UNIT I
GENERAL ITEMS OF BUILDING

1. Define estimate
An estimate is the anticipated or probable cost of work and is usuallyprepared before the construction is taken up. It is indeed calculations or computations of various items of an engineering work.

2. Define Quantity survey
It is the schedule of all items of work in a building. Thesequantities are calculated from the drawing of the building. Thus quantity survey gives quantities of work done in case of each items, when priced gives the total cost. In short, quantity survey means calculations of quantities of materials required to complete the work concerned.

3. Define Specifications
Detailed specifications gives the nature, quality and class of work,materials to be used in the various parts of work , quality of the material, their proportions, method of preparation, workmanship and description of execution of work are required.

4. Define Rates
The rates of various items of works, materials to be used in the construction andthe wages of different categories of labor (skilled and unskilled) should be available for preparing an estimate. The cost of transportation charges should also be known. As far as possible sanctioned "Schedule of Rates" shall be followed or the rates may be worked out by the "Analysis of Rates" method.

5. Define Site plan
It is the plan drawn for a particular construction showing its position withrespect to approaching roads, main bazars, markets and other permanent features in a populated area. It shows the location of the area under construction with respect to the other areas and on it generally the names of the owners of areas or property holders adjoining to it are also denoted. North line is also clearly marked on it.

6. Define Line plan
Line plan can be defined as the plan of a particular construction simplyshowing main features with the help of the single lines of different portions of the constructions. Details of constructions are not generally shown on this plan. This inside and outside dimensions shown on this plan should necessarily be corresponding to actual dimensions.

7. Define Index plan

This is the plan of a particular colony showing the positions of differenthouses in single lines their number if any position of roads, schools, market, hospitals and other features etc. this plan is generally fixed on the entrance, or at exit or in the central place of the colony, for the guidance of the inhabitants and outsiders.

8. Define Detailed plan

This plan indicates a plan of a construction drawn to a definite scale,showing all detailed information required for its execution. Various sections and elevations are clearly drawn on this plan.

9. Define Centre line plan

This is actually a layout plan drawn to facilitate the laying out offoundation lines and other features. It is generally fixed on the entrance or at exit in the central place of the colony for the guidance of the inhabitants and outsiders.

10. Define Supplemantary estimate

When some additions are done in the original work, afresh detailed estimate is prepared to supplement the original work. This estimate is called supplementary estimate. It is also accompanied by all the papers as required in thru detailed estimate.

11. Define Administrative approval

For any project required by the department an approvalso sanction of the competent authority with respect to the cost and work is necessary at the first instance. Thus administrative aooroval denotes the formal acceptance by the administrative department concerned of the proposals for incurring expenditure.

12. Define Technical sanction

It means the sanction and order by the competent authority ofthe department for the detailed estimate design calculations quantities of work rates and cost of work..after the technical sanction of the estimate is received the work is then taken up for construction.

13. Define Competent authority

An officer or any other authority in the department to whomrelevant powers are delegated by the government (Financial Department).

14. Define Ordinary measurement book

It is measured book in which entries regarding the workdone or supplies made and services performed are recorded for the purpose of making payments to the contractors or the labor. Entries in the M.B are generally recorded by the sectional officers or by any other officers deputed for the purpose

15. Define Lumpsum items

Sometimes while preparing estimate for the certain small items like front architecture or decoration work of a building it is not possible to workout detailed quantities so far such lump sum items a lump sum rate is provided.

16. Define Plinth area

The built up covered area of a building measured at floor level of any storey is called plinth area.

17. Define Circulation area

The total cost of construction including all expenditures incurred plus the cost of external servicesup to the end of the completion of the work is called capital cost. It also includes the cost of preliminary works, miscellaneous items and supervision charges etc

PART-A
PART B (Short Questions)

1. What is meant by estimating and costing and state its need?
2. Write a short note on types of estimates and their purpose?
3. What is specification and mention its necessity?
4. State the methods of arriving quantities with brief notes?
5. Write short notes on units of calculation?
6. What is lump sum „provision in estimate „?
7. Explain what is meant by work charged establishment?
8. Distinguish between detailed and abstract estimates.
9. Write short notes on approximate method of estimating.
10. Write short notes on main items of work in estimation.

PART C (Long Questions)

1. Explain principle units for various items of work?
2. List out limits of measurement and degrees of accuracy in estimating.
3. What is approximate estimate and explain the importance of approximate estimate.
4. Enumerate purpose of an approximate estimate?
5. List out general items of work for building estimates in detail?
6. Explain the following general items of work involved in the estimation for a building and its process calculation
   (a) Centering and shuttering?
   (b) Steel work.
   (c) Wood work for doors and windows.
7. How do you estimate the quantities of masonry work in semicircular arch?
8. Write down unit of measurement, unit rate of payment and mode of measurement for the following general items of work.
   (a) Asbestos Corrugated or Galvanized Corrugated Iron sheet roofing.
   (b) Jack arch roofing.
   (c) Water proofing on roof
   (d) Ceiling and linings.
9. Explain the following general items of work involved in the estimation for a building and its process calculation.
   (a) Centring and shuttering.
   (b) Steel work.
   (c) Lime concrete in roof.
   (d) Wood work for doors and windows.

