	Course Title: **ESTIMATION AND COSTING**		
	Credits (L:T:P) : **4:0:0**	Total Contact Hours: **52**	Course Code: **15CE53T**
	Type of Course: **Lectures, Practices, Student activity**	Credit **:04**	Core/ Elective: **Core**
CIE- 25 Marks			SEE- 100 Marks

Pre-requisites: Knowledge of basic Mathematics, Materials of Construction, Construction Technology, Building Planning and Drawing.

Course Objectives:

1. To differentiate the types of Estimation, adopt specification and Unit Rates.
2. To analyse rates for different items of works.
3. To interpret the drawings and estimate the Quantities of various items in civil engineering structures.
4. To understand departmental procedures and Take measurement of completed work

On successful completion of this course, the student will be able to:

Course Outcome		**CL**	**Linked PO**	**Teaching Hrs**
CO1	Compare different types of estimate, units of measurements & payments for different item of works in construction and illustrate a relationship to Bill of Quantities and Scheduled rates.	**R/U/Ap**	1,2,5, 7,10	04
CO2	Explain the specifications of different Items of works.	**R/U**	1,2,3,5,6,7,10	05
CO3	Analyse the rates of different Items of works.	**Ap/Ay**	1,2,5,6,7	08
CO4	Estimate the quantities and evaluate the abstract cost for different types of buildings by Long wall-short wall method	**Ay/Ap/E**	1,2,3,5,6,7,10	13
CO5	Estimate the quantities and evaluate the abstract cost for different types of buildings by Centre line method	**Ay/Ap/E**	1,2,3,5,6,7,10	13
CO6	Estimate the quantities of earth works and evaluate the abstract cost for road works	**Ay/Ap/E**	1,2,3,5,6,7,10	09
CO7	Organize Quantity surveying for any kind of civil structures using modern tools and manage the project problems, formulate and solve in teams, in order to improve future problem solving ability and able to present it.	**R/U/Ap/ Ay/C**	1 to 10	-
TOTAL				52

COURSE CONTENT

UNIT	MAJOR TOPICS	HOURS ALLOTTED
	PART-A	
1	INTRODUCTION TO ESTIMATION	04
2	SPECIFICATIONS	05
3	ANALYSIS OF RATES	08
	PART-B	
4	DETAILED AND ABSTRACT ESTIMATE OF BUILDINGS	27
5	ESTIMATION OF ROAD WORKS	08
	TOTAL	**52**

*** Related to Student activity beyond classroom hours.**

Programme outcome Attainment Matrix

Course	Programme Outcome									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
	Basic knowledge	Discipline knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & Sustainability	Ethics	Individual and Team work	Communication	Life long learning
ESTIMATION AND COSTING	3	3	3	1	3	3	3	1	1	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

