

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL TECHNOLOGY (36)

SUBJECT NAME: CHEMICAL PROCESS ECONOMICS

SUBJECT CODE: 2173610

B.E. VIIth SEMESTER

Type of Course: Chemical Technology

Prerequisite: Should have studied department fundamental subjects in previous semesters and the basic knowledge of engineering economic and mathematics.

Rationale: The objective to teach this course to undergraduate chemical technology students is to provide a firm grounding in modern economic theory and to instill the basic aspects of plant engineering and economic aspect related to early implementation of projects and their current practices.

Teaching and Examination Scheme:

| Teaching Scheme | | | Credits | Examination Marks | | | | | | Total Marks |
|-----------------|---|---|---------|-------------------|-----|-------|-----------------|--------|---|-------------|
| L | T | P | | Theory Marks | | | Practical Marks | | | |
| | | | ESE (E) | PA (M) | | PA(V) | | PA (I) | | |
| | | | | PA | ALA | ESE | OEP | | | |
| 3 | 0 | 0 | 3 | 70 | 20 | 10 | 0 | 0 | 0 | 100 |

L-Lectures; T-Tutorial/TeacherGuidedStudentActivity;P-Practical;C-Credit;ESE-EndSemesterExamination; PA-Progressive Assessment, ALA- Active Learning Assignment, OEP- Open Ended project

Content:

| Sr. No. | Topic | Teaching Hours | Module Weightage (%) |
|---------|---|----------------|----------------------|
| 01 | Introduction Meaning of Project Engineering, various stages of project implementation Relationship between price of a product and project cost and cost of production, EVA analysis | 4 | 14 |
| 02 | Elements of cost of production Monitoring of the same in a plant, Meaning of Administrative expenses, sales expenses etc. Introduction to various components of project cost and their estimation Introduction to concept of Inflation, location index and their use in estimating plant and machinery cost. Various cost indices, Relationship between cost and capacity. | 5 | 14 |
| 03 | Project financing Debt: Equity ratio, Promoters' contribution, Shareholders' contribution, source of finance, time value of money Concept of interest, selection of various alternative equipment or system based on this concept. Indian norms, EMI calculations. | 7 | 16 |
| 04 | Depreciation and Project Costing Depreciation concept, Indian norms and their utility in estimate of working results of project. | 9 | 20 |

| | | | |
|-----------|---|----|----|
| | Working capital concept and its relevance to project, Estimate of working results of proposed project. Capacity utilization, Gross profit, operating profit, profit before tax, Corporate tax, dividend, Net cash accruals. | | |
| 05 | Project evaluation Cumulative cash flow analysis Break-Even analysis, incremental analysis, various ratios analysis, Discounted cash flow analysis. | 5 | 16 |
| 06 | Project management Process Selection, Site Selection, Feasibility Report, Project: Conception to Commissioning: milestones, Project execution as conglomeration of technical and non-technical activities, contractual details. Contract: Meaning, contents, Types of contract. Reading of Balance Sheets and evaluation of Techno-commercial Project Reports, PERT, CPM, bar charts and network diagrams | 10 | 20 |

Suggested Specification table with Marks (Theory):

| Unit No | Unit Title | Distribution of Theory Marks (%) | | | | | |
|---------|----------------------------------|----------------------------------|---------|---------|---------|---------|-------|
| | | R Level | U Level | A Level | N Level | E Level | Total |
| 1 | Introduction | 4 | 4 | 2 | 2 | 2 | 14 |
| 2 | Elements of cost of production | 4 | 4 | 2 | 2 | 2 | 14 |
| 3 | Project financing | 3 | 3 | 4 | 3 | 3 | 16 |
| 4 | Depreciation and Project Costing | 3 | 2 | 5 | 5 | 5 | 20 |
| 5 | Project evaluation | 2 | 2 | 2 | 2 | 8 | 16 |
| 6 | Project management | 4 | 4 | 6 | 3 | 3 | 20 |

Legends: R: Remembrance; U: Understanding; A: Application; N: Analyze; E: Evaluate and above Levels (Revised Bloom's Taxonomy)

Reference Books:

1. Chemical Project Economics, Mahajani V.
2. Plant Design and Economics for Chemical Engineers, Peters M.S., Timmerhaus K.D.
3. Process Plant and Equipment Cost Estimation, Kharbanda O.P.

Course Outcomes:

This course on **Chemical Process Economics** introduces the fundamental concepts, principles and applications of project planning and evaluation.

Open Ended Project fields:-

Students are free to select any area of science and technology based on chemical technology applications to define Projects.

Some suggested projects are listed below:

OEPs project reports for a particular chemical product.

Feasibility report, techno-commercial reports based on the knowledge of subject.

List of Open Source Software/learning website:

1. NPTEL Lectures
2. Literature available on internet
3. Literature available under R&D of chemical Industries
4. Research articles
5. Delnet

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding financial aspect of the subject – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide.

