



Gyanmanjari
Innovative University

Course Syllabus
Gyanmanjari Institute of Technology
Semester-2

Subject: Fundamental Chemistry – BETCH12301

Type of course: Major (Core)

Prerequisite: To provide students the knowledge of general organic chemistry.

Rationale: The Prerequisite provides the foundation for understanding the concepts and principles of organic chemistry.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
CI	T	P		C	Theory Marks		Practical Marks		
			ESE		MSE	V	P	ALA	
4	0	2	5	60	30	10	20	30	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.



Course Content:

Unit No.	Course content	Hrs	% Weightage
1	<p>Chapter-1 Atomic Structure, Periodic Table and Chemical Bonding:</p> <p>Fundamental particles- mass and charges of electrons, protons and neutrons with names of the scientists who discovered these fundamental particles, Bohr's model of atom and successes and limitations of atomic theory (qualitative treatment only), Atomic number, atomic mass number isotopes and isobars, Definition of orbit and orbitals, shapes of s and p orbitals only, quantum numbers and their significance, Planck's Quantum Theory, Photoelectric Effect, Heisenberg's Uncertainty Principle, Aufbau's principle, Pauli's exclusion principle and Hund's rule, Electronic configuration of elements with atomic number (Z) = 30 only. (Electronic configurations of elements with atomic number greater than 30 are excluded).</p>	10	20%
2	<p>Chapter - 2 Synthesis of some industrially important food colors and dyes:</p> <p>Dyes: Synthesis and application of industrially important dyes, Non-textile applications of dyes, Alizarin, Benzanthrone, dibenzanthrone, Caledon Z green, Phenolphthalein, Mercurochrome, Methyl Orange, Methylene Blue, Auramine -O, Auramine - G, Indantherene Brown RRD, Indigo.</p>	10	20%
3	<p>Chapter - 3 Rearrangements:</p> <p>Hoffman, Schmidt, Curtius, Beckman, Fries, Benzillic acid, Lossen cope Claisen, Sommelet, Pinacole-Pinacolone, Tiemann rearrangement, Wolff rearrangement</p> <p>Chapter - 4 Water Treatment :</p> <p>The Composition of Wastewater, Characteristics of Sewage :- physical, chemical and biological, BOD, COD & TOD, Waste water treatment, Preliminary Treatment, Primary treatment, Septic tank, Imhoff tank, Secondary treatment, Trickling Filters, Rotating Biological Contactors, Stabilization Ponds or oxidation ponds, Activated Sludge System.</p>	25	40%



4.	Chapter – 5 Polymers and Elastomers : Introduction and Definition of Polymer and Monomer, Classification of Polymer on basis of Molecular structure as Linear, Branch and Cross-linked polymers, Classification on basis of monomers, Classification on the basis of Inter-molecular Forces, Classification Based on Synthesis, Types polymerization Reaction, Addition Polymerization, Condensation Polymerization, Synthesis, properties and application of Polyethylene, PTFE, Polypropylene, Polyvinyl chloride, Teflon, Polystyrene, Phenol formaldehyde, Acrylonitrile, Epoxy Resin, Elastomers, Buna-S Rubber, Buna-N Rubber, Neoprene Rubber, Conducting polymers and its classification, Poly phenylene, Polyaniline , Polypyrrole, Polyacetylene.	15	20%
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Continuous Assessment

Sr. No	Active Learning Activities	Marks
1.	Assignment Faculty will give the assignment. Students need to solve it and upload the same on GMIU Web Portal.	10
2.	Picture Analysis Faculty will assign scientific picture and student will analyze it and will make report in 100 words and upload it on GMIU Web Portal.	10
3.	React and Discover During the industrial visit students will see the chemical reactions going on and they needs to study the outcome and will upload the same on GMIU Web Portal.	10
Total		30

Suggested Specification table with Marks (Theory):60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weight age	30%	30%	30%	10%	00	00

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



Course Outcome:

After learning the course the students should be able to:	
CO1	Establish the fundamentals of chemical bonding, the periodic table, and atomic structures.
CO2	Investigate the principles involved in dye synthesis.
CO3	Understand the basics of rearrangements and also demonstrate the different methods of water treatment.
CO4	Get acquainted with both elastomers and polymers.

List of Practicals:

Sr. No	Descriptions	Unit No	Hrs
1.	Standardize KMnO_4 solution by preparing standard oxalic acid and to estimate ferrous ions.	1	2
2.	Standardize $\text{Na}_2\text{S}_2\text{O}_3$ solution by preparing standard potassium dichromate and to estimate percentage of copper from brass.	2	4
3.	Determine PH-Values of given samples of Solution by using Universal Indicator and PH-meter	3	4
4.	Determination of phenol by iodometric method.	4	4
5.	Prepare the standard solution of oxalic acid.	5	4
6.	To determine the strength of given HCl solution in terms of Normality, gram/lit and Molarity by using 0.1 N NaOH solution.	6	4
7.	To Analysis given organic compound.(Unknown)	7	2
8.	To Analysis given organic compound.(Unknown)	7	2
9.	To Analysis given organic compound.(Unknown)	7	2
10.	To Analysis given organic compound.(Unknown)	7	2
Total			30

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

- 1) Organic Chemistry Vol. I & II VIth edition by I. L. Finar ELBS Publication.
- 2) Advance Organic Chemistry IIIrd edition by J. March, Wiley Eastern Limited.
- 3) Natural Products Chemistry, Vols. I & II by K. Nakanashi, Academic Press, New York and London.
- 4) Organic Chemistry II edition by Bhupinder Mehta and Manju Mehta PHI Learning pvt.Ltd. Delhi.

