Q. Detailed Estimating

UNIT-I

INTRODUCTION

Introduction of Estimating and Costing :-

Before taking up any project for its execution the owner (or) builder (or) engineer should have a thorough knowledge about the volume of work that can be completed within the limits of his funds.

Definition of Estimation :-

Estimation of any construction work may be defined as the process of calculating the quantities of various items and cost of the various items required for the construction work with a reasonable degree of accuracy.

Need (or) objects for Estimation :-

1) To know the quantities of various items of work, material and labour and their source.
2) To decide whether the funds available being sufficient (or) not to complete the project.
To obtain the administrative approval and technical action of estimate from the competent authority to release the funds.
To invite the tenders (or) quotations based on the estimated quantities.

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Requirements of an estimate :-

The following data is necessary preparation of estimate are

① Drawings ② Specification ③ Rates.

1) Drawings :- Drawings consists plan, elevation and cross-sections of important points which gives full dimensions of each element.

2) Specification :- The quality of the work and specific description of an item (or) object and life of the structure depends in the specifications adopted during execution of structure. It specifies the properties of materials proportions in mixing types of workmanship etc.

3) Rates :- The rates of various materials and different categories of labours involved in construction of structures are available in the standard schedule of rates (SSR) approved by the concerned engineering authorities every year. The rate per unit of various item of work can be worked out by the method of analysis of rates with adoption of Breaks up from the standard data book, and lead charges from the standard schedule of Rates.

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Detail items of work in building :-

Earth work excavation :-

→ Earthwork excavation includes excavation and filling. Both are considered in different items and the quantities of both are calculated separately. The rates for both items are also different in SSR.

2) Concreting in foundations :-

The measurements taken in volume by measuring length x breadth x thickness (depth). The length and width of earthwork item is same for concreting. The thickness of concrete varies from 20cm to 45 cms. The normal thickness is 30 cm. The normal proportion are . Cement concrete 1:4:8 (or) 1:5:10 with utility of 40 mm size HB metal.

3) Brick / stone masonry with cement ~~mortar~~ mortar :-

→ The quantity of masonry can be calculated easily by multiplying the length x breadth x depth and units are in m^3. Generally brick masonry constructed with cement mortar proportion (1:6).

4) Damp proof course (DPC) :-

DPC is provided over basement to arrest/avoid rising of moisture to superstructure

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usually of 25 mm thick width CC (1:1½:3) is measured in m^2 (L x B).

→ Breadth taken should be basement width.

5) Reinforced cement concrete (R.C.C):-

→ RCC used for footings, columns, plinth beams, lintels, sunshades, beams and slabs etc.

→ Steel bars are free from corrosion, scales, oil, grease etc. and are placed in position as per drawings.

6) Roofing:-

→ For R.C.C roof the thickness of slab varies from 100 to 150 mm with min. grade of concrete is M_{20} and measured in m^3 (L x B x D).

→ In case roof is laid with mangalore tiles / country tiles / G.I. sheet / AC sheet measured in m^2 (L x B).

7) Floor finishes with ceramic tiles and Marbles:-

The quantity of flooring is calculated by multiplying length x breadth and its units are in m^2.

8) Plastering and Painting:-

→ Plastering is done to protect the masonry and to get good appearance. For brick masonry plastering is of 12mm thickness and for stone masonry is of 20 mm thick. Plastering can be calculated by Multiplying L x B.

a) White washing / colour washing :-

The quantity of white washing (or) colour washing is same as plastering item and units are measured in m^2.

b) Painting :-

Painting is calculated in m^2. For painting and varnishing the doors and windows dimensions shall be taken for outer dimensions only.

General units of various items of work :-

S.No.	Description of item of work	Unit of Measurement	Unit of payment
1.	Earthwork excavation	1 cum	1 cum.
2.	Plain cement concrete (P.C.C) for foundation	1 cum.	1 cum.
3.	R.R masonry / Brick Masonry for foundations, basement, & Super Structure	1 cum	1 cum.
4.	Filling the basement with sand	1 cum	1 cum.
5.	R.C.C for plinth beam, columns, footings, lintels, slabs etc	1 cum	1 cum.
6.	Plastering, white washing, painting, weather proof course.	1 Sq.mt.	1 Sq.mt.
7.	Damp proof course of specified width & thickness	1 Rmt	1 Rmt.

