Techno India NJR Institute of Technology

Course File

Estimation & Costing (6CE4-05)

(2022-23)

Rakesh Yadav

(Assistant Professor)

Department of CE

RAJASTHAN TECHNICAL UNIVERSITY, KOTA
Syllabus
3rd Year - VI Semester: B.Tech. (Civil Engineering)

6CE4-05: ESTIMATING & COSTING

Credit: 2

2L+0T+0P

Max. Marks: 100(IA:20, ETE:80)

End Term Exam: 3 Hours

SN	CONTENTS	Hours
1	**Introduction:** Objective, scope and outcome of the course.	1
2	Purpose and importance of estimates, principles of estimating, Methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet; bill of quantities.	4
3	**Estimating:** Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.	6
4	**Rate Analysis:** Task for average artisan, various factors involved in the rate of an item, material and labour requirement for various trades; preparation for rates of important items of work. Current schedule of rates. (C.S.R.)	6
5	**Detailed Estimates:** Preparing detailed estimates of various types of buildings, R.C.C. works, earth work calculations for roads and estimating of culverts Services for building such as water supply, drainage and electrification.	6
6	**Valuation:** Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate interest, methods of valuation, rent fixation of buildings.	5
	TOTAL	28

Office of Dean Academic Affairs
Rajasthan Technical University, Kota

Course Overview:

This course is structured in such a way that its aim is to provide the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works, and also to equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items. Main objective is to develop in the student the art and skill whereby a monetary value can be placed on the volume of work previously measured. Also, other objectives include to develop an awareness of those factors that affect the cost of construction work and to analyze the influences that effect change in these factors. Course helps students and encourages the habit of systematically recording all those statistics which are the stock in trade of the good estimator.

Estimating is the most important of the practical aspects of construction management, and the subject deserves the closest attention of one aspiring to a career in the profession. It is a comparatively simple subject to understand; however, as it brings one up against practical work, methods and procedure, knowledge of it cannot be acquired without close application.

Course Outcomes:

CO. NO.	Cognitive Level	Course Outcome
1	Application	Students will evaluate the estimate of quantities for a ResidentialBuilding & Abstract cost Estimate.
2	Evaluation	Students will be able analyze the rates of work quantities and labor.
3	Evaluation	Students will be able to evaluate the calculation regarding earth work quantity for roads and canals, Analyze different types of contracts, tenderdocument for building & valuation
4	Synthesis	Students will remember the concepts of Valuation.
5	Synthesis	Student will create Bill of Quantities.

Prerequisites:

- Students with basic knowledge of mathematical geometry can understand the topics clearly.
- Students with understanding of basic mathematics principle can grasp the topics of this course.
- Students with a basic calculation methodology can perform item rate calculations.

Course Outcome Mapping with Program Outcome:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
Estimating & Costing															
CO365.1	3	2	2	2	2	2	1	1	2	1	2	2	2	3	2
CO365.2	3	2	2	2	2	2	1	1	2	1	2	2	2	3	2
CO365.3	3	2	2	2	2	2	1	1	2	1	2	2	2	3	2
CO365.4	2	3	3	3	2	1	1	1	2	2	1	2	2	2	2
CO365.5	2	3	3	3	2	1	1	1	2	2	1	2	2	2	2
CO365 (AVG)	2.6	2.4	2.4	2.4	2	1.6	1	1	2	1.4	1.6	2	2	2.6	2

Course Coverage Module Wise:

Lecture No.	Unit	Topic
1	**1**	**INTRODUCTION** to scope, objective and outcome of subject
2	**2**	**PURPOSE AND IMPORTANCE** of estimates, principles of
3	2	Methods of taking out quantities of items of work.
4	2	Mode of measurement
5	2	Numerical on Long wall & Short wall method
6	2	Numerical on Long wall & Short wall method
7	2	Numerical on Long wall & Short wall method
8	2	Numerical on Long wall & Short wall method
9	2	Measurement sheet and abstract sheet; bill of quantities
10	**3**	Types of estimate plinth area rate, cubical content rate
11	3	Types of estimate preliminary, original, revised and supplementaryestimates
12	3	Revised and supplementary estimates
13	**3**	Revised and supplementary estimates
14	**4**	**RATE ANALYSIS:** Task for average artisan
15	4	Various factors involved in the rate of an item
16	4	Material and labor requirement for various trades
17	4	Preparation for rates of important items of work
18	**4**	Current schedule of rates. (C.S.R.)