DETAILED COURSE CONTENT

UNIT	COURSE CONTENTS	HOURS
1.0	**INTRODUCTION TO ESTIMATION** 1. Introduction to estimating: different items of works and types of estimates. 2. Units of measurements and units of payment of different items of work. 3. Deduction of Openings in different items of works and Measurements as per BIS-2000. 4. Bill of Quantities (BOQ), Scheduled rates, Lead Statements.	04
2.0	**SPECIFICATIONS** Earthwork in excavation for foundation, Cement concrete in foundation, Brick masonry, R.C.C Work, Plastering in Cement mortar, Pointing with cement mortar, Cement concrete flooring, Granite / Vitrified / Marble flooring, Centering and shuttering works, Distempering, Exterior painting (Cement), Woodwork for windows and doors, Painting woodwork and steel, Glazing works for building. Application of specifications in BOQ.	05
3.0	**ANALYSIS OF RATES** Analysis of rates for the following items of works. Earthwork excavation and filling, Cement concrete bed in foundation, Brick masonry in C.M for superstructure, Hollow concrete / solid concrete blocks masonry in CM, Plastering with cement mortar, Pointing with cement mortar, Painting the old and new wood work & Steel work, CC Flooring, Granite / Vitrified // Marble flooring, Panelled and glazed doors and windows, R.C.C roofing slab, Distempering, Corrugated galvanized iron sheet roofing.	08
4.0	**DETAILED AND ABSTRACT ESTIMATE OF BUILDINGS USING LONG WALL SHORT WALL METHOD** Prepare the detailed and abstract estimate of, 1. One room building- Ground floor with flat RCC roof 2. Two room building- Ground floor with flat RCC roof 3. 1BHK Residential building - Ground floor with flat RCC roof and Pitched roof with load bearing wall. 4. 2BHK Residential building - Ground floor with flat RCC roof for framed structures. 5. Building with semi circular/ Hexagonal room walls – Ground floor with flat RCC roof. 6. School building – Ground floor with flat RCC roof.	13
5.0	**DETAILED AND ABSTRACT ESTIMATE OF BUILDINGS USING CENTRE LINE METHOD** Prepare the detailed and abstract estimate of, 1. One room building- Ground floor with flat RCC roof 2. Two room building- Ground floor with flat RCC roof 3. 1BHK Residential building - Ground floor with flat RCC roof and Pitched roof with load bearing wall. 4. 2BHK Residential building - Ground floor with flat RCC roof for framed structures. 5. Building with semi circular/ Hexagonal room walls – Ground floor with flat RCC roof.	13

	School building – Ground floor with flat RCC roof.	
6.0	**ESTIMATION OF ROAD WORKS** Detailed Estimates and Abstract of Cost of Road work. 1. Compute earth work quantities from given cross sectional details. 2. Preparation of Detailed Estimates and Abstract of Cost of Bituminous & concrete Roads	08

COURSE DELIVERY: The course will be delivered through lectures and Power point presentations/ Videos, demonstrations etc.

STUDENT SUGGESTED ACTIVITIES

The topic should be related to the course in order to enhance his knowledge, practical skill & and lifelong learning, communication, modern tool usage.

1. Prepare Check list for different items of following type of Civil Engineering works.
   a. Load Bearing Building Structure.
   b. Framed structure type of building
   c. W.B.M.Road
   d. Septic Tank
   e. Community well
2. Writing the rules of deduction of openings for below mentioned items of work as per IS 1200.
   a. Brick / Stone masonry
   b. Plastering / Pointing
3. Preparing detailed estimate of a RCC single & two storied existing residential building for all items of work.
4. Prepare the lead statement for earth work excavation for a Road.
5. Prepare the lead and lift statement for a building.
6. Student should visit the site and study the no of labours required for a particular item of work and compare it with the SR by doing Rate analysis as per site observation.
7. Collect the market data for cost of construction materials and implement in rate analysis and compare it with the SR book.
8. Rate analysis to be done for construction activities by using alternate materials like M-sand for River sand and analyse the difference of rates.
9. Rate analysis for works under Lump sum (LS) head to be studied in detail and compared with present SR.
10. Detailed estimate of any building before project to be compared during execution and after completion of project.
11. Reconciliation of materials for a particular item need to done for an ongoing project.
12. Detailed estimate for any two or more residential buildings to be compared and rate per unit area to be find out which will help in present market survey.
13. Visit any construction site and study weekly/monthly RA bill submission from Contractors.
14. Collecting old set of tender document and writing a report on it.

15. Collection of tender notices published in newspapers for various items of civil engineering works (at least 5) write salient features of them.
16. Drafting a tender notice for construction of a civil engineering work (W. B. M. Road, residential building)
17. Preparation of tender document for the building (detailed estimate prepared for RCC. building in estimating and costing shall be used) of various account forms from PWD & writing report on it.
18. Writing a report on store procedure and account producer of PWD for it (Guest lecture of PWD official may be arranged.)
19. Writing detailed specifications for one item from each of following :
    a. Irrigation engineering system
    b. Transportation engineering system.
    c. Environment engineering system.
    d. Building construction system

NOTE:

1. Students should select any one of the above or other topics relevant to the subject approved by the concerned faculty, individually or in a group of 3 to 5. Students should mandatorily submit a written report and make a presentation on the topic. The task should not be repeated among students. Report will be evaluated by the faculty as per rubrics. Weightage for 5 marks Internal Assessment shall be as follows:

Unsatisfactory **1**, Developing **2**, Satisfactory **3**, Good **4**, Exemplary **5.**

2. Reports should be made available along with bluebooks to IA verification officer.

Example of model of rubrics / criteria for assessing student activity

Dimension	Students score (Group of five students)				
	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 4	STUDENT 5
Rubric Scale	Unsatisfactory **1**, Developing **2**, Satisfactory **3**, Good **4**, Exemplary5				
1.Organisation	2				
2.Team's roles & duties	3				
3.Conclusion	4				
4.Convensions	5				
Total	14				
Average=(Total /4)	3.5=4				
Note: Concerned faculty (Course coordinator) must devise appropriate rubrics/criteria for assessing Student activity for 5 marks One activity on any one CO (course outcome) may be given to a group of FIVE students					

Note: Dimension should be chosen related to activity and evaluated by the course faculty.

Dimension	Rubric Scale				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary
1.Literature	Has not included relevant info	Has included few relevant info	Has included some relevant info	Has included many relevant info	Has included all relevant info needed
2. Fulfill team's roles & duties	Does not perform any duties assigned	Performs very little duties	Performs partial duties	Performs nearly all duties	Performs all duties of assigned team roles
3.Communication	Poor	Less Effective	Partially effective	Effective	Most Effective
4.Convensions	Frequent Error	More Error	Some Error	Occasional Error	No Error

Course Assessment and Evaluation Scheme:

	What		To whom	When/Where (Frequency in the course)		Max Marks	Evidence collected	Course outcomes
Direct Assessment meth	CIE	IA	Students	Thrice test (Average of three tests)	Test 1	20	Blue books	CO1, CO2
					Test 2			CO3, CO4
					Test 3			CO5, CO6
				Activities		05	Written Report	CO1,CO2,CO3, CO4,CO5,CO6, CO7
	SEE	End Exam		End of the course		100	Answer scripts at BTE	CO1,CO2,CO3, CO4,CO5,CO6
Indirect Assessment	Student Feedback on course		Students	Middle of the course			Feedback forms	CO1 ,CO2,CO3,CO4 Delivery of course
	End of Course Survey			End of the course			Questionnaires	CO1,CO2,CO3, CO4,CO5,CO6,CO7 Effectiveness of Delivery of instructions & Assessment Methods

***CIE** – Continuous Internal Evaluation ***SEE** – Semester End Examination

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off to the next higher digit.

Note to IA verifier*: *The following documents to be verified by CIE verifier at the end of semester

1. Blue books (20 marks)

2. Student suggested activities report for 5 marks evaluated through appropriate rubrics.
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods

Weightage of Marks and blue print of marks for SEE

Unit	Major Topics	Hours Allotted	Questions to be set for SEE – Cognitive Levels						Marks weightage	weightage (%)	A*	B*	C*
			R	U	Ap	Ay	C	E					
1	INTRODUCTION TO ESTIMATION	4	60% **12**	40% **8**	0% **0**	0% **0**	0% **0**	0% **0**	20	13.3	2	0	0
2	SPECIFICATIONS	5	33% **8**	53% **10**	13% **2**	0% **0**	0% **0**	0% **0**	20	13.3	2	0	0
3	ANALYSIS OF RATES	08	13% **4**	20% **6**	67% **10**	0% **0**	0% **0**	0% **0**	20	13.3	2	0	0
4 &5	DETAILED AND ABSTRACT ESTIMATE OF BUILDINGS	27	10% **5**	10% **5**	80% **40**	0% **0**	0% **0**	0% **0**	50	33.3	0	1	0
6	ESTIMATION OF ROAD WORKS	08	8% **4**	32% **12**	60% **24**	0% **0**	0% **0**	0% **0**	40	26.6	0	0	2
Total		52	**21%** **33**	**26%** **41**	**37%** **76**	**0%** **0**	**0%** **0**	**0%** **0**	150	100	6	1	2

