ESTIMATING AND COSTING
(ACE017)
B.TECH VII SEMESTER

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UNIT- I
GENERAL ITEMS OF BUILDING

ESTIMATE

Estimate

- Before undertaking the construction of a project it is necessary to know its probable cost which is worked out by estimating.
- An estimate is a computation or calculation of the quantites required and expenditure likely to be incurred in the construction of a work. The primary object of the estimate is to enable one to known before hand , the cost of work(buildings or structures).
- Approximate estimate may be prepared by various methods but accurate estimate is prepared by detailed estimate.

ESTIMATE

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 execution of the work in the account section at the completion of the work when the account is completed, the actual cost is known. The actual cost should not differ much from the estimated cost worked out at beginning.

DETAILED ESTIMATE

- Preparation of detailed estimate consists of working out the quantites of different items of work & then working out the cost i.e the estimate is prepared in two stages-
- Details of Measurements & calculation of quantites -
- Details of Measurement form :

Item No	Description or particulars	No	Length	Breadth	Height or Depth	Content or quantity

ABSTRACT ESTIMATE

- Details of calculation of amount.
- Details of Abstract form.

Item No	Description or particulars	Quantity	Unit	Rate	Amount

MAIN ITEMS OF WORK & UNITS

Earth work

- Earth work in excavation & Earth work in filling are usually taken out separately under different items, units- cum.

Concrete in foundation

- LxBxthickness, proportion-1:4:8 or 1:5:10.

Soling

- When the soil is soft or bad , one layer of dry brick or stone soling is applied below the foundation concrete, units- Sqm(lengthxbreadth) specifying the thickness.

Damp proof course

- D.P.C usually of 2.5cm(1”) thick rich cement concrete 1:1.5:3 or 2cm(3/4”) thick rich cement concrete 1:2, mixed with standard waterproofing material is provided at the plinth level to full width of plinth wall.

- Units-Sqm(lengthxbreadth).D.P.C not provided at sills of doors & verandah openings for which deductions are made. 1 kg of cem-seal or impermo or other standard water proofing compund per bag of cement is used.

Masonry

- Mansory is computed in cum (LxBxH).Foundation & plinth masonry is taken under one item, and masonry in super structure is taken under separate item.

Arch masonry work

- Masonry work in arches is calculated in cum separately by multiplying the mean length of the arch by the thickness of arch & by the breadth of wall.

  Quantity of arch masonry = l_m x tx thickness of wall.

R.C.C & Reinforced brick work

- R.C.C & R.B. work may be in roof or floor slab , in beams , lintels columns, foundations and the quantites are calculated in cum.

- The quantites are calculated in cum exculsive of steel reinforcement & its bending but inclusive of centering & shuttering & bending reinforcement in position.The reinforcement including its bending is taken up separately under steel works.

Plastering and Pointing

- Plastering usually 12mm(1/2”) thick is calculated in Sqm.

Cornice

- Ornamental or large cornice is measured in running metre.

Doors& windows

- Doors and window frames or chowkhats are computed in cum.

Iron work

- This is computed in weight in kg or quintal.Density of mild steel = 7850Kg/m^3 or 78.5quintal/m^3 .

White-washing or colur-washing or distempering

- The quantites are computed in Sqm.

Painting

- Painting or varnishing of doors & windows are computed in Sqm.

Electrification & sanitary &water supply

- An 8% of the estimated cost of building.

METHODS OF APPROXIMATE ESTIMATES

The are number of methods available for preparing approximate estimate. The following methods are important which were given below.

- Plinth area method
- Cubic content method
- Service unit method.

PLINTH AREA METHOD

Plinth area method

- In this method we get the cost of the building by multiplying the plinth area by the plinth area rate. This method is adopted for ordinary buildings with one or two floors.

Plinth area rate

- Plinth area rate can be obtained from similar buildings which were constructed in the nearby locality recently with the same specification.
- Plinth area rate depends upon the type of floor, variety of fixtures in bath rooms, type of finishing (white wash or distemper or birla white or plaster of paris etc), type of construction , type of foudation, no of stories, type of wood work, type of show cases quality & quantity aspect of material & labour etc.

PLINTH AREA METHOD

Problem on plinth area method

Prepare a plinth area estimate of a building with a total plinth area of 240m^2 . Given that

1)Plinth area rate Rs9000/- per m^2

2)Extra for architectural appearance =1.5% of the building cost.

3)Extra for electrical installations =14% of building cost.

4)Extra for water supply & sanitary installation = 5% of building cost.

5)Contingencies- 3% overall.

6)Supervision charges – 8% overall.

PROBLEM ON PLINTH AREA METHOD

Solution of problem

Building cost = 240x9000= 21,60,000/-

Architectural appearance = 21,60,000x1.5/100 = 32,400/-.

Water supply & sanitary installations = 21,60,000x5/100 =1,08,000/-.

Electrical installations =21,60,000x14/100 = 3,02,400/-

26,02,800/-

Contingencies – 3% Overall

= 26,02,800x3/100 = 78,084/-.

Supervision charges – 8% Overall

= 26,02,800x8/100 = 2,08,224/-.

Total cost of building = 28,89,108/-

CUBIC CONTENT METHOD

In a building ,Cubic contents are calculated by multiplying the plinth area of the building by the height between floor of basement and top of roof level.This method is used for multi storeyed buildings and for sloped roofs.

Flat Roofs

- Height from plinth level to top of the roof excluding the parapet.

Pitched Roofs

- Height from plinth level to half the height of the gable.
- Approximate cost of building=cubic content x cost/m^3 . Or
- Cost of building = Volume of building x rate/unit volume.
- Cost/m^3 is arrived by considering newly constructed building in the near by locality or vicinity with same specifications.
- This method is more accurate than other two methods.

PROBLEM ON CUBIC CONTENT METHOD

Problem on cubic content method

Prepare a rough estimate for a proposed commercial complex for a municipal for a municipal corporation for the following data.