19	4	Current schedule of rates. (C.S.R.)
20	5	**DETAILED ESTIMATES:** Preparing detailed estimates
21	5	Numerical on Detailed Estimates
22	5	Numerical on Detailed Estimates
23	5	Numerical on Detailed Estimates
24	5	Numerical on Detailed Estimates
25	5	Numerical on Detailed Estimates
26	5	Numerical on Detailed Estimates
27	5	Services for building such as water supply, drainage & electrification
28	5	Services for building such as water supply, drainage & electrification
29	5	Services for building such as water supply, drainage and electrification
30	5	Estimating of culverts
31	5	Estimating of culverts
32	6	**VALUATION:** Purposes, depreciation
33	6	Sinking fund, scrap value
34	6	Year's purchase, gross and net income
35	6	Dual rate interest, methods of valuation
36	6	Dual rate interest, methods of valuation
37	6	Rent fixation of buildings
38		Revision of course work
39		Revision of course work
40		Revision of course work

TEXT/REFERENCE BOOKS

1. Chakraborti, M, Estimation, costing, specifications and valuation in civilEngineering –
National Halftone Co. Calcutta, 2005.

2. Dutta B.N., Estimation and costing in civil engineering: theory and Practice – UBS
Publishers Distributors Ltd, 2006

3. Birdie, G.S. - Estimation and costing in civil engineering – Dhanpat Rai Publishing co. ltd.

Course Level Problems (Test Items):

CO.NO.	Problem description
1	A. Identify and differentiate between the two types of estimate. B. Prepare a format for preparation and presentation of an estimate.
2	A. Draw up a check list for estimate control. B. Define a unit cost estimate.
3	A. Prepare an estimate for land excavation. B. State the types of foundations.

Assessment Methodology:

1. Practical exam in lab where they have to analyze the problem statement. (Once in a week)

2. Assignments one from each unit.

3. Midterm subjective paper based on topics as mentioned in the modules. (Twice during the semester)

4. Final paper at the end of the semester subjective.

TEACHING AND LEARNING RESOURCES UNIT-WISE

UNIT -1/2

https://www.civilconcept.com/types-of-estimating-and-costing/

UNIT -3

https://theconstructor.org/construction/estimating-costing/

UNIT-4

https://www.slideshare.net/thomasjbritto/estimating-andcosting-book

UNIT -5/6

https://www.udemy.com/course/estimating-and-costing/

MORE LINKS

Wikipedia

https://en.wikipedia.org/wiki/Cost_estimate#:~:text=A%20cost%20estimate%20is%20the,may%20have%20identifiable%20component%20values.

YouTube

https://www.youtube.com/watch?v=r0aDjTLxy5c

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR
B. TECH III YEAR (VI SEM.)
MT-I(APRIL'23)
ESTIMATION & COSTING (**6CE4-05**)

Time: 3 Hr   **Max. Marks:** 70

Note:
1. The paper is divided into 2 parts: Part-A and, Part-B.
2. Part-A contains 10 questions and carries 2 mark each.
3. Part-B contains 5 questions. Each question is having two options and carries 10 marks each.

	Section A (50 Marks)	
A	What are the types of Estimates? Discuss briefly.	CO1
B	What do you mean by Cubic content estimate?	CO1
C	Define the term "Technical Sanction and measurement book".	CO1
D	What are the prime costs and Overhead costs?	CO1
E	Prepare a sample measurement sheet of Abstract Estimates.	CO2
F	Prepare a sample measurement sheet of Detailed Estimates.	CO2
G	Discuss the Earthwork in excavation and brick work in Sub and superstructure.	CO2
H	What is the Centre line method? How can it be useful for irregular shape ofstructure?	CO2
I	What do you understand by Sub Heads in Building Estimates?	CO3
J	Define Plinth Area, Carpet Area, and Contingencies.	CO3