A-SEE QUESTIONS TO BE SET FOR (10MARKS) in PART – A (6 questions of 10 marks each)*
B- SEE QUESTIONS TO BE SET FOR (50MARKS) in PART –B compulsory for 50 marks*
C- SEE QUESTIONS TO BE SET FOR (40MARKS) in PART – C two questions of 20 marks*

Questions for CIE and SEE will be designed to evaluate the various educational components such as:

Sl. No	Bloom's taxonomy	% in Weightage
1	Remembering and Understanding	47%
2	Applying the knowledge acquired from the course	37%
3	Analysis	0%
4	Synthesis (Creating new knowledge)	0%
5	Evaluation	0%

MODEL Q.P FOR -CIE (TESTS)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/ 6 th week of sem 10-11 Am	V sem	ESTIMATION AND COSTING	20
	Year: 2015-16	Course code: 15CE53T	

Name of Course coordinator : **Course Outcomes : 1 & 2**

Note: Answer all questions

	Questions	M	CL	CO	PO
1	What is an Estimate? What are its types? Explain anyone briefly. OR Write a short note on, a. BOQ b. Lead statement	5	R	1	1,2,5
2	List the conditions of Deductions of openings during plastering.	5	R/U	1	2,5
3	Write down detailed specification of the following, a. Plastering in Cement mortar 1:6 b. Cement concrete in Foundation 1:2:4	5	R/U	1	1,2,3,4, 5
4	Define Analysis of Rates. Explain the various steps taken into consideration for preparing detailed Analysis of rates. OR Analyse the rates of 1cumof RCC(1:2:4) slab reinforced with MS reinforcement upto 90kg/cum of CC including Centering and Shuttering laid in position, complete in all respects. Assume suitable market rates.	5	Ap/An/E	1	2,4,5,7, 10

REFERENCE TEXT BOOKS

1. Dutta B N, "*Estimation and costing in civil engineering theory and practice*", 27th edition, UBS Publisher's Distributors (P) Ltd New Delhi.
2. D.D.Kohli & Ar.R.C.Kohli, "*Estimating and Costing(CIVIL)*"2013 edition, S.CHAND Publications.
3. IS: 1200 Part 1 to 28, *Method of Measurement of Building and Civil Engineering Works.*
4. Chakroborti M, *"Estimating, costing and specifications in Civil Enginnering"-2006.*
5. Rangawala S C,*"Valuation of Real properties"* Charotar Publishing House -2008.

E-Learning

1. http://www.nprcet.org/civil/document/CE702-ESTIMATION.pdf
2. http://theconstructor.org/construction/reinforcement-quantity-estimation/6802/
3. https://www.youtube.com/watch?v=buUKMbXfEUI
4. http://218.248.45.169/download/training/ppt3.pdf
5. http://www.slideshare.net/thomasjbritto/estimating-andcosting-book
6. http://bieap.gov.in/Pdf/CTPaperIIYR2.pdf
7. https://www.wbdg.org/ccb/DOD/UFC/ufc_3_740_05.pdf
8. http://bie.telangana.gov.in/Pdf/estimatingandcosting.pdf
9. http://cpwd.gov.in/Publication/Specs2009V1.pdf

MODEL QUESTION PAPER
ESTIMATING AND COSTING-I

Time: 3hours Max.marks:100

PART –A

1. Answer any one from the following (10x1=10)
   a. What is an Estimate? What are its types? Explain any one briefly.
   b. Write a short note on, a) BOQ, b) Lead statement.

2. Write the detailed specification(any one) (10x1=10)
   a. Concreting for RCC Slab 1:1.5:3 & Earthwork in foundation.
   b. Plastering in Cement mortar & Granite/Vitrified/Marble flooring.

