



# GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Environmental Engineering

Course / Subject Code : DI03013021

Course / Subject Name : Estimating and Costing in Environmental Engineering

<b>w. e. f. Academic Year:</b>	2024-25
<b>Semester:</b>	3 <sup>rd</sup>
<b>Category of the Course:</b>	PCC

<b>Prerequisite:</b>	Knowledge of Civil Engineering Drawing
<b>Rationale:</b>	Estimation and Costing is a vital part of Environmental Engineering. No project can begin without the total Estimation and Costing done by the Engineer. The entire cost of construction and the infrastructure used for the purpose of construction is estimated and the final costing is done on the basis of which funding is arranged for the project and orders are given to construction firms. Valuation is also one such important part of Estimation and Costing. Valuation is done after the project is complete on the latest trends of the land prices in the market. Therefore, this course has been designed so that the diploma Environmental engineer is able to prepare estimate and cost of Treatment Plant and other Environmental engineering projects which involves civil construction work.

### Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Outline the fundamentals of estimating and costing	R & U
02	Prepare estimate by interpreting detailed drawing.	R, U & A
03	Prepare specifications and rate analysis for the items of building construction works	R, U & A
04	Draft tender and contract documents for environment related construction projects	R, U & A
05	Estimate value of a property using appropriate methods.	R, U & A

\*Revised Bloom's Taxonomy (RBT)



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## Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE (E)	PA(M)	PA(I)	ESE (V)	
3	0	2	4	70	30	20	30	150

## Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	<b>Introduction to Estimation and mode of measurement</b> 1.1 Importance, Meaning & objectives of estimating & costing. 1.2 Types of Projection adopted in Building Drawing. 1.3 Skills required for a good estimator 1.4 Fundamental component of the drawing 1.5 Standard format of measurement sheet, abstract sheet and its use 1.6 Purpose, accuracy, units, rules of measurement of various items of civil work. Mode of measurements for civil works items (As per I.S. 1200)	06	10
2.	<b>Detailed Estimation</b> 2.1 Types of estimates: Preliminary and detail estimates, approximate methods of costing 2.2 Define: Provisional sum, provisional item, prime cost, spot item, Day Work, Overhead charges, contingencies, water charges, establishment charges, contractor's profit, Administrative approval, Technical Sanction (Competent Authority), Work charged establishment. 2.3 Methods of computing the quantities- Center line method, Long wall and short wall method 2.4 Estimate of Septic tank and study of its constructional features, advantages and disadvantages, Brick cum RCC type underground water storage tank , Egg shaped sewer, Surface Drain, Aeration Tank, Canal earthwork	10	20
3.	<b>Specification and Rate Analysis</b>	13	40



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	<p>3.1 Definition, purpose &amp; importance of specifications and its types</p> <p>3.2 Principles of Design and drafting of specifications</p> <p>3.3 Specification writing for some useful items like Excavation, Cement Concrete, Brickwork, Plaster, laying of pipes</p> <p>3.4 Definitions, Importance, purpose &amp; factors affecting the rate analysis.</p> <p>3.5 Rate analysis of various civil works items like excavation for foundation, plain cement concrete in foundation, R.C.C. slab, 1st class brickwork, cement plaster etc.</p>		
4.	<p><b>Tender and Contract</b></p> <p>4.1 Tenders :Classification , Opening and scrutiny , Modes of acceptance , Powers of accepting , Revocation ,Documents required for inviting tender, Tender form and notice inviting tender, Unbalanced, Informal and Global tender</p> <p>4.2 Contract : Types ,Elements of validity, Conditions, Termination, Methods for execution of work done in P.W.D , selection of mode of execution Elements of perspective drawing.</p> <p>4.3 Define Earnest money, Retention money, Security deposits and various types of bills.</p> <p>4.4 Difference between Departmental execution and contract system</p> <p>4.5 Termination of contract</p>	10	20
5.	<p><b>Valuation</b></p> <p>5.1 Terms of valuation : Cost, Price, Value, Real estate, Personal estate</p> <p>5.2 Valuation- its purpose and methods for property.</p> <p>5.3 Mortgage, freehold property, leasehold property, Property income, gross income, net income, outgoing, Depreciation and obsolescence</p> <p>5.4 Characteristics of good valuer</p> <p>5.5 Factors affecting the value of a property.</p> <p>5.6 Sinking fund: its computation and application.</p> <p>5.7 New aspects to be considered in Valuation-Big Data and valuation, Blockchain and valuation, Artificial intelligence and automated valuation.</p>	06	10
	<b>Total</b>	<b>45</b>	<b>100</b>