Section B (50 Marks)

Q1 What are the types of estimates? How do they differ from each other? Which of the methods can give us exact cost and why?   [CO1]

Q2 Prepare a preliminary estimate of a multi storey office building having a carpet area of 2200 sqm and 35% of built up area will be taken up by corridors, verandah, staircase etc. And 1% of the built-up area will be occupied by walls.   [CO1]
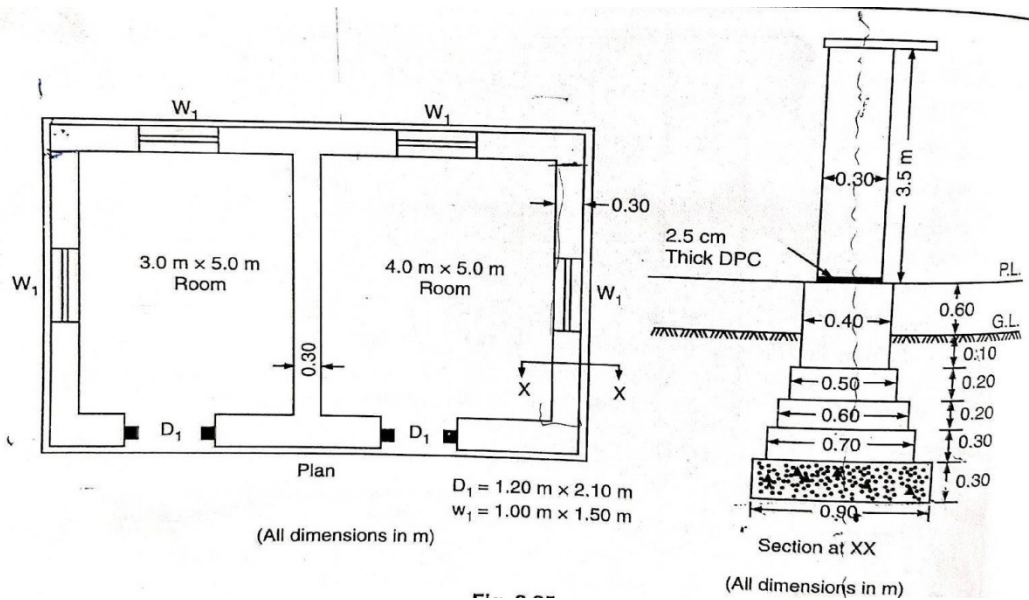
Q3 Prepare a preliminary estimate of a polytechnic building for 800 students in order to assess the amount of fund, based on following particulars: [CO2]

A. Carpet area per student= 1.20 sqm.

B. Area of corridor, verandah, staircase etc= 20%

C. Area of walls =15% of the plinth area

D. Plinth area rate = 3500 sqm

E. Cost of water supply = 5% of building cost

F. Cost of sanitation, electric and others are 7%, 12% and 3% of total building cost respectively.

G. Contingencies and establishment charges = 5% and 2.5% of total building cost

Q 4 Explain the centre line and long wall –short wall method of measuring estimates with an example.   [CO2]

Q5 Estimate the quantities of following items as shown in figure.   [CO3]

A. Earthwork in excavation in foundation.

B. 1st class brick work in cement mortar (1:4) in foundation & plinth

C. 1st class brick work in cement mortar (1:6) super structure.

Plan

D_1 = 1.20 m × 2.10 m
w_1 = 1.00 m × 1.50 m

(All dimensions in m)

Section at XX

(All dimensions in m)

TECHNO INDIA NJR INSTITUTE OF TECHNOLOGY, UDAIPUR
B. TECH 3ʳᵈ – YEAR (VI SEM.) – MT-II
Subject: ESTIMATING & COSTING (6CE4-05)

Time: 2 Hr   **Max. Marks:** 70

Note:

1. The paper is divided into 2 parts: Part-A and Part-B.

2. Part-A contains 10 questions and carries 2 marks each.

3. Part-B contains 5 questions. Each question has two options and carries 10 marks each.

Part- A (20 Marks)

