



## GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3170615

### Subject Name: Engineering Economics, Estimation and Costing Semester – VII

**Type of course:** Professional Core Course

**Rationale:** This course is designed to develop the ability in the students the basic knowledge of engineering economics, materials of construction, construction technology, building planning and drawings. In the construction of any structure, specifications of civil work are the significant parameters in deciding the cost of the project. In construction, it is often required to use the local materials for which the rates are varying in greater extent across the country. Therefore, there emerges need of discipline to suggest a specific scientific technique to determine the quantity and cost of the materials along with its justification. Today being the era of technology, a provision been also made to use the various software's for more accuracy and speedy determination of estimation and costing.

#### Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

#### Content:

Sr. No.	Content	Total Hrs
1	<b>Introduction to Engineering Economics:</b> Introduction to Engineering Economics- Flow in an economy, Law of supply and demand, Concept of Engineering Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics – Element of costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis – V ratio, Value engineering, Cash flow, Replacement and maintenance analysis, Economic decision making, Evaluating alternatives by- effect of taxation on comparison of alternatives, effect of inflation on cash flow, Evaluation of public projects, Benefit cost ration method.	06
2	<b>Estimation:</b> Definition, Units of measurements, types of estimates, Different methods to find the quantities of civil works. Estimated cost and its importance. Provisions of IS-1200, for working out quantities and deductions in civil works. Entering the measurements in quantity sheet and calculation of quantities of various items of civil works for residential, commercial and industrial buildings, Highway, Dam, Culvert etc. Market rates of material and labour, Introduction to schedule of rates, <b>Abstracting and Billing:</b> Purpose of abstract, preparation of abstract, measurement and billing, Checking of bills and final bill. <b>Book Keeping:</b>	10



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	Work abstract, material at site account, measurement book, muster role hiring and maintenance of equipment, record of bills, vouchers and receipt book.	
3	<b>Specifications:</b> Definition, Objectives and importance of specification, Types of specification, Care to be taken while drafting specifications, Drafting general specifications, and detailed specifications for various civil work items- Specification of materials, specification of works, specification as per building classification, Language of specific writing. <b>Market Survey:</b> Traditional and modular materials, Market survey of materials of Construction, Wages of labour, Tools plant and equipment of construction.	06
4	<b>Rate Analysis:</b> Definition of rate analysis, Factors affecting rate analysis, overhead expenses, procedure for rate analysis, schedule of rates, Definition of task, Determination of man power and material requirement for a given quantity of items of civil works, study of present wages of labour and prices of traditional and modular materials in the market. Study of market rents of different construction tools plant and equipments, Determination of rate of different items of civil work. Working out rates of various items of civil works.	06
5	<b>Contract:</b> Definition, legal requirements of a valid contract, types of contracts, conditions of contract, sub contracts and contractual disputes, Arbitration. Form of Contract, Responsibility of owner, Architect, Contractor and Engineer.	03
6	<b>Tender and Tender notice:</b> Bidding process, e-tendering, Prequalification process, tender notice and its essential features, drafting tender notice, Bid submission, Analysis of tenders, Basis for evaluation and acceptance, letter of intent, work order, agreement.	03
7	<b>Valuation:</b> Definitions of value, price and cost, depreciation, sinking fund, different type of values and their significance, factor affecting value, rent and standard rent, Lease hold and free hold property, obsolescence, Gross income, Outgoing and Net income, Capitalized value and Years purchase, valuation tables, Easement, types of easements, significance of easement in valuation, Methods of valuation of buildings and land, Estimation of values of different types of buildings and lands.	08

**Course Outcomes: At the end of the course, Student will be able to**

Sr. No.	CO statement	Marks % weightage
CO-1	Apply the basics of economics and cost analysis to engineering and take economically sound decision making.	20
CO-2	Prepare rate analysis, specifications, tenders and contract of different civil work.	20
CO-3	Prepare approximate and detailed estimate of a civil engineering work.	20
CO-4	Utilise software for working out quantities of items of civil works.	20
CO-5	Solve examples on valuation of properties/ buildings.	20



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### Suggested Specification table with Marks:

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
30%	20%	20%	15%	15%	-

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's 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.

### Reference Books:

- 1 Chan S.Park, Contemporary Engineering Economics, Prentice Hall of India, 2002.
- 2 Panneer Selvam, R, "Engineering Economics", Prentice Hall of India Ltd, New Delhi, 2001.
- 3 B. N. Dutta, Estimation and Costing In Civil Engineering, Ubs Publishers Distributors, Ltd.
- 4 S. C. Rangwala, Estimating and Costing, Charotar Publishing House.
- 5 G. S. Birdi, Textbook of Estimating & Costing, Dhanpat Rai and Sons, Delhi.
- 6 M. Chakraborti, Estimating, Costing, Specification and Valuation.
- 7 S. C. Rangwala, Valuation of Real Properties, Charotar Publication.
- 8 P.W.D. Handbook and SOR, IS Code – 1200.
- 9 Donald.G. Newman, Jerome.P.Lavelle, "Engineering Economics and analysis" Engg. Press, Texas, 2010.
- 10 Degarmo, E.P., Sullivan, W.G and Canada, J.R, "Engineering Economy", Macmillan, New York, 2011.
- 11 Zahid A khan: Engineering Economy, "Engineering Economy", Dorling Kindersley, 2012

### List of Experiments:

- 1 Examples on engineering economics.
- 2 Work out quantities of various items of civil works from working drawings of residential, industrial and commercial buildings.
- 3 Work out quantities of various items of civil works from drawings of culverts, L/s and C/s of Highways, etc.
- 4 To work out rates of items of civil works
- 5 Examples on valuation of land and buildings.
- 6 Drafting specifications for various items of civil works.
- 7 Use of EXCEL, AutoCAD for calculation of Quantity.
- 8 Overview of software Revit, Tekla, BIM, , MS Project, Primavera etc

### Major Equipment:

Computer system supporting the softwares like Revit, Primavera, BIM, Tekla , MS Project, etc.

### List of Open-Source Software/learning website:

nptel.ac.in