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## Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	U Level	A Level	N Level	E Level	C Level
50	50	20	-	-	-

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

## References/Suggested Learning Resources:

### (a) Books:

S. No.	Title of Book	Author	Publication
1	Estimating & Costing in Civil Engg	B.N. Dutta	UBSPD
2	Estimating & Costing (Civil Engg.)	S. C. Rangwala	Charotar Publication
3	A text book of Estimating & Costing	G. S. Birdie	DhanpatRai
4	Estimating & Costing	Vazirani & Chandola	Khanna Publisher
5	Civil Estimating costing & valuation	Amarjit Aggarwal & A.K. Upadhay	S.K.Kataria
6	CPWD SOR(2012)	CPWD	Director general,CPWD,New Delhi
7	PWD Hand books (Vol. I & Vol. II)	Govt.of Gujarat	Govt.of Gujarat
8	I.S. code 1200 (Part I to XXX)	B.I.S., Delhi	B.I.S., Delhi

### (b) Open source software and website:

- <https://onlinecourses.swayam2.ac.in/>
- www.ensoftindia.com
- www.newtonindia.com
- www.estimator.com
- www.cpwd.gov.in>Publication



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## Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
1	Interpretation of building drawings and identification of mode of measurement of various civil works	I	02
2	Estimate the civil works like footing, Column, Beam, Slab, Lintel, Weather shed.	II	02
3	Estimate items of RCC Compound wall	II	02
4	Estimate cost of septic tank of given specification	II	02
5	Estimate cost of brick cum RCC type underground water storage tank of given specification or by measuring the dimensions of the existing structure.	II	02
6	Estimate cost of egg shaped sewer of given specification or by measuring the dimensions of the existing structure.	II	02
7	Estimate of Surface Drain of given specification	II	02
8	Estimate Aeration tank of given specification	II	02
9	Estimate of Sedimentation tank with hopper bottom of given specification	II	02
10	Write the specification for different civil construction items.	III	02
11	Compare the actual analysis rates of items with the S.O.R. of P.W.D	III	02
12	Prepare Rate Analysis for various civil items of work	III	04
13	Study Tender notices and identify type of tender and contract	IV	02
14	Solve examples based on valuation of properties.	V	02
	<b>Total hrs.</b>		<b>30</b>

## List of Laboratory/Learning Resources Required: NA

## Suggested Project List:

- Prepare a chart depicting rules of deduction of openings for below mentioned items of work as per IS 1200-a) Brick masonry b) Stone masonry c) Plastering d) Pointing
- Visit construction site and prepare report on actual labors required for particular item of civil work like earthwork, concrete work, plastering, painting, flooring



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- c) Prepare a chart showing difference between market price and SOR price of various building materials
- d) Perform rate analysis using market rates and SOR rates and compare the results.
- e) Prepare report on Artificial Intelligence and automated valuation.
- f) Prepare a chart showing cut outs of various types of Tender notices appearing in newspaper
- g) Model: Prepare a scaled model of reinforcement details of beam, lintel, Retaining wall, hopper bottom sedimentation tank.
- h) Model: Prepare a scaled model of a various environmental structures like Aeration tank, clarifier, tube settler, trickling filter etc.

### **Suggested Activities for Students:**

- a) Interpret various drawings of environmental structures and label the parts and identify various dimensions
- b) Collect the tenders notice and identity the different information given in it.
- c) Visit construction site and study the drawings and quantity estimation sheets.
- d) Prepare Organization Chart of water supply & sewage Board, Pollution control board, Gujarat Ecology Commission, Gujarat State Public Works Department.
- e) Undertake micro-project.
- f) Give seminar on any relevant topic.

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