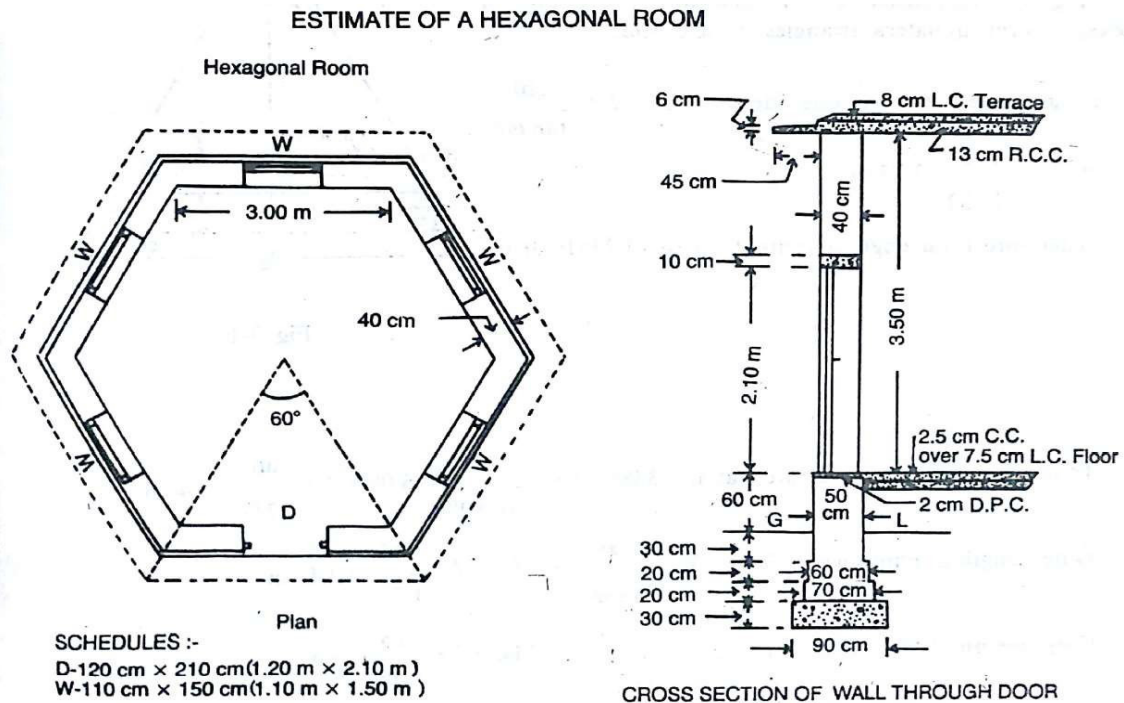| A	What are the types of Estimates? Discuss briefly.	CO3
B	Define the term "Technical Sanction and measurement book".	CO3
C	What is the Centre line method? How can it be useful for irregular shape ofstructure?	CO4
D	Define Plinth Area, Carpet Area, and Contingencies.	CO4
E	Define the term "Technical Sanction and measurement book".	CO4
F	What do you mean by rates analysis?	CO4
G	What is sinking fund?	CO5
H	Define valuation.	CO5
I	List the outgoings.	CO5
J	Brief the market rates of different items of work.	CO5

Part- B (50 Marks)

1. Describe the purposes of rate analysis. Also write its factors affecting.	CO3
2. Analysis the rate of M-20 grade of RCC excluding centering & shuttering.	CO4
3. Discuss the principle of valuation. Explain the methods to evaluate valuation	CO4
4. Write short notes on: a) year purchase b) mortgage lease c) freehold properties d) leasehold properties.	CO5
5. How do you know the term depreciation? Explain the methods of determination of depreciation.	CO5

ASSIGNMENT NO. 1

1. Explain what is detailed estimate?

2. What are the various factors involved in finalizing the rate of an item?

3. What do you understand by CSR?

4. Explain the Long wall – Short Wall method and Centre line method with Formulas and Compare them

5. Prepare a preliminary estimate of a polytechnic building for 500 students in order to assess the amount of fund, based on following particulars