Plinth area =Rs500/- per m^2 /floor.

Height of each floor = 3m.

No of stories = Ground+2.

Cubical content rate = Rs1000/- per m^3 .

Provisions are given below:

a)Water supply & sanitation = 8% of building cost.

b)Electrification = 6% of building cost.

c)Fluctuation of rates = 5% of building cost.

d)Contractors margin =10% of the total cost.

e)Petty supervision and contingencies = 3% of total cost.

PROBLEM ON CUBIC CONTENT METHOD

Solution to the problem

Cubic contents = No of stories x plinth area x height of each floor

= 3 x 500 x3 =4500m^3 .

Cost of building = cubical content cubical content rate

= 4500 x 1000=Rs 45,00,000/-

Provisions:

a)Water supply and sanitation=45,00,000x8/100= 3,60,000/-

b)Electrification = 45,00,000x6/100 = 2,76,000/-

c)Fluctuation of rate = 45,00,000x5/100 = 2,25,000/-

8,55,000/-

Structure cost 45,00,000/-

= Rs 53,55,000/-

d)P.S and contingencies =53,55,000x3/100 = 1,60,650/-

e)Contractors margin = 53,55,000x10/100 = 5,35,500/-

Total cost of building = Rs60,51,150/-

SERVICE UNIT METHOD

- The approximate cost of a building =No of service units x Cost of one service unit.
- Service unit for different structures are given below.

Type of structure	Service unit
School building -	No of students
Hostel building-	No of students
Hospital building-	No of beds
Auditorium -	No of seats
Water tank -	No of liters of water storied
Roads -	per KM.
Culverts & bridges -	per m of span.
Electrician work -	point basis
Pipe line work -	per metre
Power plant -	per Mega Watt

SERVICE UNIT METHOD

- Cost of one service unit can be arrived by dividing actual expenditure incurred in building in the near by locality within the same specification by the no of units.

- Approximate cost of a ten bed hospital is Rs50,000/- per bed becomes Rs5,00,000/-.

SERVICE UNIT METHOD

Problem on service unit method

- Prepare an approximate estimate of a polytechnic hostel for 180 students ,cost of construction of a hostel in adjacent campus recently including all provisions arrived at 50,000/- per student.Determine the total cost of hostel building.

Solution to above problem

No of students = 180

Cost of building per student/Service unit = Rs 50,000/-

Total cost of hostel building = 180x50,000 = Rs 90,00,000/-

METHODS OF DETAILED ESTIMATION

- Individual wall method or Long wall & short wall method.
- Centre line method.

Long wall and Short wall method

The lengths of long walls are out-to-out and short walls in-to-in vary in every layer of footing. To calculate the length of long walls add half the breadth of that layer at each end to the breadth of the layer from each end. Long wall length gradually decreases from earth work to brickwork in superstructure & short wall length increases.

METHODS OF DETAILED ESTIMATION

Centre line method

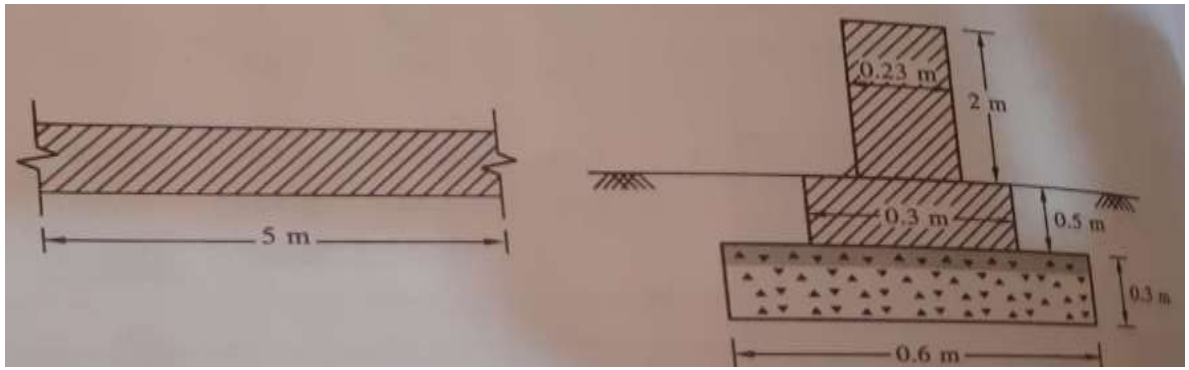
- In this method sum total length of centre lines of walls , long & short has found out.Find the total length of centre lines of walls of same type, long& short having same type of foundations & footings and then find the quantites by multiplying the total centre length by the respective breadth& height.

PROBLEM

- Fig shows the plan and section of a part of a compound wall calculate the quantity of

  a)Cement concrete required for foundation.

  b)Brick masonry required for footing &wall.



