GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: ESTIMATING & COSTING OF ENVIRONMENTAL STRUCTURES
(COURSE CODE: 3351301)

Diploma Programme in which this course is offered	Semester in which offered
Environmental Engineering	5th Semester

1. RATIONALE:

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 order's 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 a water and waste water treatment plant project.

2. LIST OF COMPETENCY:

The course content should be taught and learning imparted with the aim to develop required skills in students so that they are able to acquire following competency:

- **Prepare estimate and cost of water and waste water treatment plant projects.**

3. COURSE OUTCOMES

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Explain types of estimate and duties of an Estimator
ii. Undertake rate analysis of engineering works
iii. Determine the rates of various items of treatment plant works
iv. Calculate estimated cost of treatment plant projects
v. Prepare the tender document for civil structures
vi. Prepare the contract document

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Schedule				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	ESE	PA	ESE	PA	150
2	0	2	4	70	30	20	30	

Legends: L - Lecture; **T -** Tutorial/Teacher Guided Student Activity; **P -** Practical; **C -** Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

5. COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (in Cognitive Domain)	Topics And Subtopics
Unit-I Introduction	1a. Interpret construction drawings 1b. Describe method of estimating quantities 1c. State format of measurement sheet, abstract sheet	1.1 Drawings of various Environmental engineering structures. 1.2 Standard format of measurement sheet, abstract sheet and its use
Unit-II Detailed Estimate	2a. Describe Lead and Lift, converting Lift into Lead 2b. Calculate quantities needed for mentioned items of work - Septic Tank, Earthwork, Brick cum RCC type underground water storage tank, Egg shaped sewer , Surface Drain, Aeration Tank. 2c. Differentiate methods of taking out quantities 2d. Compute the estimate of Canal 2e. Compute the estimate of Brick cum RCC type underground water storage tank, Egg shaped sewer , Surface Drain, Aeration Tank	***Items Of Work*** 2.1 Methods of taking out quantities (i) Centerline method (ii) Long wall and short wall method 2.2 Septic Tank : Constructional features, Disposal of Effluent, Advantages and Disadvantages, estimate of septic tank 2.3 Earthwork : Lead and Lift, converting Lift into Lead, method of calculation of earthwork, Balancing depth, Estimate of Canal 2.4 Estimate of Brick cum RCC type underground water storage tank , Egg shaped sewer, Surface Drain, Aeration Tank,
Unit-III Tender	3a. Define the tender and classify tenders. 3b. Describe Tender document and all terms related to tender. 3c. Describe various types of bill 3d. Explain a tendering to execution of the work process. 3e. Draft a tender notice of invitation for a specified work 3f. State modes of acceptance of tender. 3g. Describe Procedure for Qualification , Pre and post qualification of contractors with advantages and disadvantages	***Tender*** 3.1 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 , 3.2 Procedure for Pre and Post Qualification of contractors with advantages and disadvantages 3.3 various types of bills, direct

	3h. State the types of bills	and indirect costs
Unit-IV Contract	4a. Describe Contract and all terms related to contract. 4b. Describe various types of contract with their advantages and disadvantages 4c. Explain important terms- Earnest money and Security deposits 4d. Differentiate between Departmental execution and contract system 4e. Explain the parameters of selection of mode of execution 4f. State the conditions of Termination of contract	***Contract*** 4.1 Contract : Types ,Elements of validity, Conditions, Termination, Methods for execution of work done in P.W.D , selection of mode of execution 4.2 Difference between Departmental execution and contract system 4.3 Define Earnest Money and Security Deposits
Unit-V Rate Analysis	5a. Perform rate analysis of important items mentioned.	5.1Rate analysis of important items e.g. Canal, Stone masonry, Acid resisting tile flooring, Sewer pipe line (effluent pipe line). 5.2 Special item related to environment structures
Unit-VI Valuation	6a Describe various terms related to valuation. 6b Describe valuation methods and sinking fund. 6c Explain the Mortgage, freehold property, leasehold property 6d Differentiate Property income, gross income, net income, outgoing 6e Explain the depreciation and obsolescence. 6f Describe characteristics of good valuer 6g Describe sinking fund and application. 6h State the types of Value and Factors affecting the value of a Property. 6g Computation the sinking fund for a given data / case 6h Describe the valuation methods for Property 6i Compute Installments for repayment of loan.	***Valuation*** 6.1 ***Terms of valuation*** : Cost, Price, Value, Real estate, Personal estate 6.2 Valuation : Objectives, 6.3 Mortgage, freehold property, leasehold property 6.4 Property income, gross income, net income, outgoing 6.5 Depreciation and obsolescence 6.6 Factors affecting the value of a property. 6.7 Characteristics of good valuer. 6.8 Sinking fund: its computation and application. 6.9 Valuation methods for property. 6.11 Installments for repayment of loan.

