C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences and Life Sciences**
Course: **Bachelor of Science (Physics)**
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								
									Theory				Tutorial / Practical				Total
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
				Th	Tu	Pr			Marks		Marks	Duration	Marks	Duration	Marks	Duration	
3	MINOR	CHE202-1C	Fundamentals of Chemistry II	3	-	2	5	4	10 10 05	Assignment Quiz Attendance	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	**Chemistry of s-block elements and Coordination Chemistry** **Hydrogen**. and its Chemistry. **Alkali and Alkaline Earth Metals**: Li, Na, K, Be, Mg, Ca comparative study of elements, oxides, halides, hydroxides, andcarbonates. 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.	
II	**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-craftsalkylation and acylation.	**15**
III	**Water Analysis**	**15**

	Analysis of hardness of the water in terms of Total solid and volatile solid, **N**on-filterable solid and non-filterable volatile solid, Filterable solid, Total solid, Total Suspended Solid, Acidity, Basicity or AlkalinityTurbidity. Various methods for determiningthe hardness of water **Catalysis** Introduction, Types of catalyst, Characteristics of catalysis, Theories, Acid-base catalyst, Autocatalysis, Catalytic Promotors and Poison,Negative and positive catalysts, Enzyme catalyst, Applications	

Course Outline for Practical

SR. NO	COURSE CONTENT
1	**Volumetric Analysis** 1. Estimation of the amount of Cu^{2+} in the given $CuCl_2.2H_2O$ solution using 0.01M EDTA solution. 2. Estimation of the amount of Ni^{2+}in the given $NiSO_4.7H_2O$ 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	**Volumetric Analysis** **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 **$H_2C_2O_4.2H_2O$ 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 **KMnO4** and **FeSO4.7H2O** solution using **0.1 N $H_2C_2O_4.2H_2O$** solution. **6.** To determine the normality, molarity and g/lit of **$FeSO_4$ $(NH_4)_2SO_4.6H_2O$** and **$K_2Cr_2O_7$**solutions using **0.1 N $KMnO_4$**solution.
3	**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
	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 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					
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.