PROBLEM

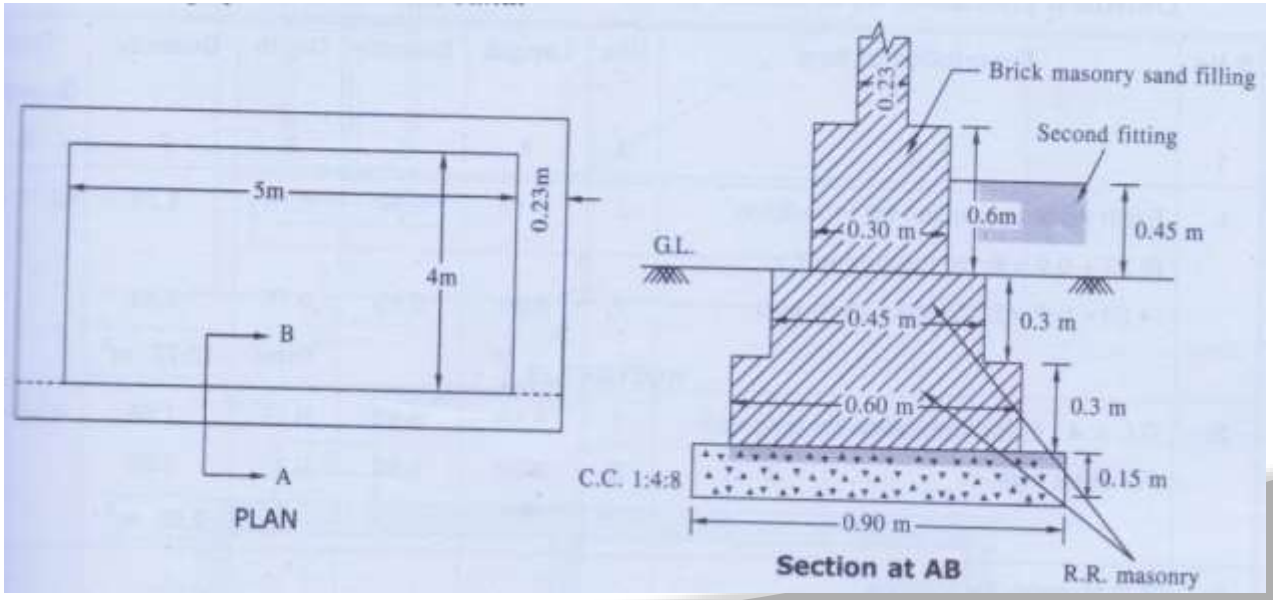
SNO	Description Of item.	No	Length	Breadth	Depth	Quantity	Total Quantity
a)	Cement concrete Reqd for foundation	1	5.00	0.60	0.30	0.90	$0.90m^3$
b)	Brick masonry required for footing	1	5.00	0.30	0.50	0.75	$3.05m^3$
	Brick masonry required for wall	1	5.00	0.23	2.00	2.30	

PROBLEM

The plan and section of a room is given below fig, calculate the following quantities by Centre line method and long wall short wall method.

(a) Earth work excavation. (b) cement concrete (1:4:8).

(c) R.R Masonry for 1st and 2nd footing. d) Brick Masonry for basement. (e) Filling of basement with sand .



PROBLEM

Solution of problem

- Centre line length of a room =2(5.23+4.23) = 18.92m
- C.L. Length of a long wall = 5.23m.
- C.L. Length of a short wall = 4.23m.

S NO	Description Of item.	No	Length	Breadth	Depth	Quantity	Total Quantity
a)	Earth work excavation for foundation around the room	1	18.92	0.90	0.75	12.77	12.77m^3
b)	Cement concrete (1:4:8) for foundation bed alround the room	1	18.92	0.90	0.15	2.55	2.55m^3
c)	RR masonry for footings. First footing alround the room	1	18.92	0.60	0.30	3.40	5.95m^3
	Second footing alround the room.	1	18.92	0.45	0.30	2.55	

PROBLEM

SNO	Description Of item.	No	Length	Breadth	Depth	Quantity	Total Quantity
d)	Brick masonry for basement alround the room	1	18.92	0.30	0.60	3.41	3.41cum
e)	Filling of basement with sand	1	4.93	3.93	0.45	8.72	8.72cum

UNIT-II
EARTH WORKS

INTRODUCTION

All the civil engineering structures such as buildings , roads, canals, railway lines, culverts and dams earth work will there.

- Cross-section of earth work of road in banking or in cutting is usually in the form of trapezium.

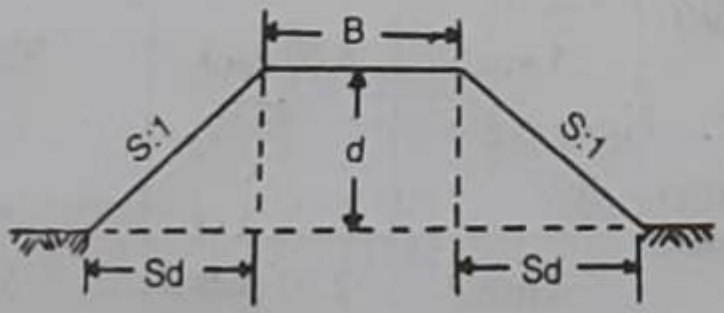


Fig. 7-1
Banking

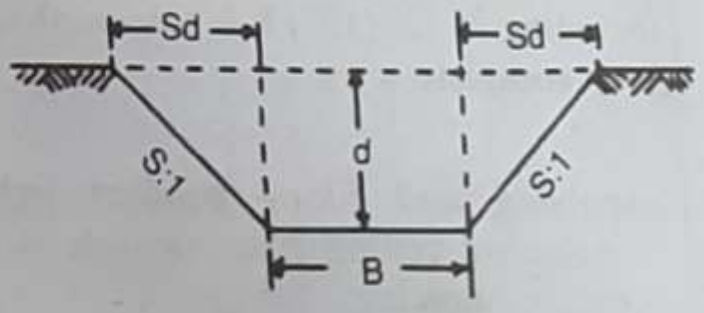


Fig. 7-2
Cutting

INTRODUCTION

- Sectional area= Area of central rectangular portion+ Area of two side triangular portions. = $Bd+2(1/2sdxd) = Bd+sd^2$
- S:1 is the ratio of side slopes as horizontal :vertical .
- For 1 vertical , horizontal is s, for d vertical , horizontal is sd.
- Quantity $=(Bd+sd^2)XL$
- Mean height = $\frac{d1+d2}{2} = d_m$
- Sectional area is taken out from mean height = $Bd_m + sd^2_m$

  $Qty = (Bd_m + sd^2_m)x\ L$

LEAD & LIFT

Lead and Lift

- Earth work is estimated for 30m lead for distance and 1.5m lift for height or depth and this distance of 30m and height of 1.5m are known as normal lead & lift.
- For greater lead or lift the rates will be different for every unit of 30m lead & for every unit of 1.5m lift.
- Longitudinal section is usually plotted with horizontal scale of 1cm=10m to 1cm = 30m lead & a vertical scale of 1cm=1m to 1cm=5m

CALCULATION OF AREA

Mid-Sectional area method

- Quantity = Area of mid-section area x length.
- Let d1 & d2 be the height of bank at two ends portion of embankment, Lthe length of the section B the formation width & S:1(horizontal :vertical).
- Area of mid-section = Area of rectangular portion +area of two triangular portion.

