GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM

Course Title: Organic Chemistry
(Code: 3320501)

Diploma Programmes in which this course is offered	Semester in which offered
Chemical Engineering, Textile Processing Technology	**Second Semester**

1. RATIONALE

Organic Chemistry is the foundation for Chemical Engineering, Textile Processing, Textile Manu., Plastic Engineering courses.
This course provides the basic knowledge of organic compounds and their chemical behavior. This course gives clarity to the students regarding the knowledge of aromatic, aliphatic and heterocyclic compounds & several inorganic salts with their structural formulas in detail. This course is designed in way that it may be useful in chemical industries as well as in textile field. Moreover it will be useful for the study of chemistry of dye stuff & intermediates, drugs & pharmaceutical, polymer science, plastic technology & the study of explosives materials it is an essential subject.
Thus good foundation in Basic Organic Chemistry will help the students in performing in a better way in their engineering field.

2. COMPETENCIES

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire the following competencies:

i. **Select proper organic compounds required for different application in their field of engineering.**
ii. **Use selected organic compounds in different engineering processes appropriately.**

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**	
4	0	2	06	70	30	20	30	**150**

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

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENTS

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I CONCEPT OF ORGANIC CHEMISTRY:	1a. Classify the Organic compound 1b. Classify the functional group 1c. Explain nomenclature of organic compound 1d. Comprehend the concept of isomerism	1.1 Introduction 1.2 Classification of Hydrocarbons 1.4 Functional group classification of organic compound 1.5 IUPAC system of nomenclature. 1.6 Isomerism. 1.6.1 Structural Isomerism - Position Isomerism - Chain Isomerism - Mesmerism Isomerism - Functional Isomerism 1.6.2 Stereo Isomerism. - Optical isomerism - Geometrical Isomerism
Unit– II PURIFICATION OF ORGANIC COMPOUNDS	2a. Describe various methods of purification 2b. Explain purification of organic compound	2.1 Crystallization 2.2 Sublimation 2.3 Distillation 2.3.1 Simple distillation 2.3.2 Fractional distillation 2.3.3 Distillation under reduced pressure 2.3.4 Steam distillation 2.4 Tests of purification- M.P. & B.P. of organic compounds.
Unit– III DETECTION & ESTIMATION OF ELEMENTS	3a. Use different methods for detection and testing of elements 3b. Estimate the elements by different mrthods	3.1 Detection of C, H, N, halogens, S & P. 3.1.1 Lassaigne's Test for detection of N, Cl, B, I & S. 3.2 Estimation of C & H. 3.3 Estimation of Nitrogen by Duma's method. 3.4 Estimation of Nitrogen by Kjeldahl's method. 3.5 Estimation of halogens, sulphur and Phosphorous by Cariu's Method. 3.6 Problems based on methods of estimation.

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit– IV **STUDY OF ALIPHATIC COMPOUNDS**	4a. Differentiate aliphatic and aromatic compound 4b. Describe different methods of preparation and Uses of aliphatic compound	4.1 Preparation, Properties & Uses of following Compounds. 4.1.1 Alcohol, Aldehyde & Ketone (Methanol, Ethanol ,Acetaldehyde & Acetone.) 4.1.2 Carboxylic Acid (Acetic Acid & Oxalic Acid.) 4.1.3 Esters and ether (,Methy & Ethyl Acetate & Diethyl ether 4.1.4 Amines (Methylamine, Ethyl Amine).
Unit– V **STUDY OF AROMATIC COMPOUNDS**	5a. Explain the specific properties of aromatic compound 5b. Describe different methods of preparation and Uses of aromatic compound	5.0 Preparation, Properties & Uses of following Compounds. 5.1 Benzene & Toluene 5.2 Nitrobenzene & Aniline. 5.3 Phenol & Benzaldehyde 5.4 Benzoic Acid & Salicylic Acid. 5.5 Styrene. & Naphthalene
Unit– VI **BRIEF STUDY OF VARIOUS UNIT PROCESSES**	6a.Identify the different unit process 6b. Define various unit processes 6c.Enlist suitable reagents for each unit process	6.1 Study of the following unit processes: 6.1.1 Sulphonation 6.1.2 Nitration 6.1.3 Halogination 6.1.4 Diazotization 6.2 Reagents used for above unit processes.
Unit– VII **CARBOHYDRATES,SOAPS & DETERGENT**	7a. Classify carbohydrates 7b. Classify soaps and detergent 7c. Describe mechanism of cleansing action	7.1 Introduction: Carbohydrates and its classification with suitable Examples 7.2 Explain soaps and Detergent 7.3 Classification of soaps and detergent with suitable example of each class 7.4 Mechanism of cleansing action
Unit– VIII CHEMISTRY OF DYES & ITS CLASSIFICATION	8a. Explain difference between dyes & color 8b. Classify dyes in different ways	8.1 Define Dye. 8.2 Difference between Dye & Colour. 8.3 Explain- Chromogens, Chromophore & Auxoch 8.4 Classification of Dyes base on Structure. 8.5 Classification of Dyes based on method of application.