10. Write down unit of measurement, unit rate of payment and mode of measurement for the following general items of work.
    (a) Dressed stonework as in chajjas, jallies, shelves etc.
    (b) Boulder work.
    (c) Terraced roofing portion of tiles, bricks or stone slabs.
    (d) Lime terracing on roof.

11. Explain the following general items of work involved in the estimation for a building along with the process of calculations.
    (a) Earthwork in excavation.
    (b) Earthwork in filling.
    (c) Brick at soling.
    (d) Masonry work in foundation.
    (e) Damp proof course.

12. Explain the following methods along with an example.
    (a) Straight line method
    (b) Quantity survey method.

13. What is the difference between preliminary estimates, detailed estimates?

14. What are different types of estimates? How do they differ from each other? Which of the methods can give us the exact cost and why?

15. Prepare a preliminary estimate of four strayed office building having total carpet area of 2000sq.m for obtaining the administrative approval of the government, given the following data. It may be assumed that 40% f the built up area will be taken up by corridors, verandah, lavatories, staircase etc.
    Plinth area rate in Rs. 4500/- per sq.m.
    Extra due to deeper foundation at site 1 % of building cost.
    Extra for special architectural treatment 0.5% of building cost.
    Extra for water supply and sanitary installations at 8% of building cost.
    Extra for internal electrical installation at 12.5% of building cost.
    Extra for other services 5% of building cost.
    Contingencies – 2.5%
    Supervision charges – 10 %.

16. Prepare a rough estimate of the hospital building for 100 beds. The cost of construction altogether for each bed Rs. 1, 25,000/-. Determine the total cost building assuming suitable provisions as per Standard data book.

17. Prepare a rough estimate of the hostel building which can accommodate 270 students. The cost of construction altogether including all provisions is Rs. 45,000/- per student. Determine the total cost building assuming suitable provisions as per Standard data book.

18. Describe the procedure for the calculation of rate per unit cum of I-class brick in superstructure with 20 x10x 10 cm bricks with cement sand mortar 1:6.

19. State the requirements for preparation of estimates.

20. State the various types of preparation of rough estimates.

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OBJECTIVES

1. How does the strength of concrete differ with age of concrete?
a) Increases
b) Decreases
c) No effect
d) Increases, then decreases

2. Bleeding of concrete may be due to
1. excess of water
2. too much finishing
3. coarse aggregates
 (a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1,2 and 3

3. Bleeding can be prevented by
(a) controlling water content
(b) using finely ground cement
(c) controlling compaction
(d) all the above

4. Consider the following statements
 Sand in mortar is needed for
1. decreasing the quantity of cement
2. reducing shrinkage
3. decreasing the surface area of the binding material
4. increasing the strength
Of these statements
 (a) 2,3, and 4 are correct
(b) 1,2 and 3 are correct
(c) 1,3 and 4 are correct
(d) 1,2 and 4 are correct

5. Separation of cement paste from sand in the mortar allowing the water or cement paste to appear at the surface is called
(a) bleeding
(b) segregation
(c) honeycombing
(d) none of these

6. Concrete grows with age. This statement is
(a) true
(b) false
(c) debatable
(d) given by Duff Abrams

7. Concrete in the structural member has to pass through
(a) plastic stage
(b) hardened stage
(c) both (a) and (b) above
(d) neither (a) nor (b)

8. Separation of the coarse aggregate from mortar is called
(a) bleeding
(b) segregation
(c) compaction
(d) none of the these

9. The ease with which concrete can be compacted fully without segregation is called
(a) bleeding
(b) segregation
(c) workability
(d) none of these

10. Segregation can be prevented by
(a) properly grading the aggregate
(b) controlling water content in a mix
(c) using correct handling procedures
(d) all the above

UNIT II
DETAILED ESTIMATE

PART A

1. General items of building

Estimating is the technique of calculating or computing the variousquantities and the expected Expenditure to be incurred on a particular work orproject. In case the funds available are less than the estimated cost the work isdone in part or by reducing it or specifications are altered, the following requirementare necessary for preparing an estimate.

1. Drawings like plan, elevation and sections of important points.

2. Detailed specifications about workmanship& properties of materials etc.

3. Standard schedule of rates of the current year.

2. Units of measurements

The units of measurements are mainly categorized for their nature, shape and size and for making payments to the contractor and also. The principle of units of measurements normally consists the following:

a) Single units work like doors, windows, trusses etc., is expressed in numbers.

b) Works consists linear measurements involve length like cornice, fencing, hand rail, bands of specified width etc., are expressed in running meters (RM)

c) Works consists areal surface measurements involve area like plastering, white washing, partitions of specified thickness etc., and are expressed in square meters (m2)

d) Works consists cubical contents which involve volume like earth work, cement concrete, Masonry etc are expressed in Cubic metres.