6. What do you mean by sinking fund?

7. Explain what is detailed estimate?

8. Explain what is detailed estimate?

9. What are the various factors involved in finalizing the rate of an item.

10. What do you understand by CSR (Current Schedule of Rates).

ASSIGNMENT NO. 2

1. Explain the types of estimates?

2. Discuss importance of estimation and costing

3. What is purpose of rate analysis?

4. Analysis the rate of M-20 grade of RCC excluding centering & shuttering

5. The plan and part cross-section of a hexagonal room are given in below figure. Estimate the quantities of

   a) Earthwork in excavation in foundation,

   b) Lime concrete foundation,

   c) l-class brickwork in foundation and plinth in lime mortar,

   d) Damp proof course

   e) I-class brickwork in superstructure in lime mortar,

   f) R.C.C. work in roof including chujja and lintels,

ESTIMATE OF A HEXAGONAL ROOM

Hexagonal Room

Plan

SCHEDULES :-
D-120 cm × 210 cm(1.20 m × 2.10 m)
W-110 cm × 150 cm(1.10 m × 1.50 m)

CROSS SECTION OF WALL THROUGH DOOR

6. Explain the Long wall – Short Wall method and Centre line method with Formulas and Compare them.

7. Estimate the cost of a masonry water tank from the given drawings,

   Cement mortar 1: 6. Wall finishing and outside 12 mm cement plastered 1: 4 with local sand.

   Flooring 5 cm cement concrete 1:1:3 over 30 cm Lime concrete with neat cement finishing. Foundation - Lime concrete.

   Masonry- Ist class brickwork in Inside 12 mm cement plastered 1: 2 with coarse sand.

MASONRY TANK

SECTION ON AA

PLAN
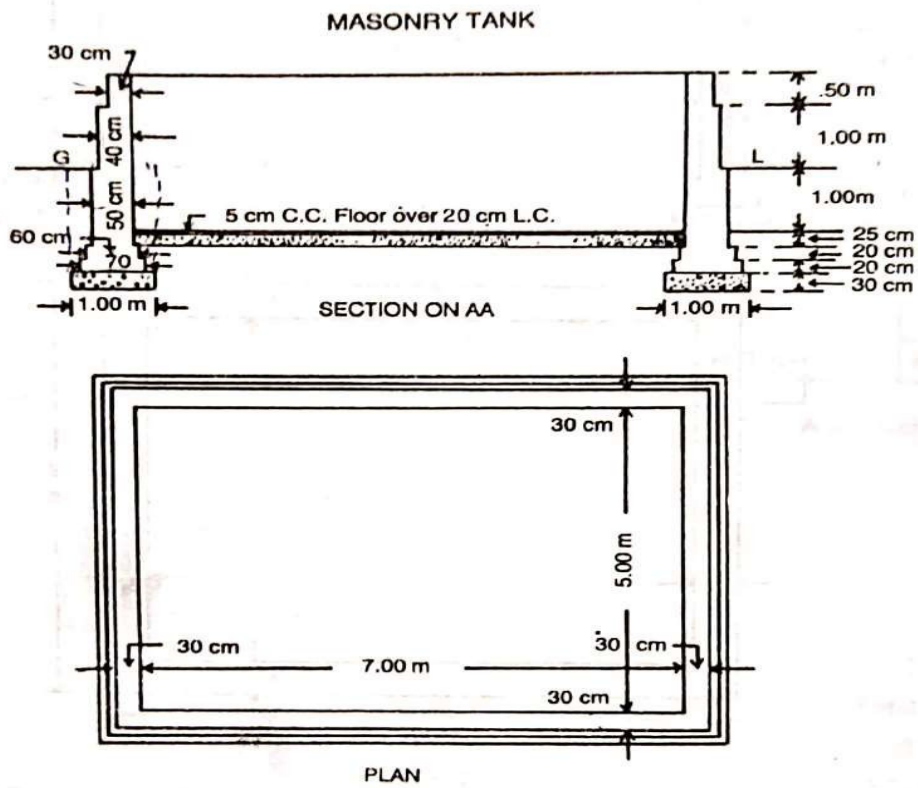
OBJECTIVE TYPE QUESTION

1. 1. To make out an estimate for a work the following data are necessary-

   Drawing, Specification and ___
   a) materials
   b) rates
   c) labors
   d) transportation   (b)

