C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences and Life Sciences**
Course: **Bachelor of Science (Physics)**
Semester**: I**
Subject Code**: CHE201-1C**
Subject Name: **Fundamentals of Chemistry-I**

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	CHE201-1C	Fundamentals of Chemistry-I	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	**Chemical Thermodynamics** • Definition of thermodynamic terms: System, surrounding etc. • Types of systems. • Intensive & extensive properties, state of path functions, thermodynamic process, concept of heat & work. • First law of Thermodynamics.:- Statement, definition of internal energy & enthalpy, heat capacity, heat capacities of constant volume & pressure & their relationship. • Joule's law calculation of W, q, dU and dH for the expansions of ideal gases under isothermal & adiabatic conditions for reversible process. • Limitations of first law of Thermodynamics. • Second law of Thermodynamics. • Different statements of Second law of Thermodynamics. • Definition of entropy and free energy,Significance of entropy in a reaction. • Carnot theorem, Carnot cycle and its efficiency. • Thermodynamic scale of temperature. • Numerical based on first and second law of thermodynamics.	**15**
II	**V.B. & M.O. Theory**	**15**

	• Valence bond theory of chemical bonding, • Explanation of formation of covalent bond by Lewis theory. • Limitations of Lewis theory, V.B.T. for formation of covalent bond. • Overlapping of s-s, s-p & p-p orbital. • Explanation of H_2, N_2, O_2,F_2,NH_3, H_2O & HF molecules by V.B.T. • Limitations of V.B.T, Formation of bonding and anti-bonding molecular orbitals and bond order. • Order of energy for molecular orbitals. • Molecular orbital diagram of homonuclear diatomic molecules • Molecular orbital diagram of ions such as H_2, H_2^+, He_2, He_2^+ **IUPAC Nomenclature** • IUPAC nomenclature of monofunctional aliphatic, alicyclic, and aromaticorganic compounds such as alkanes,alkenes, alkynes, alkyl halides, nitro, alcohols, aldehydes, ketones,carboxylic acids, esters, amines, nitriles, ethers, and amides.	
III	**Basic Analytical Chemistry** Introduction, Qualitative and Quantitative analysis, Instrumental and Chemical Methods of Analysis, Selection of Methods, limitations of Analytical Methods Classification of Errors, Accuracy, and Precision, Absolute and Relative Error, Minimization of Error, Statistical Terms: Mean, Median, Standard Deviation, Reliability of Results (Q-test), Comparison of Results: Student's t-test and F-test, confidence limit (interval), Numerical based on above topics. **Modes of Concentration** Preparation of Standard Solutions: Equivalent weight of acid and base, Equivalent weight of acid salt, Equivalent weight of an ion, Molarity with numerical, Normality with numerical, Molality with numerical, Strength of solutions: %Concentration w/v, Weight Fraction,Volume Fraction, Examples	**15**

Course Outline for Practical

SR. NO	COURSE CONTENT
1	**Demonstrative Practicals** Introduction to the laboratory, safety rules during practicals, and knowledge about different signs and symbols regarding hazardous materials. Calibration and use of apparatus/common glassware (Measuring Cylinder and flasks)
2	**Qualitative Analysis of Organic Compound(Minimum 6)** Organic compounds containing the following groups: Carboxylic Acid, Phenol, Amine, Hydrocarbon.
3	**Qualitative Analysis of Inorganic Salts (Minimum 6)** Inorganic salts containing two radicals **Anion:** Cl^-, Br^-, I^-, NO_2^-, SO_4^{-2}, CO_3^{-2},$CrO4^{-2}$, $Cr_2O_7^{-2}$ **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.