



Faculty of: **Sciences and Life Sciences**

Course: **Bachelor of Science (Mathematics)**

Semester: **II**

Subject Code: **CHE202-1C**

Subject Name: **Fundamentals of Chemistry II**

Sr. No	Category	Subject Code	Subject Name	Teaching hours/Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								Total
				Th	Tu	Pr			Theory				Tutorial / Practical				
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
									Marks	Marks	Marks	Duration	Marks	Duration	Marks	Duration	
3	MINOR	CHE202-1C	Fundamentals of Chemistry II	3	-	2	5	4	10	Assignment	50	2	25	1	-	-	100

AIM

- Aware students of the history of chemistry and its scope.
- Acquaint the basic concept of Analytical Chemistry as a subject.
- Basic concepts related to Organic and Analytical chemistry.
- Learn laboratory skills for handling glassware and chemicals for safety purposes.

COURSE CONTENTS

Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
I	<p>Chemistry of s-block elements and Coordination Chemistry</p> <p>Hydrogen. and its Chemistry. Alkali and Alkaline Earth Metals: Li, Na, K, Be, Mg, Ca comparative study of elements, oxides, halides, hydroxides, and carbonates. Exceptional properties of Lithium and Beryllium Coordination Chemistry Definition of some terms, Classification of ligands, Chelate, chelating ligand and Chelation, Classification of chelates, Uses of Chelates, Coordination number and Stereochemistry of complexes, and Nomenclature of coordination compounds.</p>	15
II	<p>Fundamental Aspects in Organic Chemistry Hybridization, sigma and pi-bonds, hydrogen bond, inductive effect, resonance effect, hyper-conjugation, steric effect, acids and bases, structure and stability of carbocation, carbanions, and free radicals, aromaticity: Benzenoids and Huckel's rule. Electrophilic aromatic substitution Introduction, effect of substituent group, classification of substituent group, electrophilic substitution reactions like Nitration, Sulphonation, Friedal-crafts alkylation and acylation.</p>	15
III	Water Analysis	15

	<p>Analysis of hardness of the water in terms of Total solid and volatile solid, Non-filterable solid and non-filterable volatile solid, Filterable solid, Total solid, Total Suspended Solid, Acidity, Basicity or Alkalinity Turbidity. Various methods for determining the hardness of water</p> <p>Catalysis Introduction, Types of catalyst, Characteristics of catalysis, Theories, Acid-base catalyst, Autocatalysis, Catalytic Promotors and Poison, Negative and positive catalysts, Enzyme catalyst, Applications</p>	
--	--	--

Course Outline for Practical

SR. NO	COURSE CONTENT	
1	<p>Volumetric Analysis</p> <ol style="list-style-type: none"> 1. Estimation of the amount of Cu^{2+} in the given $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$ solution using 0.01M EDTA solution. 2. Estimation of the amount of Ni^{2+} in the given $\text{NiSO}_4 \cdot 7\text{H}_2\text{O}$ solution using 0.01 M EDTA solution. 3. Estimation of the amount of Zn^{2+} in the given ZnCl_2 solution using 0.01 M EDTA solution. 4. Estimation of total, temporary, and permanent hardness of water. 5. Determination of acetic acid in commercial vinegar using 0.1 M NaOH 	
2	<p>Volumetric Analysis</p> <ol style="list-style-type: none"> 1. To prepare a solution of acids and bases with a definite concentration 2. To prepare a solution by dissolving 'x' g NaHCO_3 / Na_2CO_3 in 100 ml solution and determine its concentration in terms of normality and molarity using the given 0.1 M HCl solution 3. To determine the normality, molarity, and g/litre of NaOH and HCl using 0.05M Na_2CO_3 solution 4. To determine the molarity, g/litre, and normality of each component in a mixture of $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ and H_2SO_4 using 0.02 M KMnO_4 and 0.1 M NaOH solution 5. To determine the normality, molarity and g/lit of KMnO_4 and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ solution using 0.1 N $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$ solution. 6. To determine the normality, molarity and g/lit of FeSO_4 (NH_4)$_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$ and $\text{K}_2\text{Cr}_2\text{O}_7$ solutions using 0.1 N KMnO_4 solution. 	
3	<p>Qualitative Analysis of Inorganic Salts Inorganic salts containing two radicals Anion: SO_3^{-2}, S^{-2}, PO_4^{-3} (Soluble and Insoluble) Cation: Group I to VI positive ions</p>	
	Total Hours = 30	

TEACHING METHODOLOGY

- Conventional method (classroom blackboard teaching)
- ICT Techniques
- Teaching through the classroom, laboratory work
- variety of learning styles and tools (PowerPoint presentations, audio-visual resources, e-resources, seminars, workshops, models)
- Teaching through laboratory work

LEARNING OUTCOME

- Expand the basic knowledge of chemistry
- To understand the fundamentals of thermodynamics
- To learn about various theories of bonding in chemistry
- To acquire knowledge of the nomenclature system of IUPAC
- To learn the basics of analytical chemistry
- Understanding the importance of laboratory work and laboratory safety
- Acquire knowledge about types of glassware and their calibration
- Development of analytical skills by analysis of various organic and Inorganic compounds

ARRANGEMENT OF LECTURE DURATION AND PRACTICAL SESSION AS PER DEFINED CREDIT NUMBERS

Units	Lecture Duration (In Hrs.)		Calculation of Credits (In Numbers)		Total Lecture Duration	Credit Calculation
	Theory	Practical	Theory	Practical	Theory+ Practical	Theory+ Practical
Unit – 1	15	30	3	1	45+30	4
Unit – 2	15					
Unit – 3	15					
TOTAL	45	30	3	1	75	4

EVALUATION

Theory Marks	Practical Marks	Total Marks
75	25	100

REFERENCE BOOKS

- | | | |
|---|--|--|
| 1 | Principles of Inorganic Chemistry | B.R. Puri, L.R. Sharma & K.C Kalia, |
| 2 | Organic Chemistry | Morrison Boyd |
| 3 | Principles of Physical Chemistry | Puri, Sharma, Pathania. |
| 4 | Fundamental of analytical chemistry | Skoog & West |
| 5 | Vogel's Qualitative Inorganic Analysis | G. Svehla, B. Sivasankar |
| 6 | Practical Chemistry | Pandey, O. P., Bajpai, D. N., Giri, S. |