CALCULATION OF AREA

- Area= $Bd_m + 1/2Sd_m^2 + 1/2Sd_m^2 = Bd_m + Sd_m^2$
- Quantity of earth work = $(Bd_m + Sd_m^2)xL$.
- General $Q = (Bd+Sd^2)xL$ where d stands for mean height or depth.

Area of side sloping surface

- The area of sides which may require turfing or pitching , may be found by multiplying the mean sloping by length.

CALCULATION OF AREA

Mean sectional area method

- Quantity = Mean sectional area x length.
- Sectional area at one end $A_1 = Bd_1 + sd_1^2$
- Sectional area at other end $A_2 = Bd_2 + sd_2^2$, d_1 and d_2 are the heights or depths at the two ends.

CALCULATION OF AREA

Prismoidal formula method

- Quantity or Volume = $1/6[A_1+A_2 + 4A_m]$, where A_1 and A_2 are the cross-sectional areas at the two ends of a portion of embankment of a road of length L and A_m is the mid-sectional area.

UNIT-III
RATE ANALYSIS

INTRODUCTION

Definition

- In order to determine the rate of a particular item, the factors affecting the rate of that item are studied carefully and then finally a rate is decided for that item.

- This process of determining the rates of an item is termed as analysis of rates or rate analysis.

INTRODUCTION

Rate analysis factors

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

- Specifications of works and material about their quality,proportion and con-structional operation method.

- Quantity of materials and their costs.
- Cost of labours and their wages.
- Location of site of work and the distances from source and conveyance charges.
- Overhead and establishment charges.

Cost of materials

The costs of materials are taken as delivered at site inclusive of the transport local taxes and other charges. Purpose of Analysis of rates

- To work out the actual cost of per unit of the items.
- To work out the economical use of materials and processes in completing the particulars item.
- To work out the cost of extra items which are not provided in the contract bond, but are to be done as per the directions of the department.
- To revise the schedule of rates due to increase in the cost of material and labour or due to change in technique

COST OF LABOUR

The labour can be classified in to

- Skilled 1st class
- Skilled IInd Class
- Unskilled
- The labour charges can be obtained from the standard schedule of rates 30% of the skilled labour provided in the data may be taken as Ist class, remaining 70% as II class.
- The rates of materials for Government works are fixed by the superintendent Engineer for his circle every year and approved by the Board of Chief Engineers. These rates are incorporated in the standard schedule of rates.

CEMENT CONCRETE

Cement concrete

- Sum total quantity of determining the quantity of materials for 10cum concrete is to divide 15.2 by the sum of the numerals of the proportion of the materials which gives the quantity of cement in cum.
- To find the materials for 10cum of cement of 1:4:8 proportion.
- Cement =15.2/1+4+8 =1.17cum, say 1.15cum.
- Sand = 1.15x4 = 4.60cum.
- Ballast or Aggregate = 8x1.15 =9.20 cum.

BRICK WORK

Calculation of materials required for brick work

- Use of standard bricks
- Take a wall 1.5 brick thick 30cm nominal thickness of 20m length and 5m height.
- Nominal value =20x0.30x5 =30cum.
- Normally mortar joint will be less than 1cm, taking 1cm mortar joint, the actual thickness of wall be 29cm.
- Therefore, actual volume = 20x0.29x5 =29cum.

BRICK WORK

- Number of standard bricks of 20cmx10cmx10cm of nominal size= 29/0.2x0.10x0.10 = 14500nos.
- There , number of bricks per cum (nominal)=14500/30=484nos.
- Considering 5% breakages, wastages, this may be taken 500nos per cum.
- For 10cum of brick work 5000 bricks are required.

BRICK WORK

Mortar calculation for brick work

- Mortar requirement = total volume of brick work minus net volume of bricks = 29-(0.19x0.09x0.09x14500) =

  29-22.315= 6.685cum.
- For frog filling , for use of cut bricks for bonding for uniform joints, wastages etc 15% extra mortar may be required.
- For wet volume increase by 0.25 of dry volume of mortar=6.685+6.685x0.15=7.688cum =7.688+0.25x7.688 =9.61cum.

BRICK WORK

Mortar calculation for brick work

- For 30cum of brick work, dry volume of mortar = 9.61cum.
- For 10cum of brick work , dry volume of mortar=9.61x10/30= 3.2cum.
- In practice , for cement mortar 3cum dry mortar and lime mortar 3.5cum of dry mortar are taken for 10cum brick work.

PLASTERING

Materials calculation for 12mm thick plastering

- Materials for 12mm thick plastering in wall for 100sqm=0.012x100 =1.2cum.
- Add 30% to fillup joints , uneven surfaces etc =1.2+.3x1.2=1.56cum.
- Increasing by 25% the total dry volume = 1.56+0.25x1.56 =1.95(say 2.0 cum)

PLASTERING

Materials calculation for 20mm thick plastering

- Materials for 20mm thick plastering in wall for 100sqm=0.02x100 =2.0cum.
- Add 20% to fillup joints , uneven surfaces etc =2.0+.2x2.0=2.4cum.
- Increasing by 25% the total dry volume = 2.4+0.25x2.4 =3.0cum

PLASTERING

Materials calculation for 12mm thick Ceiling plastering for 100sqm.

- Materials for 12mm thick plastering for 100sqm=0.012x100 =1.20cum.
- Add 20% to fillup joints , uneven surfaces etc =1.20+.2x1.20=1.44cum.
- Increasing by 25% the total dry volume = 1.44+0.25x1.44 =1.80cum.
- For 6mm thick plastering RCC ceiling the quantity of dry mortar may be taken as 1.00cum.

