C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences and Life Sciences**
Course: **Bachelor of Science (Chemistry)**
Semester**: II**
Subject Code**: CHM203-1C**
Subject Name: **Inorganic and Physical 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	
1	MAJOR	CHM203-1C	Inorganic and Physical Chemistry II	3	-	2	5	4	10 10 05	Assignment Quiz Attendance	50	2	25	1	-	-	100

AIM

- Aware students of the about hydrogen and its chemistry
- Acquaint the basic concept of s-block elements
- Basic concepts related to acid, base, and buffers
- Learn concepts of volumetric analysis and their calculations.

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, 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.	**15**
II	**Electron-deficient compounds: Boranes** Preparation and properties of boranes, diborane, uses of diborane, structure and bonding in diborane. **Catalysis** Introduction, Types of catalyst, Characteristics of catalysis, Theories, Acid-base catalyst, Autocatalysis, Catalytic Promotors and Poison, Negative and positive catalysts, Enzyme catalyst, Applications	**15**
III	**Acid, Base, and Buffers** **Concepts:** Arrhenius, Lowry – Bronsted and Lewis acid-base Concept, Strength of	**15**

	Acids and Bases, Basic properties of acids and bases **pH**: pH scale, measurements of pH by pH paper, indicators, and pH meter, Degree of hydrolysis (h), Derivation of hydrolysis constant, common ion effect, Derivation of Henderson equation, pH of salt of Strong acid-weak base, Strong base- weak acid, Weak acid-weak base **Buffers:** buffer solutions, buffer capacity, Mechanism of acidic and basic buffer solution, Numerical – calculation of pH of buffer solutions, Derivation of equation for pH of acidic and basic buffer solution **Solid State** Types of solids, Symmetry of crystals, Bravais lattice, miller indices, X-ray crystallography, Bragg's equation, and its derivation, measurement of diffraction angle by rotating crystal method and powder method, classification of crystals on the basis of bonds, liquid crystals, types of liquid crystals, application of liquid crystals	

Course Outline for Practical

SR. NO	COURSE CONTENT
1	**Demonstrative Practicals** • Determination of pH through pH Strips and pH meters of one acid, base, and neutral solution • Preparation of buffers and their application • Chemical reaction with catalyst and without catalyst
2	**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.
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

- Procure knowledge of trends in s-block elements
- Obtain significant knowledge about solid-state
- Acquire knowledge about different types of catalysts
- Develop skills in volumetric analysis
- Learn to analyze the positive and negative ions from unknown 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	Basic Inorganic Chemistry	FA. Cotton and G. Wilkinson.
2	Principles of Inorganic Chemistry	B.R. Puri, L.R. Sharma & K.C Kalia,
3	Principles of Physical Chemistry	Puri, Sharma, Pathania.
4	A Textbook of Physical Chemistry	B.K. Sharma.
5	Vogel’s Qualitative Inorganic Analysis	G. Svehla, B. Sivasankar
6	Practical Chemistry	Pandey, O. P., Bajpai, D. N., Giri, S.