3. Prepare Rate analysis for any **one** of the following(10x1=10)
   a. Concreting for RCC Slab 1:1.5:3
   b. Earthwork in foundation.

PART –B

4. Prepare detailed and abstract estimate for the following items of the building as shown in fig (by any method)

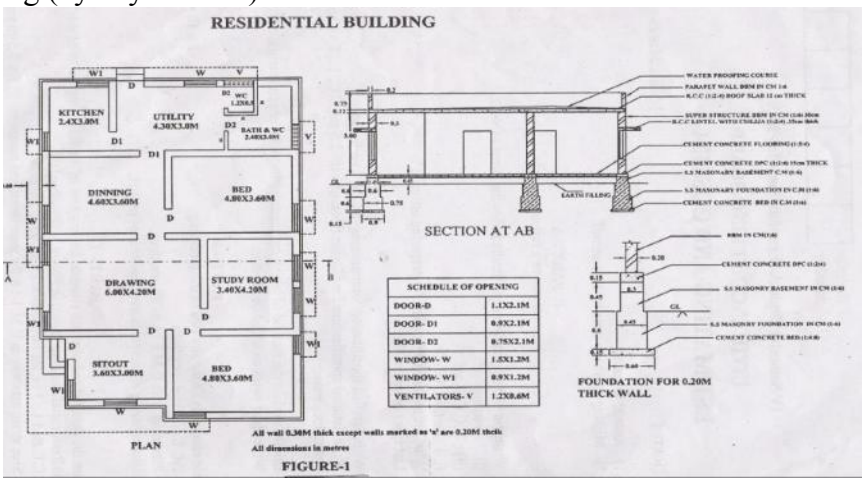


FIGURE-1

-50m

   a. Earthwork excavation in foundation.
   b. Brick work in cement mortar in foundation and plinth.
   c. Internal Plastering excluding Bath and W/C.
   d. RCC for Lintels and Chajjas above opening.(with 1.5% steel)
   e. External plastering.

PART –C

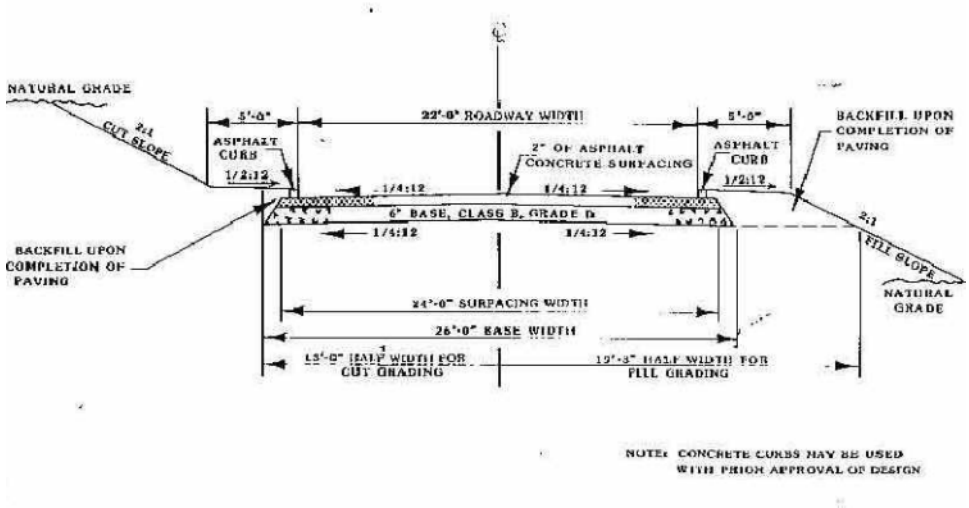
5. Estimate the quantity of earthwork for the portion of a road between chainages 0 to 10 from the following data, lengths being measured with a standard 20m chain.

Chains	0	1	2	3	4	5	6	7	8	9
G.L.	131.1	131.2	130.9	130.8	130.7	130.6	130.4	129.1	129.5	129

The formation level at 0 chainage is 130.0 and the road is in a rising gradient of 1 in 200. The width of formation 9 m. and the side slopes 1.5: 1 in banking and 1:1 in cutting. The lateral slope of the ground may be assumed as level. -20m

OR

Estimate the quantities of the following items of works for the cross section of a 1km long road shown in fig.



