



# C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences and Life Sciences**

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

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><b>Chemistry of s-block elements and Coordination Chemistry</b></p> <p><b>Hydrogen.</b> and its Chemistry.  <b>Alkali and Alkaline Earth Metals:</b> Li, Na, K, Be, Mg, Ca comparative study of elements, oxides, halides, hydroxides, and carbonates. Exceptional properties of Lithium and Beryllium</p> <p><b>Coordination Chemistry</b>            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>	
II	<p><b>Fundamental Aspects in Organic Chemistry</b>            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.</p> <p><b>Electrophilic aromatic substitution</b>            Introduction, effect of substituent group, classification of substituent group, electrophilic substitution reactions like Nitration, Sulphonation, Friedal-crafts alkylation and acylation.</p>	15
III	<b>Water Analysis</b>	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><b>Catalysis</b> Introduction, Types of catalyst, Characteristics of catalysis, Theories, Acid-base catalyst, Autocatalysis, Catalytic Promotors and Poison, Negative and positive catalysts, Enzyme catalyst, Applications</p>	
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### Course Outline for Practical

SR. NO	COURSE CONTENT	
1	<p><b>Volumetric Analysis</b></p> <ol style="list-style-type: none"> <li>1. Estimation of the amount of <math>\text{Cu}^{2+}</math> in the given <math>\text{CuCl}_2 \cdot 2\text{H}_2\text{O}</math> solution using 0.01M EDTA solution.</li> <li>2. Estimation of the amount of <math>\text{Ni}^{2+}</math> in the given <math>\text{NiSO}_4 \cdot 7\text{H}_2\text{O}</math> solution using 0.01 M EDTA solution.</li> <li>3. Estimation of the amount of <math>\text{Zn}^{2+}</math> in the given <math>\text{ZnCl}_2</math> solution using 0.01 M EDTA solution.</li> <li>4. Estimation of total, temporary, and permanent hardness of water.</li> <li>5. Determination of acetic acid in commercial vinegar using 0.1 M NaOH</li> </ol>	
2	<p><b>Volumetric Analysis</b></p> <ol style="list-style-type: none"> <li>1. To prepare a solution of acids and bases with a definite concentration</li> <li>2. To prepare a solution by dissolving 'x' g <math>\text{NaHCO}_3</math> / <math>\text{Na}_2\text{CO}_3</math> in 100 ml solution and determine its concentration in terms of normality and molarity using the given 0.1 M HCl solution</li> <li>3. To determine the normality, molarity, and g/litre of <b>NaOH and HCl</b> using 0.05M <math>\text{Na}_2\text{CO}_3</math> solution</li> <li>4. To determine the molarity, g/litre, and normality of each component in a mixture of <b><math>\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}</math> and <math>\text{H}_2\text{SO}_4</math></b> using 0.02 M <math>\text{KMnO}_4</math> and 0.1 M NaOH solution</li> <li>5. To determine the normality, molarity and g/lit of <b><math>\text{KMnO}_4</math> and <math>\text{FeSO}_4 \cdot 7\text{H}_2\text{O}</math></b> solution using <b>0.1 N <math>\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}</math></b> solution.</li> <li>6. To determine the normality, molarity and g/lit of <b><math>\text{FeSO}_4</math> (<math>\text{NH}_4</math>)<math>_2\text{SO}_4 \cdot 6\text{H}_2\text{O}</math> and <math>\text{K}_2\text{Cr}_2\text{O}_7</math></b> solutions using <b>0.1 N <math>\text{KMnO}_4</math></b> solution.</li> </ol>	
3	<p><b>Qualitative Analysis of Inorganic Salts</b> Inorganic salts containing two radicals <b>Anion:</b> <math>\text{SO}_3^{-2}</math>, <math>\text{S}^{-2}</math>, <math>\text{PO}_4^{-3}</math> (Soluble and Insoluble) <b>Cation:</b> Group I to VI positive ions</p>	
	<b>Total Hours = 30</b>	

#### 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 lectures 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					
<b>TOTAL</b>	<b>45</b>	<b>30</b>	<b>3</b>	<b>1</b>	<b>75</b>	<b>4</b>

**Evaluation:**

Theory Marks	Practical Marks	Total Marks
75	25	100

**REFERENCE BOOKS:**

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|---|--|--|
| 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. |