3. Rules for measurement

The rules for measurement of each item are invariably described in IS- 1200.
However some of the general rules are listed below.

1.Measurement shall be made for finished item of work and description of each item shall include materials, transport, labor, fabrication tools and plant and all types of overheads for finishing the work in required shape, size and specification.

2.In booking, the order shall be in sequence of length, breadth and height or thickness.

3.All works shall be measured subject to the following tolerances.

a).linear measurement shall be measured to the nearest 0.01m.

b).Areas shall be measured to the nearest 0.01 sq.m

c).Cubic contents shall be worked-out to the nearest 0.01 cum

Same type of work under different conditions and nature shall be measured separatelyunder separate items.

The bill of quantities shall fully describe the materials, proportions, workmanships and accurately represent the work to be executed.

In case of masonry (stone or brick) or structural concrete, the categories shall be measured separately and the heights shall be described:

a)   From foundation to plinth level.

b)From plinth level to first floor level.

c)From Fist floor to second floor level and so on.

4. Requirements of estimation and costing

a)Estimate gives an idea of the cost of the work and hence its feasibility can be determined i.e. whether the project could be taken up with in the funds available or not.

b)Estimate gives an idea of time required for the completion of the work.

c)Estimate is required to invite the tenders and Quotations and to arrange contract.

d)Estimate is also required to control the expenditure during the execution of work.

e)Estimate decides whether the proposed plan matches the funds available or not.

5. Procedure of estimating or method of estimating.

Estimating involves the following operations
Preparing detailed Estimate.
Calculating the rate of each unit of work
Preparing abstract of estimate

6. What are the Data required to prepare an estimate

Drawings i.e. plans, elevations, sections
etc. Specifications and rates.

Drawings

If the drawings are not clear and without complete dimensions the preparation of estimation become very difficult. So, it is very essential before preparing an estimate.

Specifications

General Specifications: This gives the nature, quality, class and work and materials in general terms to be used in various parts of wok. It helps no form a general idea of building.

Detailed Specifications: These gives the detailed description of the various items of work laying down the Quantities and qualities of materials, their proportions, the method of preparation workmanship and execution of work.

Rates

For preparing the estimate the unit rates of each item of work are required.
for arriving at the unit rates of each item.
The rates of various materials to be used in the construction.
The cost of transport materials.
The wages of labor, skilled or unskilled of masons, carpenters, Amador, etc

Complete estimate

Most of people think that the estimate of a structure includes cost of land, cost of materials and labor, but many other direct and indirect costs included and are shown below.

The following are some of L.S. Items in the estimate.
Water supply and sanitary arrangements.
Electrical installations like meter, motor, etc.,

Architectural   features.
Contingencies and unforeseen items.
In general, certain percentage on the cost of estimation is allotted for the above L.S.Items Even if sub estimates prepared or at the end of execution of work, the actual cost should not exceed the L.S.amounts provided in the main estimate.

Work charged establishment

During the construction of a project considerable number of skilled supervisors, work assistance, watch men etc., are employed on temporary basis. The salaries of these persons are drawn from the L.S. amount allotted towards the work charged establishment. That is, establishment which is charged directly to work. AnL.S.amount of 1½ to 2% of the estimated cost is provided towards the work charged establishment.

7. Methods of taking out quantities

The quantities like earth work, foundation concrete, brickwork in plinthand super structure etc., can be workout by any of following two methods:

Long wall - short wall
method Centre line method.
Partly centre line and short wall method.

Long wall-short wall method

In this method, the wall along the length of room is considered to be longwall while the wall perpendicular to long wall is said to be short wall. To get thelength of long wall or short wall, calculate first the centre line lengths of individual walls. Then the length of long wall, (out to

out) may be calculated after adding half breadth at each end to its centre line length. Thus the length of short wall.

Measured into in and may be found by deducting half breadth from its centre linelength at each end. The length of long wall usually decreases from earth work tobrick work in super structure while the short wall increases. These lengths aremultiplied by breadth and depth to getquantities.

Centre line method

This method is suitable for walls of similar cross sections. Here the totalcentre line length is multiplied by breadth and depth of respective item to get thetotal quantity at a time.

When cross walls or partitions or verandah walls joinwith main all, the centre line length gets reduced by half of breadth for eachjunction. Such junction or joints are studied carefully while calculating total centreline length. The estimates prepared by this method are most accurate and quick.

Partly centre line and partly cross wall method

This method is adopted when external (i.e., around the building) wall isof one thickness and the internal walls having different thicknesses. In such cases,centre line method is applied to external walls and long wall-short wall method isused to internal walls. This method suits for different thicknesses walls and differentlevel of foundations. Because of this reason, all Engineering departments arepracticing this method.

