GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
Subject Code: 3163620
Semester – VI
Subject Name: Chemical Process Industries

Type of course: Open Elective

Prerequisite: The students have already undertaken course work with different Unit Operations, Process engineering based aspects of various process applications. Basic knowledge of Chemistry is also required

Rationale: The main objective of this subject is to make students aware about the manufacturing procedures of different chemical compounds and their engineering aspects as it is necessary for them to access the potential hazardous which can occur during the processes.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	**Basic of Petroleum and its properties:** Role of Crude oil in global economy, Present Scenario of Crude Oil Refinery, Importance, Occurrence, Origin(formation), Exploration, Composition, Classification and Evaluation of Crude oil, Crude Assay Analysis, Distillation Characteristics such as TBP,ASTM&EFV, Various types of Petroleum Fraction and its properties like ASTM Distillation, RVP, Octane Number, Oxidation Stability, Sulphur Content Viscosity Index, Carbon Residue, Penetration Index, Softening Point, Flash& Fire Point, Smoke Point , Aniline Point etc.	8
2	**Paints, Inorganic pigments and Enamels :** Paints, different types of pigments such as white, blue, red, yellow, green, brown, black, etc. Varnishes, Industrial Coatings, printing inks, Polishes etc.	6
3	**Fermentation industries :** Industrial alcohol, absolute alcohol, beers, wines and liquors, Manufacturing of Butyl alcohol & Citric acid by Fermentation	6
4	**Introduction to industrial gases:** Gases like carbon dioxide, oxygen, nitrogen, hydrogen, rare gases of atmosphere, helium, acetylene, sulfur dioxide, carbon monoxide, nitrogen oxide.	7
5	**Petrochemicals:** Process engineering aspects of manufacture of Methanol & methanol based chemicals such as acetic acid, dimethyl ether, dimethyl carbonate, etc. Ethylene oxide, glycols, vinyl chloride, vinyl acetate, Propylene oxide, hydroformylation of propene to manufacture butyraldehyde. Manufacture of aromatics, terephthalic acid, phthalic anhydride, phenol, nitrobenzene, aniline.	8

6	**Polymerization Technology:** Polyethylene, polypropylene, LDPE, HDPE, PVC, SBR, NBR, fibers, polyamides, polyesters, Acrylic fibers.	**9**

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
28	**24**	**18**	**16**	**14**	**--**

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

Reference Books:

1. Chemical process Industries Shreve, Brink & Austin, Mc Graw Hill ,4th Ed., 1984
2. Dryden's outlines of chemical technology for the 21st century, third edition by M Gopala Rao &Marsal Sitting, East-West Press Publications.
3. Chemical Process Technology, J Moulijn, M Makkee and A Diepen, John Wiley & Sons, 2001
4. Encyclopedia of Industrial Chemistry ,Ullmann, VCH, 1996
5. Industrial Organic Chemistry ,Weissermel K &Arpe H.J., Weinheim, 1978
6. Unit process in Organic Synthesis, P.H Groggins, Tata Mc Graw Hill Publishing Company.
7. Pandey G.N., "A Text Book of Chemical Technology", Volume 1 and 2, Vikas Publications
8. From Hydrocarbons to Petrochemicals, Hatch L.F. & Matar S., Gulf Pub. Co., 1981
9. B. K.Bhaskar Rao, Modern Petroleum Refining Processes, Oxford and IBH 2007 .
10. B.K.Bhaskar Rao, A Text on Petrochemicals, 2ndEdition, Khanna Publishers, Delhi, 1998

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	To build a basic technical knowledge of the process carried out in chemical industry	15%
CO-2	To interpret technical knowledge with real system and understand the basic working of system.	10%
CO-3	To analyze conventional system with new technological updating	15%
CO-4	To determine which unit operations and unit process can be used so that productivity can be increases.	20%
CO-5	To collect all information about from initialization to end of the unit process.	25%
CO-6	To summarize the pros and cons of the unit process and their components so improvement can be done in the future.	15%

List of Open Source Software/learning website:

- Literature available in any laboratory manual of Chemical Process Technology.
- NPTEL
- MIT Open course lecture available on Internet