PLASTERING

Neat cement flooring

- For neat cement finishing in floor or dado or skirting, the thickness of neat cement layer may be taken as 1.5mm thick.
- Cement paste requirement for 100sqm = 100x0.0015 = 0.15cum
- Dry volume of cement increased by 25% = 0.15+0.25x0.15 = 0.19cum = 0.20cum = 6 bags per 100sqm.

CEMENT CONCRETE FLOOR

Cement concrete floor

- For 2.5cm thick c.c floor for 100sqm = 0.025x100 = 2.5cum.
- Adding 10% extra for unevenness = 2.5+0.10x2.5 = 2.75cum.
- For dry volume of materials increase by 50% = 2.75+0.50x2.75=4.125cum.
- For 1:2:4, Cement = 4.125/1+2+4 =0.59(say 0.60,18bags).
- Sand = 2x0.6 = 1.20cum,
- Aggregate = 4x0.60 = 2.40cum
- For neat cement surface finishing additional 0.20cum(6bags) of cement will required.

CEMENT CONCRETE FLOOR

Cement concrete floor for 2cm thick (1:1.5:3)

- For 2cm thick floor 1:1.5:3 proportion for 100sqm the dry volume of materials is equal to 4.125cum.
- Cement = 4.125/1+1.5+3 = 0.75cum =22.5bags.
- Sand = 0.75x1.5 = 1.125cum.
- Aggregate = 3x0.75 = 2.25cum.
- For neat cement finishing add extra cement of 0.20cum(6 bags).

CEMENT CONCRETE FLOOR

Cement concrete floor for 4cm thick (1:2:4)

- For 4cm thick floor 1:2:4 proportion for 100sqm, total dry volume of concrete = 100x0.04+10%(for unevenness)+50% increase for dry volume = 4.40+2.20 = 6.60cum.

- Cement = 6.60/1+2+4 = 0.94cum (28.2bags).
- Sand = 0.94x2 = 1.88cum.
- Stone aggregate = 4x0.94 = 3.76cum.
- For neat cement finishing add extra cement of 0.20cum(6 bags).

CEMENT CONCRETE FLOOR

Cement concrete floor for 7.5cm thick (1:4:8)-unit 1sqm.

Take 100sqm

Quantity of cement concrete = 100x0.075 = 7.5cum.

Quantity of materials may be calculated proportionately ¾ of 10cum = ¾ x15.2 = 11.4cum.

Cement = 11.4/1+4+8 = 0.88, Sand = 4x0.88 = 3.5cum.

Aggregate = 8x0.88 = 7.0cum.

UNIT-IV
REINFORCEMENT BAR BENDING

INTRODUCTION

- Bar bending schedule: plays a vital role in finding the quantities of reinforcement in structure. In order to find out the Bar bending schedule for slab or steel reinforcement in Slab, I recommend you to learn Basics of Bar Bending schedule and how to adopt concrete cover for different components of a building.
- There are 16 different types of slabs in construction. Well, the thickness of slab generally varies between 4″ to 8″. We generally adopt 6″ (0.15m) slab thickness. For occasionally heavy loads we adopt 8″ and above thickness slabs.
- Quantity of Reinforcement (Steel) required for Slab Or Bar Bending Schedule for Slab:-

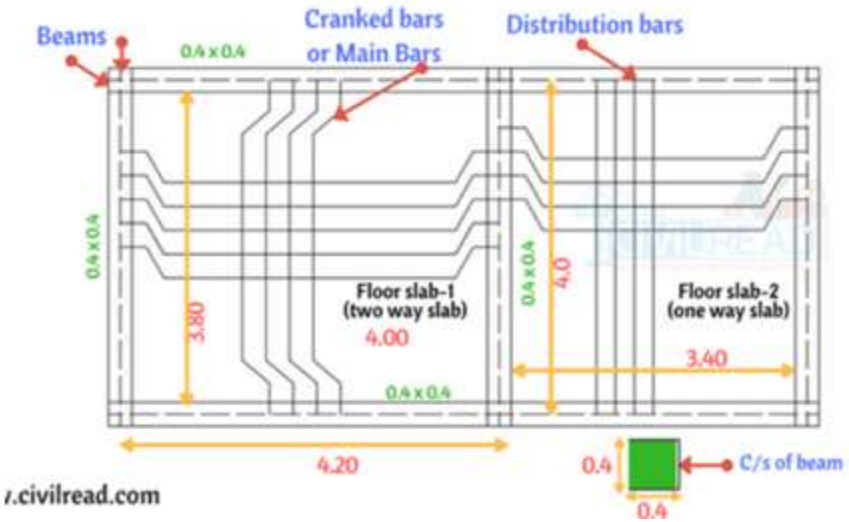
BAR BENDING PROCEDURE

- I am finding out the Estimation of Steel reinforcement required for a Slab to work on this I considered a plan as shown below.
- Primarily slabs are classified into two types One-way Slab and Two-way slab to know more about the differences refer here.
- In one-way slab, Main bars are provided in shorter direction (Cranked bars) and distribution bars are provided in Longer direction (Straight bars).
- Whereas in Two-way slab Main bars (cranked bars) are provided in both directions. Usually, the Two-way slab is adopted when the length and width of the slab is more than 4m.