8. Detailed estimate

The preparation of detailed estimate consists of working out quantities of various items of work and then determines the cost of each item. This is prepared in two stages.

9. Details of measurements and calculation of quantities

The complete work is divided into various items of work such as earth work concreting, brick work, R.C.C. Plastering etc., The details of measurements are taken from drawings and entered in respective columns of prescribed preformed. The quantities are calculated by multiplying the values that are in numbers column to Depth column as shown below:

Details of measurements form

S.No	Description of Item	No	Length (L) m	Breadth (B) m	Depth/ Height (D/H)m	Quantity	Explanatory Notes

10. Abstract of Estimated Cost

The cost of each item of work is worked out from the quantities that already computed in the details measurement form at workable rate. But the total cost is worked out in the prescribed form is known asabstract of estimated form. 4%of estimated Cost is allowed for Petty Supervision, contingencies and Unforeseen items.

11. Types of Estimates
   Abstract of estimate form

Item No.	Description/ Particulars	Quantity	Unit	Rate	Per (Unit)	Amount

The detailed estimate should accompanied with

   i) Report

   ii) Specification

   iii) Drawings (plans, elevation, sections)

   iv) Design charts and calculations
   v)Standard schedule of rates.

12. Factors to be consisdered while preparing detailedEstimate

i) Quantity and transportation of materials:

For bigger project, the requirement of materials is more. such bulk volume of materials will be purchased and transported definitely at cheaper rate.

ii) Location of site:

The site of work is selected, such that it should reduce damage or in transit during loading, unloading, stocking of materials.

iii) Local labor charges:

The skill, suitability and wages of local labors are considered while preparing the detailed estimate.

13. Data

The process of working out the cost or rate per unit of each item is called as Data. In preparation of Data, the rates of materials and labor are obtained from current standard scheduled of rates and while the quantities of materials and labor required for one unit of item are taken from Standard Data Book.

14. Plinth area method

The cost of construction is determined by multiplying plinth area with plinth area rate. The area is obtained by multiplying length and breadth (outer dimensions of building). In fixing the plinth area rate, careful observation and necessary enquiries are made in respect of quality and quantity aspect of materials and labour, type of foundation, height of building, roof, wood work, fixtures, number of storey's etc., As per IS 3861-1966, the following areasinclude while calculating the plinth area of building.

PART B (SHORT QUESTIONS)

1. State the necessity of preparing the approximate estimate?
2. What is a Detailed estimate?
3. What is a Data estimate.
4. What is an Abstract estimate?
5. State the various types of preparation of rough estimates?
6. State the requirements for preparation of estimates?
7. Differentiate between detailed estimate and approximate estimate?
8. What is an Estimate?
9. Write the units of measurement for Doors And Windows.
10. Write the units of measurement for Damp Proofing Course?

PART-C (LONG QUESTIONS)

1. Give the detailed specifications of the following items of works?
   (a) Earthwork in excavation in foundation
   (b) Centring and shuttering.
2. Explain the following estimates?
   (a) Detailed estimate
   (b) Repair estimate
   (c) Revised estimate and supplementary estimates due to reduction of cost
3. Explain the following methods along with an example?
   (a)Straight line method
   (b)Quantity survey method.
4. Prepare a preliminary estimate of four strayed office building having total carpet area of 4000sq.m for obtaining the administrative approval of the government, given the following data. It may be assumed that 40% f the built up area will be taken up by corridors, verandah, lavatories, staircase etc.

   Plinth area rate in Rs. 6500/- per sq.m.
   Extra due to deeper foundation at site 2 % of building cost.
   Extra for special architectural treatment 1.5% of building cost.
   Extra for water supply and sanitary installations at 9% of building cost.
   Extra for internal electrical installation at 12.5% of building cost.
   Extra for other services 5% of building cost.
   Contingencies – 2.5%
   Supervision charges – 10 %.
5. Prepare a rough estimate of the hospital building for 500 beds. The cost of construction altogether for each bed Rs. 4, 25,000/-. Determine the total cost building assuming suitable provisions as per Standard data book.
6. Calculate the quantity of wood work in chowkhat of a door frame 2.1m X 1.2m size and 7.5cm X 10cm in section?
7. Prepare a preliminary estimate of four strayed office building having total carpet area of 6000sq.m for obtaining the administrative approval of the government, given the following data. It may be assumed that 40% f the built up area will be taken up by corridors, verandah, lavatories, staircase etc.