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution Of Theory Marks			
			R Level	U Level	A LEVEL	Total Marks
I	Introduction	1	1	1	0	2
II	Detailed Estimate	9	4	4	6	14
III	Tender	4	4	6	4	14
IV	Contract	4	4	6	4	14
V	Rate Analysis	5	4	4	6	14
VI	Valuation	5	3	6	3	12
	TOTAL	**28**	**20**	**27**	**23**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

7. SUGGESTED LIST OF EXCERCISES/PRACTICAL:

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Note*: Here only outcomes mainly in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of* ***Course Outcomes*** *related to affective domain. Thus over all development of* ***Programme Outcomes (****as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes

Sr. No.	Unit No.	Practical / Exercise	Approx. Hrs. Required
1.	I	Estimate cost of septic tank of given specification or by measuring the dimensions of the existing structure.	4
2.	II	Estimate cost of canal of given specification or by measuring the dimensions of the existing structure.	4
3.	III	Estimate cost of brick cum RCC type underground water storage tank of given specification or by measuring the dimensions of the existing structure.	6
4.	IV	Estimate cost of egg shaped sewer of given specification or by measuring the dimensions of the existing structure.	6
5.	V	Estimate of Surface Drain of given specification or by	2

		measuring the dimensions of the existing structure	
6.	VI	Estimate Aeration tank of given specification or by measuring the dimensions of the existing structure	2
7.	VII	Estimate of Sedimentation tank with hopper bottom of given specification or by measuring the dimensions of the existing structure	4
TOTAL			**28**

8. SUGGESTED LIST OF STUDENT ACTIVITIES

S. No.	Unit No.	Student Activities
i.	II	Take measurements of any existing treatment plant unit and calculate its present value.
ii	V	Compare the actual analysis rates of items with the S.O.R. of P.W.D

9. SPECIAL INSTRUCTIONAL STRATEGIES(if any):

i. Give as many exercises as possible.

ii. Give tender documents/contracts and ask student to study them and discuss various clauses of these documents in group discussion. Ask students to find strengths and weaknesses of these clauses. .

10. SUGGESTED LEARNING RESOURCES

A. List of Books

SR. NO	TITLE OF BOOKS	AUTHOR	PUBLICATION
1	Estimating & Costing in Civil Engg	B. N. Dutta.	Sangam Books
2	Estimating & Costing	S. C. Rangwala.	Charotar
3	Textbook Of Estimating & Costing Civil Engg	G.S.Birdie	Dhanpat Rai Publishing Co (p) Ltd
4	Estimating & Costing	N. A. Shah	Khanna Publishers
5	Civil Estimating, costing and Valuation	Amarjit Aggarwal	S.K. Kataria & sons

B. List of Major Equipment/Materials :

i. Measuring Taps
ii. Computers in sufficient numbers

C. List of Software:

i. Estimator

11. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

Faculty Members from Polytechnics

- **Prof .M.C. Sanandiya,** Lecturer in Environmental Engineering, K. J. Polytechnic, Bharuch,

Coordinator and Faculty Members from NITTTR Bhopal

- **Prof. V.H. Radhakrishnan**, Professor, Department of Civil and Environmental Engineering.
- **Prof. Shashi Kant Gupta.** Professor and Coordinator for State of Gujarat.