2. _____Is required for preliminary studies of various aspects of awork or project.
   a) Supplementary Estimate
   b) Plinth Area Estimate
   c) Revised Estimate
   d) Abstract Estimate   (d)

3. Approximate cost of a hostel building for 100 students @Rs 10000/- per student works out as Rs. 10 lakhs.
   a) True
   b) False   (a)

4. Cube rate estimate is less accurate as compared to the plinth area estimate asthe height of the building is also compared.
   a) False
   b) True   (b)

5. In this method approx. total length of walls is found in running meter and thistotal length multiplied by the rate per running meter of wall gives a fairly accurate cost.
   a) Annual repair
   b) Item rate estimate
   c) Approximate quantity method estimate
   d) Cubical content estimate   (c)

6. A large work or project may consist of several building or small works and eachof these works is known as
   a) sub-work
   b) sub-project
   c) sub-head
   d) sub-construction   (a)

Roll No. _____ [Total No. of Pages : 4

4E 4116

4E 4116

B.Tech. IV Semester (Main/Back) Examination, May 2018
Civil Engineering
4CE6A Quantity Surveying & Valuation

Time : 3 Hours

Maximum Marks : 80
Min. Passing Marks : 26

Instructions to Candidates:

*Attempt any five questions, selecting one question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/calculated must be stated clearly.*

Unit - I

1. a) Describe the approximate size of the following items/works

   i)   Height of a common room

   ii) Shallow foundation

   iii) Plinth height

   iv) Steps, Rise/Treads   (4×2=8)

   b) Write down units of measurements for the following works

   i)   Dismantling of electric wiring

   ii)   Skirting 4" Wide

   iii) Damp proof course 2" Thick

   iv)   Roofing with GI sheet

   v)   Ornamental pillar caps

   vi)   Plastering on walls

   vii) Thin partition wall

   viii) Fixing of Fans in a hall   (8×1=8)

OR

1. Write short notes on the following :

   i) Bill of quantities

   ii) Schedule of Rates

iii) Revised Estimate

iv) Plinth area Estimate $(4 \times 4 = 16)$

Unit - II
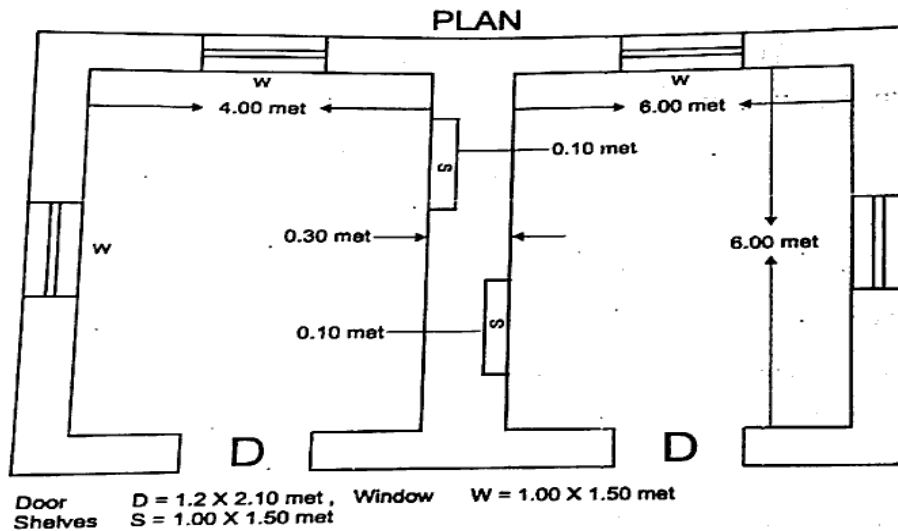
2. a) Describe the purpose of Rate analysis (4)

   b) Analysis the rates of M - 15 grade reinforced cement concrete for slab on 1st floor (Assume suitable data for labour & material rates) (12)