   Plinth area rate in Rs. 6200/- per sq.m.
   Extra due to deeper foundation at site 2.5 % of building cost.
   Extra for special architectural treatment 2.5% of building cost.
   Extra for water supply and sanitary installations at 9% of building cost.
   Extra for internal electrical installation at 14.5% of building cost.
   Extra for other services 5% of building cost.
   Contingencies – 2.5%
   Supervision charges – 10 %.
8. Prepare a rough estimate of the hospital building for 800 beds. The cost of construction altogether for each bed Rs. 4, 75,000/-. Determine the total cost building assuming suitable provisions as per Standard data book.
9. Prepare a preliminary estimate of multi-storeyed office building having a carpet area of 3300 sq.m. 35% of built up area will be taken up by corridors, verandas, lavatories, staircases etc. and 1% of the built up area will be occupied by walls. Assume the plinth area

rate to be Rs. 6800 per sq.m. And provide for water supply and sanitary fitting and electrical installations, contingencies and other services?

10. List out general items of work for building estimates in detail?
11. List out general items of work for building estimates in detail?
12. Explain the following general items of work involved in the estimation for a building and its process calculation
    (a) Centring and shuttering?
    (b) Steel work.
    (c) Wood work for doors and windows.
13. How do you estimate the quantities of masonry work in semicircular arch?
14. Write down unit of measurement, unit rate of payment and mode of measurement for the following general items of work.
15. State the various types of preparation of rough estimates?
16. State the requirements for preparation of estimates?
17. Differentiate between detailed estimate and approximate estimate?
18. What is an Estimate and explain detailed?
19. Differentiate between detailed estimate and abstract estimate
20. Differentiate between approximate estimate and abstract estimate.

OBJECTIVES

1. Workability of concrete can be improved by?
   a) Increasing size of aggregates
   b) Decreasing size of aggregates
   c) Increasing fine aggregates
   d) Increasing flaky aggregates

2. Workability of concrete is directly proportional to
a) Grading of the aggregates
b) Time of transit
c) Aggregates cement ratio
d) Water cement ratio

3. Workability of concrete is inversely proportional to
a) Grading of the aggregates
b) Time of transit
c) Aggregates cement ratio
d) Water cement ratio

4. If compaction factor of concrete is .90, then workability is
a) Low
b) Very low
c) Medium
d) High

5. A compaction factor of .85 for a cement concrete sample indicates
a) Low workability

b) Medium workability

c) Good workability

d) Very good workability

6. Adding water increases

a) Workability

b) Strength

c) Fame

d) Quality

7. Why Shape and texture of aggregates is must?

a) Smooth surfaces give better workability

b) Smooth surfaces give poor workability

c) Rough surfaces give better workability

d) Rough surfaces give poor workability

8. How many types of tests are there to find workability?

a) 3

b) 4

c) 5

d) 6

9. These test find workability

a) Directly

b) Indirectly

c) 0

d) Equals to the weight of the cement

10. Workability of concrete is measured by

a) Vicat apparatus test

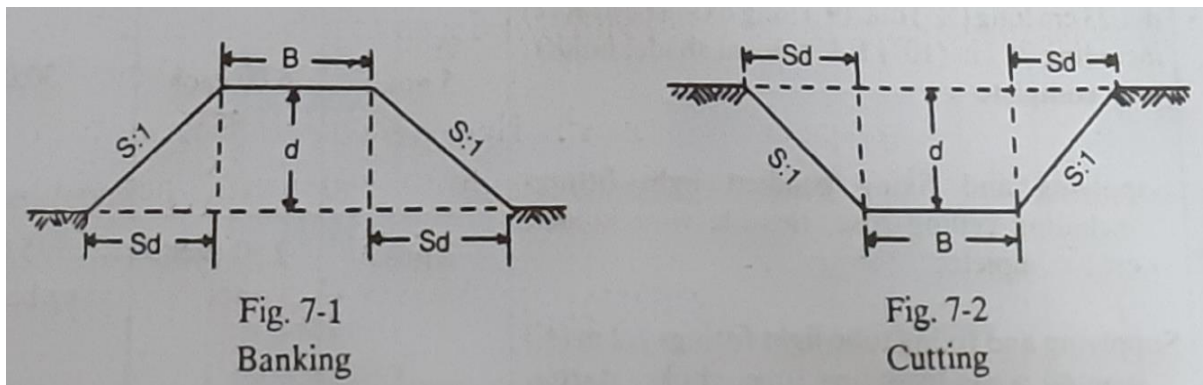**b) Slump test**

c) Minimum void method

d) Talbot Richard test

UNIT III

EARTH WORK

1. Define the earth work analysis

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

2. Define the sectional area method?

• 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 $= \underline{d1+d2} = dm$
                        2
Sectional area is taken out from mean height = Bdm
$+sd^2m$ Qty = $(Bdm + sd^2m)x$

3. Define the 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 and 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.

4.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, L the 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.

Area= $Bd_m + 1/2 Sd_m^2 + 1/2 Sd_m^2 = Bd_m + Sd_m^2$

Quantity of earth work = $(Bd_m + Sd_m^2)$ xL.