S.No	Description of item of work	Unit of Measurement	Unit of Payment
8.	Roofing with AC sheets / Tiled roof etc.	10 sq.mt	10 sq.mt
9.	Wooden & steel trussel	1 No.	1 No.
10.	Doors, windows, ventilators, rain water pipes	1 No	1 No.
11.	R.C.C. Sunshade of specified width & thick	1 Rmt	1 Rmt.
12.	Spreading of gravel, metal for road work	10 Sqmt	10 Sqmt
13.	Gravel, metal collection for road work	1 cum	1 cum.
14.	Steel RF in R.C.C	1 kg	1 kg.
15.	VRCC (vibro Rolled compacted Concrete) for OHSR / columns, beams	1 cum	1 cum.
16.	Fencing, hand rail bands of specified width; cornice	1 Rmt	1 Rmt
17.	Ornamental borders of specified width & thickness	1 Rmt	1 Rmt
18.	Jungle clearance	1 Sqmt	1 Sqmt.

Approximate

Types of estimates :-

In general, the estimate can be divided into the following three types. They are :

1) Approximate estimate ② Detailed estimate
③ Abstract estimate.

Description of item of work | Unit of Measurement | Unit of Payment

Approximate Estimate

It is called rough estimate, but it is not the accurate estimate. It is useful for preliminary study of various aspects of work (or) project to finalise the budget of the project with the existing funds. Some times approximate estimate is called as preliminary estimate. This estimate can be divided into three types. They are :-

1) Plinth area method
2) Cubic content method
3) Service unit method (or) Unit cost method.

1) 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.

2) Cubic content method :- In a building, cubic contents are calculated by multiplying the plinth area of the building by the height b/w floor level of basement and top of roof level. This method is used for multi storeyed buildings and for sloped roofs.

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Cubic content = cubic area × cubic cost.

3) Service unit method :- The app. cost of a building = No. of service units × cost of one service unit

Service units for different structures are given below :-

Type of structure	Service Unit
School building	No. of students
Hostel building	No. of student
Hospital building	No. of beds.
Auditorium	No. of seats.
water tank	No. of litres of water stored
Roads	Per km
Culverts & bridges	per mt. of span
Electrician work	Point basis.
Pipe line work	Per metre
Power plant	Mega watt.

2) Detailed Estimate :- In detailed estimate, the quantities each item of work such as earth work excavation, bed concrete, brick masonry etc. are calculated. The dimensions of length, breadth, depth or height are read of from the drawings and entered

in the prescribed format is given below. (3)

S.No.	Description of item	No.	Length	Breadth	Depth	Quantity	Total quantity.

→ In detailed estimate quantities are worked out in the order in which the construction proceeds.
→ Similar works are grouped at one place and sum the total contents.
→ Detailed estimate is required for arranging the contract and entering into agreement b/w contractor and engineer / owner.

3) Abstract estimate :- This estimate gives the exact cost of the project. For preparing abstract estimate we need.
→ Quantities of items — arrived in detailed estimate.
→ Rates of items arrived in analysis of rates by using schedule of rates and data.
→ Necessary L.S. provisions are made for petty supervision, contingencies and unforeseen items.

The format for abstract estimate is given

Item No.	Quantity	Description of item	Rate	Per	Amount (₹)

Problems on Approximate Method.

a) Plinth area method problems :-

1) Prepare the total cost of the building by plinth area method with the following data:

1) Plinth area of the building = 200 m²
2) Plinth area rate = 10,000/- per m².
3) 25% of building cost is allowed for different provisions of water supply, sanitary, electrical installations, architectural features, P.S. & contingencies etc put together.

Sol:- Given Plinth area = 200m², plinth area rate = 10,000/m²

Cost of the building = plinth area x plinth area rate

= 200 x 10,000

= 2,00,000/-

Provisions allowed = $20,00,000 \times \frac{25}{100}$ = 5,00,000/-

Total cost of building = 20,00,000 + 5,00,000

= 25,00,000/-

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an approximate estimate of building project with area of building is 600m². From the following data (6)
Calculate the total cost of the project.
Plinth area rate Rs. 12000/- per sq.m.
b) Cost of water supply @ 7½ % of cost of building.
c) Cost of sanitary & electrical installations each 7½ % of cost of building.
d) Cost of architectural features 1% of building cost
e) cost of roads & lawns @ 5% of building cost.
f) Cost of P.S & contingencies @ 4% of building cost.