OR

2. a) Discuss various factors affecting the Rate analysis. (4)

   b) Calculate the material & labour (Analysis of rate) to construct a Random Rubble Stone masonary Boundary Wall (in super structure) for 10 cub met. (Assume suitable data) http://www.rtuonline.com (12)
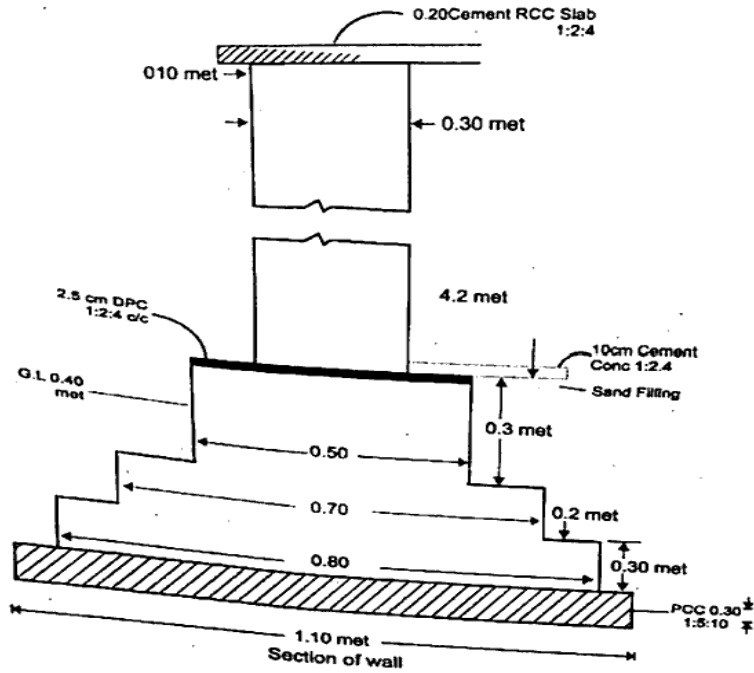
Unit - III

3. From the given figure below, prepare the detail & abstract estimate for two room building (For load Bearing structure) by long wall. Short wall method.

PLAN

Door D = 1.2 X 2.10 met, Window W = 1.00 X 1.50 met
Shelves S = 1.00 X 1.50 met

(16)

Door D = 1.2×2.10 met, Windows W = 1.00 × 1.50 met, Shelves S = 1.00 × 1.50 met.

4E4116 (2)

0.20Cement RCC Slab
1:2:4

010 met

0.30 met

2.5 cm DPC
1:2:4 c/c

4.2 met

10cm Cement
Conc 1:2.4

Sand Filling

G.L 0.40
met

0.3 met

0.50

0.70

0.2 met

0.80

0.30 met

PCC 0.30
1:5:10

1.10 met
Section of wall

OR

3. Prepare a detailed estimate for the earth work for a portron of a road from the following data :

(16)

Chainage	R.L of Ground	R. L of formation	Gradient
0	114.50		
100 m	114.75		
200 m	114.25		Upward gradient
300 met	115.20		(1 in 200) up
400 met	116.10	115.0	to 600 met
500 met	116.85		
600 met	118.00		Downword gradient
700 met	118.25		(1 in 400)
800 met	118.10		
900 met	117.80		
1000 met	117.75		
1100 met	117.90		
1200 met	117.50		

(3)

[Contd....

The formation width the road is 10 met. Side sloper are 2 : 1 in Banking & $1\frac{1}{2}$:1 in cutting.

Draw longitudinal section of the road & a typical cross section and prepare an estimate of the earth work for the road at the rate of Rs. 485 per cubic meter in Banking & Rs. 385 per cubic meter in cutting.