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

Unit No	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total
I	Concept Of Organic Chemistry:	06	2	2	3	07
II	Purification Of Organic Compounds:	06	2	2	3	07
III	Detection And Estimation Of Elements :	07	3	3	4	10
IV	Study Of Aliphatic Compounds:	10	3	3	4	10
V	Study Of Aromatic Compounds:	10	4	4	4	12
VI	Brief Study Of Various Unit Processes:	07	3	3	4	10
VII	Carbohydrates, Soaps And Detergents	06	2	2	3	07
VIII	Chemistry Of Dyes & Its Classification	04	2	2	3	07
	Total	**56**	**21**	**21**	**28**	**70**

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

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

6. SUGGESTED LIST OF EXERCICES/PRACTICALS

The practical/experiments should be properly designed and implemented with an attempt to develop different types of skills so that students are able to acquire above mentioned competencies:

Sr. No.	Unit No.	Practical Exercise	Approx Hours Required
1	All	Physically Observing of Organic Acid, Base, Phenol & Neutral Compounds.(Their physical state, Structural formula & Solubility).	04
2	II	Purification of a given organic compound by crystallization.	02
3	II	Purification of a given organic compound by Solvent Treatment method.	02
4	II,IV & V	Detection of Melting point of some Organic Solids by Thiele's Method.	04
5	II,IV & V	Detection of Boiling point of some Organic liquids by Semi micro method.	04
6	II,IV & V	Separation of some Organic Compounds (Acid + Phenol + Base) using solvent treatment method.	04
7	V, VI & VIII	Preparation of some compounds such as i) Nitrobenzene from Benzene	04
8	II , V& VI	Purification of some organic compounds by Sublimation method.	02
9	II	Detection of some Elements by Lassaigne's test.	02
10	IV & V	Practical are to be performed based on the organic spotting of the following compounds. Organic Qualitative Analysis i) Acetic Acid & Benzoic Acid (ii) Aniline & Nitrobenzene iii) Benzene & Acetone (iv) Chloroform & Phenol	04
		Total	**32**

NOTE: Minimum Ten Experiments should be performed by the students from the above given list OR any other experiments related to above topics

7. SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Library Survey regarding Molecular & Structural formulas of Different Organic Compounds.
- Group Discussion Regarding Purification of Several Organic Compounds.
- Challenging task related to purification of organic Compounds given by faculty.
- Oral presentation related to different unit processes.
- Library Survey regarding Qualitative Analysis of different Compounds.
- Study of Industries involved in the mfg. of some important Compounds.

8. SUGGESTED LEARNING RESOURCES

A. List of Books

Sr.No.	Title of Books	Author	Publication
1	A Textbook of organic chemistry	B.S. Bahl & Arun Bahl	S. Chand & Co., New Delhi.
2	A Textbook of organic chemistry	P.L.Soni	S. Chand & Co., New Delhi.
3	A Textbook of organic chemistry	O.P. Agrawal	Krishna Prakashan
4	A Textbook of organic chemistry	Bahl & Tuli	S. Chand & Co., New Delhi.
5	A Manual of Practical Engineering Chemistry	Sudha Jain & Shradha Sinha	S. Chand & Co., New Delhi.
6	Organic Chemistry	I.L. Finar	ELBS
7	Organic Chemistry	Robert Morrison & Boyd	Prentice Hall of India, New Delhi.

B. List of Major Equipment/ Instrument

- Glass wares
- Melting Point apparatus.
- Gas line & burners.
- Distillation Assembly.
- Chemicals & Reagents.
- Water / Send Bath.
- Evaporating Dishes etc.

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE:

Faculty Members from Polytechnics

- **Prof. J.C.Patel,** I/C.Head, Science & Humanities Department, Dr. S.& S.S. Ghandhy College of Engineering Technology, Surat
- **Prof. Dr. P.R.Patel,** Head, Science & Humanities Department, N.G.Patel Polytechnic, Isroli, Bardoli
- **Prof. S.A.Nimakwala,** I/C.Head, Science & Humanities Department, Shri.K.J. Polytechnic, Bharuch.
- **Prof. R.R.Patel,** I/C.Head, Science & Humanities Department,G.P. Himmatnagar.

Coordinator and Faculty Member From NITTTR Bhopal

- **Dr. Bashirulla Shaik,** Assistant Professor, Dept. of Applied Sciences
- **Dr. Abhilash Thakur,** Associate Professor, Dept. of Applied Sciences