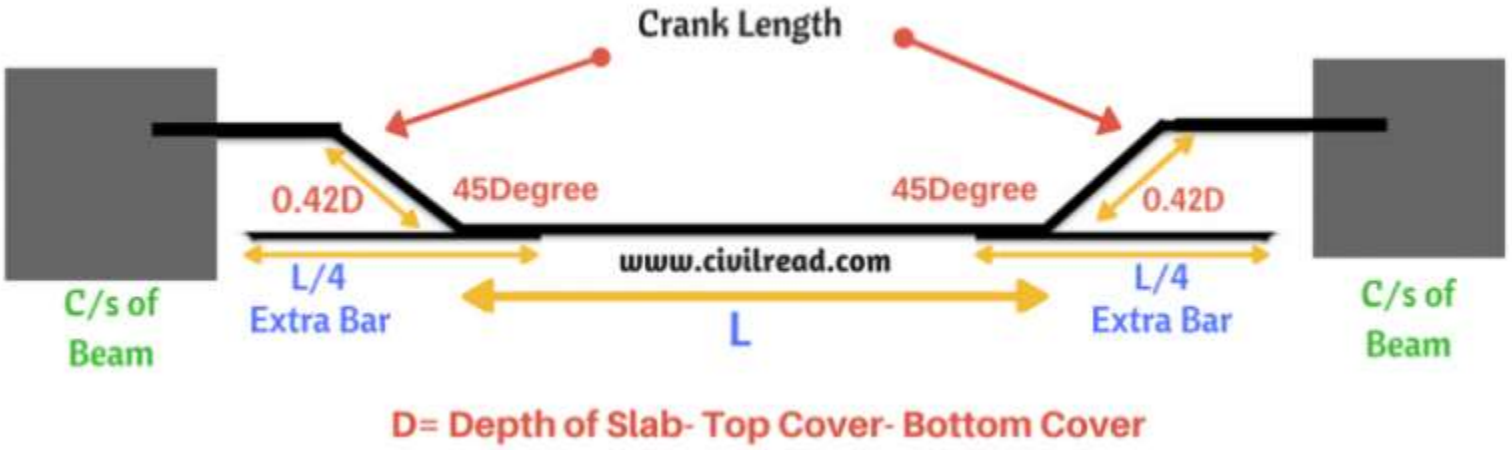
BAR BENDING PROCEDURE

- Well to make you perfect in Bar Bending Schedule for a slab, I am considering a One-way slab and two way slab as shown in the figure. Main bars and distribution bars are provided in the One-way slab. In two way slab, distribution bars are provided in both sides of slab.
- Distribution bars:- These bars are straight bars.
- Main bars:- These bars are cranked bars. Main bars are cranked at an angle of 45 Degree with the length of 0.42D

  Where, D = Depth of Slab- Top cover – Bottom cover
- Extra Bars:- The extra bar is provided at the bottom of Cranked bars to maintain the framework of the slab.
- The length of Extra bar is L/4.


Beams
0.4 x 0.4
Cranked bars
or Main Bars
Distribution bars
0.4 x 0.4
3.80
Floor slab-1
(two way slab)
4.00
0.4 x 0.4
4.0
Floor slab-2
(one way slab)
3.40
0.4 x 0.4
4.20
0.4
C/s of beam
0.4
r.civilread.com

BAR BENDING PROCEDURE



D= Depth of Slab- Top Cover- Bottom Cover

PROBLEM

1. Deduction of cover:- For this divide the beam into two parts with axis line.
   From the Figure breadth and depth of beam is 0.4 x 0.4. .
2. Length of Distribution bar = Bar length C/C- Deduction of cover(both sides)
   +0.42D x 2

   $= 4.2 - 0.025 - 0.025 + 0.42D \times 2$

   D = Depth of slab – Top cover – Bottom cover

   Depth of Slab = 0.15m

   As per condition for 0.15m cover of 0.025m is provided from top and bottom

   Therefore, D = 0.15-0.025-0.025

   = 0.1m

   Length of distribution bar=4.2-0.025-0.025+0.42x0.1x2

   = 4.234m

3. No. of Bars $= \frac{\text{Opp length}}{\text{Spacing}} + 1$

   $= \frac{3.8}{0.1} + 1 = 39$ bars

4. Extra Bar length $= \frac{L}{4} = \frac{4.15}{4} = 1.0375$m
5. For Each bar 2 extra bars are provided
   Therefore length of extra bar for 1 bar = 1.0375 x 2 =2.075
6. Total Length of Distribution Bars = 39 x 4.234+ Length of extra bar

   = 165.126m + 39 bars x 2.075
   = 246.051

7. Weight of Steel bar in $= \frac{D^2}{162}$ Kgs/m

   (For 10 mm) $= \frac{10^2}{162} = 0.61$kgs/m
8. Total Weight of Steel = 0.61 x 246.051 = **150.091Kgs**

CONTRACTS

Contract

- A contract is a legally enforceable agreement between two or more parties with mutual obligations.
- The remedy at law for breach of contract is "damages" or monetary compensation
- A strong contract should contain the maximum amount of details about the job along with responsibilities as possible.

CONTRACTS

Types of Contracts

- Item rate contract
- Percentage rate contract
- Lumpsum contract
- Labour contract
- Materials supply contract
- Piece-Work agreement
- Cost plus percentage rate contract
- Cost plus fixed fee contract
- Cost plus fluctuating fee contract
- Target contract

TYPES OF CONTRACT

Item Rate Contract

- For this contract, contractors are required to quote rates for individual items of work on the basis of schedule of quantities furnished by the client's department.

Percentage Rate Contract

- For this contract, contractors are required to quote rates for individual items of work on the basis of schedule of quantities furnished by the client's department.

TYPES OF CONTRACT

Lumpsum Contract

- In this form of contract, contractors are required to quote a fixed sum (lumpsum amount) for execution of a work complete in all respects i.e., according to the drawings, design and specifications supplied to them with the tender within the specified time.

Labour Contract

- This is a contract where the contractor quotes rates for the item work exclusive of the elements of materials which are supplied by the client's Department.

TYPES OF CONTRACT

Materials Supply Contract

- In this form of contract, the contractors have to offer their rates for supply of the required quantity of materials, inclusive of all local taxes, carriage and delivery charges of materials to the specified site within the time fixed in the tender.

Piece-Work Agreement

- As the name signifies the piece-work agreement, it is that for which only a rate is agreed upon without reference to the total quantity of work to be done or the quantity of work to be done within a given period.