Unit - IV

4. a) Describe work charge establishment in detail. (4)
   b) Write short notes on the following :
      i) Measurement Book
      ii) Travelling allowance
      iii) Liquidated damages
      iv) Imprest Account (3×4)

OR

4. a) Discuss various factors affecting the cost of work. (5)
   b) Give the percentage break up in building for following
      i) Cost of different parts break up of building (excluding sanitary & electrical work) (5)
      ii) Cost of sanitary & electrical works (2)
      iii) Cost of material & labour required for building percentage distribution.(4)

Unit - V

5. a) Write short notes on
      i) Outgoing
      ii) Salvage value
      iii) Obsolescence (4×3)
   b) What is sinking fund & why it is provided? (4)

OR

5. A city corporation has to acquire an area of 35,0000 sq met for the development of a new colony. After developing the area it is proposed to be sold at Rs. 45,000 per sq.met. Work out the maximum compensation which can be given to the owners, whose land is to be acquired for the development of the colony assuming

   a) The corporation establishment charges = 15% on sale price.
   b) 40% area is to be provided for roads, parks and other public emenities.
   c) Colony improvements expenditure = Rs 130 per sq. met.
   d) Engineer's and Architect's fee for surveying and planning the colony = 4% on the sale plots. (16)

Roll No. _____   Total No. of Pages : 4

4E4116

4E4116

B. Tech. IV-Sem. (Main / Back) Exam; April-May 2017
Civil Engineering
4CE6A Quantity Surveying & Valuation

Time : 3 Hours   Maximum Marks : 80
                                                   Min. Passing Marks : 26

Instructions to Candidates :-

Attempt any five questions, selecting one question from each unit. All Questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.
Units of quantities used · calculated must be stated clearly.
Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1. NIL _____   2. NIL _____

UNIT - I

1 (a) Enumerate different types of estimates and explain each in detail.
                                                                          8

   (b) Explain the general rules for measurement of works. State unit of measurement for following item of works :
        (i)   Damp Proof Course (D.P.C)
        (ii)   Skirting
        (iii) R.C.C. lintels
        (iv)   Rain water pipes.

                                                              4+4 = 8
                              OR

4E4116]   1   [P.T.O.

1 (a) What are measurement sheets and abstract sheets ? What are bills of qualities ? Explain Schedule A and Schedule B.

8

(b) Enumerate in chronological order various major items of works carried out during construction of a building.

8

UNIT - II

2 (a) Discuss various factors affecting the rate analysis in detail.

8

(b) Analyze the rate for the work "2.5 cm cement concrete floor 1:2:4". Assume suitable rates of mterial and labour.

8

OR

2 (a) Differentiate the freehold and leasehold properties.

4

(b) Define the term tender and its important features.

4

(c) Write down the specifications for 1st class brick work in cement mortar 1:6 in super structure. http://www.rtuonline.com

8

UNIT - III

3 (a) Write short notes on the following :
(i) Administrative approval
(ii) Expenditure Sanction and Technical Sanction.

4×2=8

(b) What are the factors to be considered for the preparation of detailed estimate. Explain in detail.

8

OR

3 Estimate the cost of earthwork for a portion of road at the rate of Rs. 465.00 in banking and Rs. 365.00 in cutting for 400 m length from the following data :

Formation width of road is 10 m. side slopes are 2:1 in banking and 1.5 : 1 in cutting http://www.rtuonline.com

Station	Distance in meters	R.L. of Ground	R.L. of Formation
25	1000	51.00	52.00
26	1040	50.90	Downward gradient of 1 in 200
27	1080	50.50	
28	1120	50.80	
29	1160	50.60	
30	1200	50.70	
31	1240	51.20	
32	1280	51.40	
33	1320	51.30	
34	1360	51.00	
35	1400	50.60	

Draw the longitudinal section of road and a cross section.

16

UNIT - IV

4 (a) How does a subsidiary cash book differ from an ordinary cash book ? What certificate is required to be given at the time of closing of a cash book ?

8

(b) Explain the rule for preparation of Muster Roll.

8

OR

4   Write short notes on the following :
(i)   Standard Measurement book
(ii) Contingencies and work charge establishment
(iii) Imprest account
(iv) Liquidated damages.

4×4=16

UNIT - V

5   (a) Enlist the different methods of valuation. Explain in detail Land and Building method. http://www.rtuonline.com

8

(b) Explain the role of Valuer in a society.

8

OR

5   (a) Explain the term "Lease Hold Property" in detail.

8

(b) Differentiate between the following :
(i)   Scrap value and Salvage value
(ii) Depreciation and Sinking fund.

4×2=8