General Q = $(Bd + Sd^2)$ xL where d stands for mean height or depth.

5.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

6.Mean sectional area method

Quantity = Mean sectional area x length.

Sectional area at one end A1 = $Bd_1 + sd_1^2$

Sectional area at other end A2 = $Bd_2 + sd_2^2$, d1 and d2 are the heights or depths at the two end

7. Prismoidal formula method

Quantity of volume $= 1/6[A1+4Am+An]$

At the two ends of a portion of embankment of a road of length L and A_m is the mid-sectional area.

PART A

1. Define and explain regarding Earth work embankment?
2. Define and explain regarding Earthwork cutting.
3. Define and explain regarding Lead?
4. Define and explain regarding Lift.
5. State the methods of calculating quality of earthwork?
6. Distinguish lead and lift?
7. Distinguish earthwork in embankment and in cutting.
8. Distinguish trapezoidal rule and prismoidal rule.
9. Draw a neat sketch for earthwork banking and describe its various terms?
10. Draw a neat sketch for earthwork cutting and describe its various terms?

PART B

1. Draw the tabular form for the calculation of earthwork with the following methods?
   (a) Mid – ordinate method
   (b) Mean – sectional area method.
2. List out the general methods for computation of earth work. Explain?
3. Earth work with vertical fall of the ground surface for fully in banking.
4. Calculate the volume of earthwork for 100.00m length of road in a uniform ground. Height of the bank at one end is 0.75m and at the other end 1.20m. Formation width is 10.00m and side slopes of embankment are 2:1. Ground does not have any cross slope. Calculate the volume of earthwork by.
   (a) Mid – ordinate method
   (b) Mean – sectional area method and
   (c) Trapezoidal method

5. Distinguish trapezoidal rule and prismoidal rule?
6. Draw a neat sketch for earthwork banking and describe its various terms?
7. Draw a neat sketch for earthwork cutting and describe its various terms?
8. Consider a cross section and calculate its area using trapezoidal formula?
9. Consider a cross section and calculate its area using Prismoidal formula?
10. water allowance in constuction explain.
11. Reduced levels of ground along the center line of a proposed road from chainage "0" to "9" are given below. The formation level at "0" chainage is10.00 and the road is in downward gradient of 1 in 100. Formation width of road is 10m and side slopes are 2:1 for both banking and cutting. Length of chain is 20m. The ground level is in the transverse direction Calculate the quantity of earthwork required by
    (a) Trapezoidal rule
    (b) Prismoidal rule

Chainage	0	1	2	3	4	5	6	7	8
R.L. of	8.00	7.80	7.60	7.20	6.80	6.10	6.20	5.90	5.00

12. What are the building material used in the construction?
13. Distinguish lead and lift?
14. Distinguish earthwork in embankment and in cutting.
15. Distinguish trapezoidal rule and prismoidal rule.
16. Draw a neat sketch for earthwork banking and describe its various terms.

OBJECTIVES

1. Workability of concrete is inversely proportional to
a) Grading of the aggregates
b) Time of transit
c) Aggregates cement ratio
d) Water cement ratio

2. If compaction factor of concrete is .90, then workability is
a) Low
b) Very low
c) Medium
d) High

3. A compaction factor of .85 for a cement concrete sample indicates
a) Low workability
b) Medium workability
c) Good workability
d) Very good workability

4. Adding water increases
a) Workability
b) Strength
c) Fame
d) Quality

5. Why Shape and texture of aggregates is must?
a) Smooth surfaces give better workability
b) Smooth surfaces give poor workability
c) Rough surfaces give better workability
d) Rough surfaces give poor workability

6. How many types of tests are there to find workability?
a) 3
b) 4
c) 5
d) 6

7. These test find workability
a) Directly
b) Indirectly

c) 0
d) Equals to the weight of the cement

8. Workability of concrete is measured by
a) Vicat apparatus test
b) Slump test
c) Minimum void method
d) Talbot Richard test

9. Which test gives good results for rich mixes?
a) Slump test
b) Compacting factor test
c) Flow table test
d) VeBe test

10. Which test used for low workable concretes?
a) Slump test
b) Compacting factor test
c) Flow table test
d) VeBe test

11. Which test Used for high workable concretes?
a) Slump test
b) Compacting factor test
c) Flow table test
d) VeBe test

UNIT IV
RATE ANALYSIS
PART - A

1. Cement Concrete (Plain and Reinforced)

The quality of materials and method and control of manufacture and transportation of all concrete work in respect of mix, where reinforced or otherwise, shall conform to the applicable portions of these specifications. The Engineer-in-charge shall have the right to inspect the sources of materials, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipments and the quality control system. Such an inspection shall be arranged by the contractor and the Engineer-in-charge's approval shall be obtained prior to starting the concrete work.
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2. Materials for Standard Concrete

The ingredients to be used in the manufacture of standard concrete shall consist solely of a standard type Portland cement, clean sand, natural coarse aggregate, clean water, ice and admixtures if specially called for as per drawings or schedule of quantities.
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3. Specific Gravity

Aggregates having a specific gravity below 2.6 (saturated surface dry basis) shall not be used without special permission of the Engineer-in-charge.