TYPES OF CONTRACT

Cost plus Percentage Rate Contract

- In tendering for work on a “Cost Plus” basis, the contractor is paid the actual cost of the work, plus an agreed percentage in addition, to allow for profit.

Cost plus fixed fee contract

- In this type of contract, the contractor is paid by the owner an agreed lump-sum amount over and above the actual cost of work.

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TYPES OF CONTRACT

Cost plus Fluctuating Fee Contract

- In this type of contract, the contractor is paid by the owner the actual cost of construction plus an amount of fee inversely variable according to the increase or decrease of the estimated cost agreed first by both the parties.

Target Contract

- This is the type of contract where the contractor is paid on a cost-plus percentage work performed under this contract. In addition, he receives a percentage plus or minus on savings or excess effected against either a prior agreed estimate of total cost or a target value arrived at by measuring the work on completion and valuing at prior agreed rates.

UNIT-V
VALUATION

VALUATION

Valuation

- Valuation is the technique of estimating and determining the fair price or value of a property such as a building, a factory or other engineering structures of various types, land etc.

Purpose of Valuation

- Six important Purposes of Valuation.

The main purpose of valuation are as follows

Buying or Selling Property

- When it is required to buy or sell a property, its valuation is required.

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PURPOSE OF VALUATION

Taxation

- To assess the tax of a property, its valuation is required. Taxes may be municipal tax, wealth tax, Property tax etc, and all the taxes are fixed on the valuation of the property.

Rent Function

- In order to determine the rent of a property, valuation is required. Rent is usually fixed on the certain percentage of the amount of valuation which is 6% to 10% of valuation.

PURPOSE OF VALUATION

Security of loans or Mortgage

- When loans are taken against the security of the property, its valuation is required.

Compulsory acquisition

- Whenever a property is acquired by law; compensation is paid to the owner.
- To determine the amount of compensation, valuation of the property is required.
- Valuation of a property is also required for Insurance, Betterment charges, speculations etc.

VALUATION OF BUILDING

Valuation of Building

- Valuation of a building depends on the type of the building, its structure and durability, on the situation, size, shape, frontage, width of roadways, the quality of materials used in the construction and present day prices of materials.
- Valuation also depends on the height of the building, height of the plinth, thickness of the wall, nature of the floor, roof, doors, windows etc.
- The valuation of a building is determined on working out its cost of construction at present day rate and allowing a suitable depreciation.

DIFFERENT METHODS OF VALUATION

Six Methods of Valuation

- Rental Method of Valuation.
- Direct Comparisons of the capital value.
- Valuation based on the profit.
- Valuation based on the cost.
- Development method of Valuation.
- Depreciation method of Valuation.

Rental Method of Valuation

- In this method, the net income by way of rent is found out by deducting all outgoing from the gross rent.
- A suitable rate of interest as prevailing in the market is assumed and Year's purchase is calculated.
- This net income multiplied by Year's Purchase gives the capitalized value or valuation of the property.
- This method is applicable only when the rent is known or probable rent is determined by enquiries.

Direct comparison with the capital Value

- This method may be adopted when the rental value is not available from the property concerned, but there are evidences of sale price of properties as a whole.
- In such cases, the capitalized value of the property is fixed by direct comparison with capitalized value of similar property in the locality.

Valuation based on profit

- This method of Valuation is suitable for buildings like hotels, cinemas, theatres etc for which the capitalized value depends on the profit.
- In such cases, the net income is worked out after deducting gross income; all possible working expense, outgoings, interest on the capital invested etc.
- The net profit is multiplied by Year's Purchase to get the capitalized value. In such cases, the valuation may work out to be high in comparison with the cost of construction.

Valuation based on cost

- In this method, the actual cost incurred in constructing the building or in possessing the property is taken as basis to determine the value of property.

- In such cases, necessary depreciation should be allowed and the points of obsolescence should also be considered.

Development Method of Valuation

- This method of Valuation is used for the properties which are in the underdeveloped stage or partly developed and partly underdeveloped stage.
- If a large place of land is required to be divided into plots after providing for roads, parks etc, this method of valuation is to be adopted.
- If a building is required to be renovated by making additional changes, alterations or improvements, the development method of Valuation may be used.
- In such cases, the probable selling price of the divided plots, the area required for roads, parks etc and other expenditures for development should be known.

Depreciation Method of Valuation

- According to this method of Valuation, the building should be divided into four parts:1. Walls 2. Roofs 3. Floors 4. Doors and Windows
- And the cost of each part should first be worked out on the present day rates by detailed measurements.
- The present value of land and water supply, electric and sanitary fittings etc should be added to the valuation of the building to arrive at total valuation of the property.

METHODS OF DEPRECIATION

Depreciation

- Depreciation is the gradual exhaustion of the usefulness of a property. This may be defined as the decrease or loss in the value of a property due to structural deterioration, life wear and tear, decay and obsolescence.

Methods of Depreciation

Four Methods for calculating depreciation

- Straight line Method
- Constant percentage method
- Sinking Fund Method
- Quantity Survey Method

Straight Line Method

- In this method, it is assumed that the property losses its value by the same amount every year. A fixed amount of the original cost is deducted every year, so that at the end of the utility period, only the scrap value is left.
- Annual Depreciation, D = (original cost of the asset – Scrap Value)/life in years.
- For example, a vehicle that depreciates over 5 years, is purchased at a cost of US$17,000, and will have a salvage value of US$2000, will depreciate at US$3,000 per year: ($17,000 ? $2,000)/ 5 years = $3,000 annual straight-line depreciation expense.

Constant Percentage Method or Declining balance Method

- In this method, it is assumed that the property will lose its value by a constant percentage of its value at the beginning of every year.

- Annual Depreciation, D = 1-(scrap value/original value)1/life in year

Sinking Fund Method

- In this method, the depreciation of a property is assumed to be equal to the annual sinking fund plus the interest on the fund for that year, which is supposed to be invested on interest bearing investment.