1. Earthwork excavation for the pavement shown in figure
2. 6" Base concrete for the road.
3. Top concrete surface.
4. 2" Asphalt layer above top layer.
5. Asphalt kerbing on both sides. -20m

Model Questions Bank

Unit 1- INTRODUCTION TO ESTIMATION
Cognitive level –Remember 1. What is an Estimate? What are the types of Estimation? 2. Explain briefly detailed and Abstract Estimate. 3. List the units of measurements for the following items of works a. Earthwork excavation. b. Plastering in CM 1:6 c. Pointing in CM 1:6 4. List the points to be kept in mind for opening deduction while doing External Plastering. 5. List the points to be kept in mind for opening deduction while doing Internal Plastering. 6. Write a short note on, a) BOQ, b) Lead statement.
Cognitive level –Understand 1. Write the procedure to be adopted for calculating the quantities for Earthwork Excavation. 2. Differentiate Preliminary Estimate and Item rate Estimate.

Unit 2- SPECIFICATIONS
Cognitive level –Remember 1. Write down the detailed Specifications for the following a. Plastering in Cement mortar 1:6 b. Terrazzo flooring. c. Cement concrete 1:2:4 in foundation and Plinth. d. Distempering for internal walls. e. Pointing with cement mortar.
Cognitive level –Understand 1. Differentiate between General specification and detailed specification.
Unit 3- ANALYSIS OF RATES
Cognitive level –Remember 1. Define Analysis of rates. Explain the various steps taken into consideration for

preparing detailed Analysis of rates.

2. List the Type of labours to be considered for different construction activities while doing analysis of rates.
3. Format a typical Rate analysis sheet for any construction work in separate heads, Materials cost, labour cost, taxes, profit, contingencies etc.

Cognitive level –Understand

1. What are the importances of preparing Rate analysis?
2. How to arrive Material rate and labour rate.
3. Mention the basic information requirement for Rate analysis.

Cognitive level –Application

1. Analyse the rates for the below construction activities by using present SR book.
   a. Plastering in Cement mortar 1:6
   b. Terrazzo flooring.
   c. Cement concrete 1:2:4 in foundation and Plinth.
   d. Distempering for internal walls.
   e. Pointing with cement mortar

Unit 4- DETAILED AND ABSTRACT ESTIMATE OF BUILDINGS

Cognitive level –Remember

Cognitive level –Understand

1. Explain the method of taking out the quantities by long wall & short wall method and centre line method.

Cognitive level –Application

1.

Unit 5- ESTIMATION OF ROAD WORKS

Cognitive level –Remember

1. Estimate the quantity of earthwork for the portion of a road between chainages 0 to 10 from the following data, lengths being measured with a standard 20m chain.

Chainages	0	1	2	3	4	5	6	7	8	9
G.L.	131.1	131.2	130.9	130.8	130.7	130.6	130.4	129.1	129.5	129

The formation level at 0 chainage is 130.0 and the road is in a rising gradient of 1 in 200. The width of formation 9 m. and the side slopes 1 1/2 : 1 in banking and 1:1 in cutting. The lateral slope of the ground may be assumed as level. -20m

Cognitive level –Understand

Cognitive level –Remember

1. Estimate the quantity of earthwork for the portion of a road between chainages 0 to 10 from the following data, lengths being measured with a standard 20m chain.

Chainages	0	1	2	3	4	5	6	7	8	9
G.L.	131.1	131.2	130.9	130.8	130.7	130.6	130.4	129.1	129.5	129

The formation level at 0 chainage is 130.0 and the road is in a rising gradient of 1 in 200. The width of formation 9 m. and the side slopes 1 1/2 : 1 in banking and 1:1 in cutting. The lateral slope of the ground may be assumed as level. -20m