Sol: Given plinth area = 600m²
Plinth area rate = 12000/- per m².

Cost of the building = plinth area × plinth area rate
= 600 × 12000 = 72,00,000/-
~~= 72,00,000/-~~

a) Cost of water supply @ 7½ of B.C
$= \frac{7.5}{100} \times 72,00,000$ = 5,40,000/-

b) Cost of Sanitary & Electrical installations each @ 7½ · B.C = $\frac{7.5}{100} \times 72,00,000$ = 10,80,000/-

c) Cost of architectural features @ 1% of B.C
$= \frac{1}{100} \times 72,00,000$ = 72,000/-

d) Cost of roads & lawns @ 5% of B.C
$= \frac{5}{100} \times 72,00,000$ = 3,60,000/-

e) Cost of P.S & Contingencies @ 4% of B.C
$= \frac{4}{100} \times 72,00,000$ = 2,88,000/-

∴ Total cost of the project = 95,40,000/-

b) Cubic content method problems :-

3) Prepare a preliminary estimate of Cinema theatre building Cubic contents area 10,000 m³. cost of theatre building 500/- per m³. Assume suitable provisions.

Sol:- Given cubic Area = 10,000 m³.

cost of cubic area = 500/- per m³.

Cost of Cinema theatre = 10,000 X 500 = 50,00,000/-

Suitable provisions :-

a) Add for water supply & Sanitary Charges at -

12 % of B.C = $\frac{12.5}{100} \times 50,00,000$ = 6, 25,000/-

b) Add for electrical installations charges

at 12 1/2 % of B.C = $\frac{12.5}{100} \times 50,00,000$ = 6, 25,000/-

62, 50,000/-

c) Add 3% for pretty supervisions & on overall

cost = $62,50,000 \times \frac{3}{100}$ = 1, 87,500

Total cost of Cinema Theatre = 64, 37,500/-

4) Prepare a rough estimate for a proposed commercial Complex for a municipal corporation for the following data.

Plinth area = 500 per m²/floor

Height of each floor = 3m.

No. of stories = Ground floor + 2

Cubical content rate = 1000/- per m³.

Provisions are given below :-

a) Water supply & sanitation = 8% of Building cost

b) Electrification = 6% of B.C

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Location q rates = 5% q Building cost

Contractors' margin = 10% q total cost

Pretty Supervision & Contingencies = 3% q total cost.

Given Plinth area = 500 per m² / floor.

Ht. q each floor = 3m

No. q stories = G.F + 2 = 3

Cubic rate = 1000/- per m³.

Cubic Area = No. q stories × Plinth area × Ht. q each floor

= 3 × 500 × 3 = 4500 m³.

Cost q building = Cubic area × Cubic rate

= 4500 × 1000 = 45,00,000/-

Provisions:-

a) Water Supply & Sanitation @ 8% q B.C = $\frac{8}{100}$ × 45,00,000 = 3,60,000/-

b) Electrification @ 6% q B.C = $\frac{6}{100}$ × 45,00,000 = 2,70,000/-

c) Fluctuation q rate @ 5% q B.C = $\frac{5}{100}$ × 45,00,000 = 2,25,000/-

Total cost q Building = 53,55,000/-

d) P.S & Contingencies @ 3% q T.C = $\frac{3}{100}$ × 53,55,000 = 1,60,650/-

e) Contractors margin @ 10% q T.C = $\frac{10}{100}$ × 53,55,000 = 5,35,500/-

Total cost q Building = 60,51,150/-

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c) Service unit method problems

5) Prepare an approximate estimate of hospital building in a primary health centre for 20 beds. The cost of construction for each bed is arrived at Rs. 70,00,000/- by considering the hospital building constructed recently in near by locality. Determine the total cost of hospital building.

Sol:- Given no. of beds = 20

each bed cost = 70,00,000/-

∴ Total cost of hospital building = no. of beds x Bed cost

= 20 x 70,00,000

= 14,00,000/-

6) Prepare an approximate estimate of a polytechnic hostel for 150 students capacity. The 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.

Sol- Given no. of students = 150.

Cost per student = 50,000/-

Total cost of Hostel building = 150 x 50,000

= 90,00,000/-