin{array}{l}\text{Total plinth area}\\ \text{of proposed bldg}\end{array}\right] \times \left[\begin{array}{l}\text{cost/unit area}\\ \text{of similar}\\ \text{existing bldg}\end{array}\right]$$

For better result by this method following pt should taken into consideratn.

(1) Ht of bldg.
(2) Perimeter of bldg
(3) Price index
(4) locatn of bldg.
(5) specificatn.
(6) openning in bldg.

cubical content method :-

This method of approx estimate is more accurate then plinth area method. This cubic content method of proposed bldg is found out. There the rate per cubic meter of the existing bldg is feund out

Approx cost of proposed bldg

$$= \left[\begin{array}{c}\text{Total cubic} \\ \text{content}\end{array}\right] \times \left[\begin{array}{c}\text{cost / cubic meter of} \\ \text{similar existing bldg}\end{array}\right]$$

Following pt should be taken into considered

(1) Ht of bldg (2) Price index (3) Locat of bldg
(4) specificath & type of constructh

Typical bay method :-

The space betn centre to centre of two sucessive column is called bay. This method is suitable for bldg which have several identical bay like factory shed, cycle stand etc

A typical bay is selected & cost of each & every item of bay is work out at prevailing market rate. This cost is then divided by length of bay to obtain the cost / running metre of bldg.

$$\text{Approx cost of proposed area} = \left[\begin{array}{c}\text{No of bays} \\ \text{of proposed} \\ \text{bldg}\end{array}\right] \times \left[\text{cost of one bay}\right]$$

Pt to be considered while prepaired by bay method
(1) Framed structure should be identical
(2) End correctn should be done for end bays due to end walls.

PREPAIRATION OF APPROX ESTIMATE OF DIFF ITEMS

Approx estimate for Road or highway
the unit of calculatn for approx estimate for a highway or road is per kilometer length.
To prepaire a approx estimate of road, consider a typical one kilometer length of a simillar exist road. Then calculate the rate of each component of road and at std market rate. The approx rate of proposed road can be found by multiplying the total length of proposed road with rate/km for existing road.
The main component of road are
(1) land aquisitn. (3) Bridge, CD work (or) surface dressing
(2) Earth work. (4) Road amenities
the approx estimate is also improved by making necessary adjustment in proposed & existing road by considering following factors
(1) site condith (3) Type of CD work.
(2) price index (4) Type of masonry.

Approx estimate for water supply project

It consist of following steps

(I) collection of data:-

(a) situation & boat of scheme (e) Existing water supply
(b) configuration of river (f) Existing drainage
(c) Rainfall data of that region (g) Necessity of the scheme
(d) population growth

(II) Estimating the cost of project:-

To cost of the proposed water supply scheme the entire scheme is divided into following components & cost of each component is determined separately. The total cost is found out by adding cost of each component. To this cost add 5% for work charge establishment to be given. The final total runs obtained will be approximate of water supply scheme

component of water supply scheme are

1) Preliminary survey (5) service reservoir
2) Head work (6) Treatment plant
3) Pump house (7) Distribution system
4) Rising mains (8) Land acquisition
5) Approach road.

Head work:- (a) Dam
(b) Infiltration gallery.

Approx estimate for sanitary project

First we have to divide it into components then the cost of each component is found out. To this about 20% total cost is added as work charg establishment the grand total thus obtain ed give the rough estimate of sanitary project the main components are

(1) Priliminary survey (4) sewage treatment disposal
(2) Collectn media (5) land aquisitn
(3) Rising main

Rough estimate for bridge or culvert

The approx cost of a bridge can be worked out by

(1) the linear water way at the time of H.F is found.

(2) To find the rate of constructn per m of linear water way of simillar bridge the cost of constructn is divided by linear water way

(3) To get the cost of proposed structure multiply the calculated rate proposed span to get the approx cost of structure

Approx estimate for irrigation work

It is found out by one of the following method

(a) Hectare meter of storage is considered the unit to arrive at the approx the quantity of water collected in hectare area of one metre depth is the

Hectare meter storage. The cost per hectare meter of similar existing structure is determined. The rate so obtained is then multiplied with total storage of proposed structure will be given the approx cost required

(b) The complete irrigation project is divided into no of units

(1) Preliminary survey (3) Earthwork
(2) Masonry work. (4) land acquisition

The cost of each item is work out of individual by comparison with similar existing scheme. Add 20% W.C establishment to the cost. This is an approx estimate of an irrigation scheme.

Approx estimate for dam

The procedure are as follows

(1) selection of site for dam with help of topo sheet
(2) calculate the C.A for proposed dam.
(3) Fix the capacity of dam by contours
(4) collect the rainfall data at raingauge station near the proposed C.A
(5) calculate the construction cost per million cumec
(6) Multiply this cost with total storage capacity to this cost add 20% work charges (W.C) establishment. The grand total thus obtain is the approx cost of a dam.

Approx cost of a R.C.C retaining wall.

The approx cost of R.C.C retaining wall can be determ by knowning the total quantity of concrete casted. the quantity will depend on the type of foundation available, type of back filling and nature of loading. usually quantity per linear measurement is worked out then, the cost is corresponding determined. This cost is then multiplied by total length of the R.C.C a retaining wall to get the approx cost of R.C.C retaining wall.

Method of approx costing for culvert

Depending upon the nature of foundation the type of material used, width of road way etc the approx cost /m of span is estimated to workout the approx cost of a culvert whose span are known.

For culvert with small spans. the approx cost can be found out on lumpsum basis per no from the record of culvert having smaller span.

age