GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Principles of Chemical Engineering
(Code: 3311703)

Diploma Programmes in which this course is offered	Semester in which offered
Instrumentation & Control Engineering	**First Semester**

1. RATIONALE

The student will understand the principles of chemical engineering and their applications in process industry. The student will be able to understand the use of instrumentation for operations specific to a chemical process environment.

2. LIST OF COMPETENCIES

The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies.

i. Identify need for different instruments for various Chemical Engineering Processes

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	
3	0	0	3	70	30	00	00	**100**

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice **P** - Practical; **C** – Credit;
ESE - End Semester Examination; **PA** - Progressive Assessment.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I Unit Operations	1.1 Define processes 1.2 Compare processes 1.3 Select operations	1.1 Introduction to process & Instrumentation for Chemical Processes 1.2 Definitions, application & comparison : Batch Process, Continuous Process 1.3 Importance & applications of Unit Operations 1.4 Brief Description & Uses of Agitation, Drying, Evaporation, Blending, Crushing, Grinding, Conveying, Filtration, Crystallization, Centrifugation
Unit– II Unit Process	2.1 Identify application of unit process 2.2List & select unit processes	2.1 Introduction, importance & application of Unit Process 2.2 Brief description & application of Cracking, Reforming, Polymerization, Alkylation, Hydrogenation, Isomerisation, absorption, Adsorption, Extraction
Unit-III Thermodynamics of Process	3.1State laws of thermodynamics 3 .2 Classify, define & describe heat transfer reaction 3.3 select, define & describe Heat exchanger 3.3 describe Refrigeration & Air-condi.System	3.1 Laws of Thermodynamics 3.2 Application of Thermodynamic Laws in Processes 3.3 Brief description of Heat Transfer Reaction : Exothermic & Endothermic 3.4 Definition and Types of Heat Exchangers 3.5 Basic Instrumentation for Shell and Tube type Heat Exchanger 3.6 Principle and brief description with schematic diagram of Refrigeration System & Air-conditioning System
Unit– IV Process equipments	4.1 Classify Pumps & Compressors 4.2 describe pumps, compressor, belt & belt conveyers	4.1 Classification of Pumps & Compressors 4.2 Brief description of Pumps : Centrifugal, Reciprocating 4.3 Brief description of Compressors : Rotary, Reciprocating 4.4 Brief description of belt conveyers & bucket elevators
Unit– V Principles of Electrochemical Analysis:	5.1Define electrochemistry 5.2Understand activity series of metals 5.3Define redox reactions 5.4Describe electrochemi	**5.** 5.1 Electrochemistry- definition a Activity Series of Metals b Redox Reactions 5.2 Electrochemical Cell Potentiometric titration Types of Battery (only List) 5.3 pH measurement: a Logarithmic nature of pH b Measurement electrode: c List types of electrodes

Unit	Major Learning Outcomes	Topics and Sub-topics
	cal cell 5.5Define potentiometric titration 5.6 List types of batteries 5.7 Classify, define & describe heat transfer reaction	d Functional layers of the glass membranes

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks (Duration – 2.5 Hours)			
			R Level	U Level	A Level	Total
1.	Unit Operations	08	4	4	6	14
2.	Unit Process	06	4	6	4	14
3.	Thermodynamics of Process	10	6	6	2	14
4.	Process equipments	06	7	7	0	14
5.	Principles of Electrochemical Analysis	12	2	6	6	14
	Total	**42**	**23**	**29**	**18**	**70**

Legends
R = Remembrance; U = Understanding; A = Application and above levels (Revised Bloom's taxonomy)

6. SUGGESTED LIST OF EXPERIMENTS/PRACTICALS

There are no practical/experiments in this course.

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Visit to one relevant process industry, where most of the above processes are in use is recommended. Students should be asked to study the processes and the type and specifications of the Instruments installed for efficient functioning of those processes.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

S.No.	Author	Title of Books	Publication
1	Bela G. Liptak	Process Measurement and Analysis	Chilton Book company, Radnor, Pennsylvania
2	R.N. Shreeve	Chemical Process Industries	Mcgraw hill Publishers
3	Dryden	Handbook of chemical engg.	

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty members from Polytechnic:

- **Prof. M. K. Parikh**, HOD IC dept, Government Polytechnic, Ahmedabad
- **Prof. R. R. Manchiganti**, HOD IC dept, Government Polytechnic, Gandhinagar
- **Prof. A. K. Bilkhiya**, Lecturer IC dept, Government Polytechnic, Gandhinagar
- **Prof. M. M. Mulchandani**, O.S.D., CEC, RCTI Campus, Ahmedabad
- **Prof. Ashvin M. Patel**, Lecturer IC Dept, Government Polytechnic, Palanpur
- **Prof. S. K. Raval**, Lecturer IC Dept, Government Polytechnic, Ahmedabad
- **Prof. J. A. Sutariya**, Lecturer IC Dept, Government Polytechnic, Ahmedabad
- **Prof. N. J. Dehalvi**, Lecturer IC Dept, Government Polytechnic, Gandhinagar
- **Prof. J. A. Mishra**, Lecturer IC Dept, Government Polytechnic, Ahmedabad

Coordinator & Faculty members from NITTTR Bhopal :

- **Dr. Joshua Earnest**, Professor and Head Electrical Engineering Department, NITTR, Bhopal
- **Dr Anju Rawalley**, Professor Department of Applied Sciences, NITTTR, Bhopal