- If A is the annual sinking fund and b, c, d, etc. represent interest on the sinking fund for subsequent years and C = total original cost, then – Sinking Fund Method.

Quantity Survey Method

- In this method, the property is studied in detail and loss in value due to life, wear and tear, decay, and obsolescence etc, worked out.

- Each and every step is based is based on some logical grounds without any fixed percentage of the cost of the property. Only experimental valuer can work out the amount of depreciation and present value of a property by this method.

DEFINITIONS

Market Value

- The market value of a property is the amount which can be obtained at any particular time from the open market if the property is put for sale.
- The market value will differ from time to time according to demand and supply.
- The market value also changes from time to time for various miscellaneous reasons such as changes in industry, changes in fashions, means of transport, cost of materials and labour etc

Book Value

- Book value is the amount shown in the account book after allowing necessary depreciations.
- The book value of a property at a particular year is the original cost minus the amount of depreciation allowed per year and will be gradually reduced year to year and at the end of the utility period of the property, the book value will be only scrap value.

Capital cost

- Capital cost is the total cost of construction including land, or the original total amount required to possess a property.

- It is the original cost and does not change while the value of the property is the present cost which may be calculated by methods of Valuation.

Capitalized Value of a Property

- The capitalized value of a property is the amount of money whose annual interest at the highest prevailing rate of interest will be equal to the net income from the property.
- To determine the capitalized value of a property, it is required to know the net income from the property and the highest prevailing rate of interest.
- Therefore, Capitalized Value = Net income x year's purchase

Year's Purchase

- Year's purchase is defined as the capital sum required to be invested in order to receive a net receive a net annual income as an annuity of rupee one at a fixed rate of interest.
- The capital sum should be 1×100/rate of interest.
- Thus to gain an annual income of Rs x at a fixed rate of interest, the capital sum should be x(100/rate of interest).
- But (100/rate of interest) is termed as Year's Purchase.
- Capital Sum = Annual income x Year's Purchase
- The multiplier of the net annual income to determine the capital value is known as the Year's Purchase (YP) and it is useful to obtain the capitalized value of the property.

Gross income

- Gross income is the total income and includes all receipts from Various sources the outgoings and the operational and collection charges are not deducted .
- Net income or Net return = Gross income – outgoings.

Out goings

- Outgoings or the expenses which are required to be incurred to maintain the revenue of the building.
- 1)Taxes- Municipal tax, property tax, wealth tax. 2)Repairs 3)Management and collection charges.

Sinking fund

- A certain amount of the gross rent is set aside annually as sinking fund to accumulate the total cost of construction when the life of the building is over. This annual sinking fund is also taken as outgoings.
- $I = Si/(1+i)^n - 1$,

- Where S= Total amount of sinking fund to be accumulated.
- n= no. of years required to accumulate sinking fund.
- i= rate of interest in decimal.

Scrap Value

- Scrap value is the value of dismantled materials.For a building when the life is over at the end of its utility period the dismantled materials as steel, bricks timber will fetch a certain amount which is scrap value.

Salvage Value

- It is the value at the end of the utility period without being dismantled.

Annuity

- Annuity is the annual periodic payements for repayments of the capital amount invested by a party.

Mortgage lease

- An owner can borrow money against the security of his property, and for that purpose he is required to grant an interest to the party advancing the loan. The loan is required to be returned in specified time. The person who takes the loans is known as Mortgagor and the person who advances the loan is known as Mortgagee, and the relevant document for the mortgage transaction is known as Mortgage deed.

Free hold property

- A free hold property mans that the owner is in absolute possession of the property, and the owner can utilize the same in any manner, he likes, subject to the rules and regulations of government and local authorities.He may use the property by himself, he may grant leases, or tenancies for a short period or any period.

LEASES

Lease hold property

- It indicates the physical possession of the property and the use of it may be allowed by the original owner (lessor) as per lease document. The owner of a free hold property may give permission to any other person to use his free hold which is known as giving property on lease.
- The person who takes lease is known as lessee or lease holder and the owner who grant lease is known as lessor.

Main types of lease are

- Building lease
- Occupation lease

LEASES

Building lease

- The owner of a free hold land leases out his plot of land to somebody to construct a building. On payment of a yearly ground rent by the lease holder.
- The lease holder constructs the building and maintains it at his own expenses and earns some rent from the building.
- The net income to the lease holder will be net rent minus the ground rent he pays to the lessor.
- As the lease holder has to invest sufficient money in constructing the building, such lease is granted for long period, for 99 or 999 years.
- At the end of the lease period the lessor has got the right on his land together with the structure on the land.

LEASES

Occupation lease

- In this case the building or the structure is built by the owner (free holder) and built up property is given on lease for the purpose of accupation for a specified period on payement of certain amount of annual rent .
- The occupational lease may be for residential , office, factory, shop . The lease period will depend on the purpose for which the structure or building has been constructed.

FIXATION AND CALCULATION OF RENT

Fixation of rent

- The rent of building is fixed on the basis of certain percentage of annual interest on the capital cost and all possible annual expenditures on outgoings.

FIXATION AND CALCULATION OF RENT

Fixation and calculation of rent of government building.

Method I

- According to this method the annual standard rent is taken as 6% per annum of the total capital cost.
- The capital cost includes the cost of construction of the building , the cost of sanitary and water supply works, and the cost of electric installations .
- The cost of construction of compound walls, fencing and gates and the cost of approach roads, and other roads within the boundaries are also considered as part of the capital cost. The cost of land is not included.

FIXATION AND CALCULATION OF RENT

Method II

- According to this method the standard rent is calculated at 6% interest on the capital cost and in addition the expenditure on annual and special maintenance and repairs and muncipal and other taxes are added. For annual repairs 1.5% of the cost of building, 1% of water supply works , 1% of the cost of sanitary works and 1.5% of the cost of electric installation are allowed per annum.