4. Fine Aggregate

Fine aggregate except as noted above, and for other than light weight concrete shall consist of natural or crushed sand conforming to IS 383. The sand shall be clean, sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, loam, alkali, organic matter mica, salt or other deleterious substances which can be injurious to the setting qualities / strength / durability of concrete.

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5. Screening and Washing

Sand shall be prepared for use by such screening or washing or both as necessary, to remove all objectionable foreign matter while separating the sand grains to the required size fractions. Sand with silt content more than 3 percent will not be permitted to be used unless same is washed and silt content is brought within 3% by weight.

6. **Gradation**

Unless otherwise directed or approved, the grading of sand shall be within thelimit indicated here under:-Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron (IS) sieve by not more than 5% it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron (IS)sieve or to percentage passing any other sieve size on the coarser limit of grading zone I or the finer limit of grading zone IV. Fine aggregates conforming to Grading zone IV shall not be used unless mix designs and preliminary tests have shown its suitability for producing concrete of specified strength and workability.

7 **Design Mix Concrete**

All reinforced concrete in the works shall be "Design Mix Concrete" as defined in I.S.456-2000. All "Design Mix Concrete" work to be carried out under these specifications shall be in grades designated as per table below:

Grades of Concrete

Grade Designation	Specified Characteristic compressive strength at 28 days(N/mm2)
M 10	10
M 15	15
M 20	20
M 25	25
M 30	30
M 35	35
M 40	40

8. Define curing?

It should be clear from what has been said above that the detrimental effects of storage of concrete in a dry environment can be reduced if the concrete is adequately cured to prevent excessive moisture loss.

9. **Mode of Measurement for concrete work General**

Concrete as actually done shall be measured for payment, subject to the following tolerances, unless otherwise stated hereinafter. Any work done extra over the specified dimensions shall not be measured for payment.

a. Linear dimensions shall be measured in full centimeters except for the thickness of slab which shall be measured tot eh nearest half centimeter.

b. Areas shall be worked out to the nearest 0.01 sqm.

c. Cubic contents shall be worked out the nearest 0.001 cum.

d. The concrete shall be measured for its length, breadth and height/depth limiting dimensions to those specified on drawings or as directed by the Engineer-incharge.

Note: The sizes of RCC members as assumed in to estimate are based on preliminarydrawings andare likely to be changed. The contractor is not entitled to any extra claim due to such changes.

10. **Column**

Column shall be measured from top footings to the plinth level and from plinth level to the structural slab level ad to the subsequent structural slab levels. Measurements for higher grade concrete in column at its junction with lower grade concrete beams shall be restricted total column section supporting the beam in question

11. What is shrinkage?
A. The volumetric changes of concrete structures due to the loss of moisture by evaporation are known as concrete shrinkage or shrinkage of concrete. It is a time-dependent deformation which reduces the volume of concrete without the impact of external forces.

12. What are the types of shrinkage?
A. 1. Plastic shrinkage
   2. Drying shrinkage
   3. Carbonation shrinkage
   4. Autogenously shrinkage.

13. **Tolerance on placing of reinforcement**

Unless otherwise specified by the Engineer-in-charge, reinforcement shall be placed within the following tolerances:
Tolerance in spacing

   a) For effective depth, 200 mm or less + 10 mm

   b) For effective depth, more than 200 mm + 15 mm

PART A (SHORT QUESTION)

1.   Define Water/cement ratio.
2.   What is meant by gel-space ratio?
3.   Why is Elastic Modulii Important for Concrete?
4.   Define Shrinkage cracking
5.   Define Tension cracking
6.   Define Creep.
7.   Which factors lead to strength in hardened concrete?
8.   Discuss the relation between creep and time.
9.   How does creep affect hardened concrete?
10.   write short notes on the following: Alkali attack
ART-B (LONG QUESTION)

1. What is Abram's law? How does it affect concrete?
2. What are the various factors affecting strength of hardened concrete?
3. What is curing? What are the different methods of curing?
4. Explain briefly about Tension test?
5. Write a short note on Flexural test
6. Explain nondestructive tests.
7. Write a short note on Elasticity of concrete
8. Write a short note on Creep
9. What is creep of concrete
10. What is shrinkage?
11. Explain briefly about Compression test?
12. Describe briefly about Split tensile test
13. Write a short note on Shrinkage
14. Write a short note on Durability of concrete
15. What are the factors influencing creep?
16. What is the relation between creep & time?
17. What are effects of creep?
18. What are the types of shrinkage?
19. What are the codal provisions for NDT?
20. Describe types of NDT tests?

OBJECTIVES

1. Which test used for fiber reinforced concrete?
a) Slump test
b) Compacting factor test
c) Flow table test
d) VeBe test

2. _____ is practical in field test.
a) Slump test
b) Compacting factor test
c) Flow table test
d) Kelly Ball Test

3. What is the compaction factor for medium degree of workability?
a) .78
b) .85
c) .92
d) .95

4. What is the Vee-Bee time for medium degree of workability?
a) 10-20 sec
b) 5-10 sec
c) 2-5 sec
d) 35 sec

5. The accumulation of water on outer surface of concrete is:
a) Transpiration
b) Bleeding
c) Guttation
d) Ponding

6. Properties of concrete can broadly be divided into:
a) 8
b) 6
c) 4
d) 2

7. How does the strength of concrete differ with age of concrete?
a) Increases
b) Decreases
c) No effect
d) Increases, then decreases

8. Bleeding of concrete may be due to
1. excess of water
2. too much finishing
3. coarse aggregates
 (a) 1 and 2 only
(b) 2 and 3 only
(c) 1 and 3 only
(d) 1,2 and 3

9. Bleeding can be prevented by
(a) controlling water content
(b) using finely ground cement
(c) controlling compaction
(d) all the above

10. Consider the following statements
 Sand in mortar is needed for
1. decreasing the quantity of cement
2. reducing shrinkage
3. decreasing the surface area of the binding material
4. increasing the strength
Of these statements
 (a) 2,3, and 4 are correct
(b) 1,2 and 3 are correct
(c) 1,3 and 4 are correct
(d) 1,2 and 4 are correct

11. Separation of cement paste from sand in the mortar allowing the water or cement paste to appear at the surface is called
(a) bleeding
(b) segregation
(c) honeycombing

(d) none of these

12. Concrete grows with age. This statement is
(a) true
(b) false
(c) debatable
(d) given by Duff Abrams

UNIT V
CONRACTS &VALUATION
PART - A

Definitions

1. **Expenditure**

The whole amount can be spent during the financial year or not.

2. **Capital cost**

Total cost including all the expenditure incurred from beginning to the completion of a work.

3. **Provisional sum**

Estimate of bill quantities for some special work to be done by a specialist firm whose details are known at the time of preparation of estimate.

4. **Rate of cost**

The cost per unit of subhead which is arrived at by dividing the up-todate final charges on a sub-head by its up-to-date progress.

5. **Premium**

The tendered percentage rate above the notified rates.

6. REBATE

The tendered percentage rate below the notified rates.

7. PLINTH AREA

It is a covered area of a building measured at floor level. It is measured by taking external dimensions excluding plinth offset if any.

8. RATES

Rates followed are of sanctioned schedule of rates or nonscheduled, this fact is to be mentioned under this sub – head.

9. Contingencies

Incidental expenses of miscellaneous character which cannot be classified approximately under any distinct sub-head, but is added in the cost of construction necessarily.

10. Valuation

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

11. Salvage value

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

12. Sinking fund

The fund is gradually accumulated by way of periodic on annual deposit for the replacement of the building or structure at the end of its useful life.

13. Depreciation

Depreciation is the gradual exhaustion of a usefulness of a property. Decrease or loss in the value of a property due to its structural deterioration use, life wear and tear, decay and obsolescence.

14. Scrap value

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

15. Objects of valuation

It 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.

16. Six important Purposes of Valuation

The main purposes of valuation are as follows:

17. Buying or Selling Property

When it is required to buy or sell a property, its valuation is required.
18. 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.

19. 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.

20. Security of loans or Mortgage

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

21. 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.

22. 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.

23. Methods of Valuation

1. Rental Method of Valuation

2. Direct Comparisons of the capital value

3. Valuation based on the profit

4. Valuation based on the cost

5. Development method of Valuation

6. Depreciation method of Valuation

PART – A(short question)

1. Define valuation of building and its purpose
2. Explain about Municipal taxes?
3. Write short note on Scrap value
4. Give a shot notes on Salvage value
5. Write short note on Market value
6. Explain Book value
7. Write short note on Market value
8. What are the Ratable value & Obsolescence
9. Define Annuity & Capital cost
10. Write short note on sinking fund

PART – B(Long question)

1. Explain the detailed specifications of plastering cement mortar / lime mortar
2. Write the detailed specifications of pointing
3. Explain the detailed specifications for white washing , color washing
4. Explain the detailed specifications for wood work
5. Write the detailed specifications for centering and shuttering
6. Give the detailed specifications for earthwork in irrigation channels & roads
7. Explain the detailed specifications for cement mortar.
8. Give the detailed specifications for painting
9. Write short note on capitalized value
10. Write short note on depreciation & mortgage
11. What are the factors to be considered for valuation of building?
12. State methods of calculating depreciation
13. Write the detailed specifications of damp-proof course 2.5cm