



Course Title: GENERAL CHEMISTRY

Course Code: CHEM105

Credit Units: 4

Level: UG

Course Objectives:

Chemistry is essential to develop analytical capabilities of students, so that they can characterize, transform and use materials in engineering and apply knowledge in their field. All engineering fields have unique bonds with chemistry whether it is Aerospace, Mechanical, Environmental and other fields. The makeup of substances is always a key factor, which must be known. The upcoming field of technology like Nanotechnology and Biotechnology depends fully on the knowledge of basic chemistry. With this versatile need in view, course has been designed in such a way so that the student should get an overview of the whole subject starting from the very basic bonding mechanism to the application of materials. To train students practically in basic and applied principles of Chemistry.

Prerequisites:

Knowledge of Chemistry of Higher Secondary level

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
2	1	2	0	4

#	Course Title	Weightage (%)
1	Module I: Chemical Bonding	20
	<ul style="list-style-type: none">Types of bond: Ionic, Covalent and Co-ordinate bond.Fajan's rule; Hybridisation.H- bonding.Valence bond and Molecular orbital theory for diatomic molecule.	
2	Module II: Organic Mechanism	20
	<ul style="list-style-type: none">Electronegativity and dipole moment.Electron Displacement Effects: Inductive Effect; Mesomeric Effect; Electromeric Effects.Fission of covalent bonds.Intermediates of Organic reactions; Carbonium, Carbanion, Free Radical and Carbene.	

	<ul style="list-style-type: none"> Types of organic reactions; Substitution, Elimination, Addition. 	
3	Module III: Thermodynamics	20
	<ul style="list-style-type: none"> Introduction; Terminology; First Law; Heat Capacity; Calculation of thermodynamic quantities; Adiabatic and Isothermal Process; Reversible and Irreversible Process; Second law of Thermodynamics; Standard State; Gilbb's Helmholtz equation; VantHoff Isotherm and Isochore; Maxwell Relation; Third law of Thermodynamics; Chemical Potential; Activity and Activity Coefficient; Coupled Reactions. 	
4	Module IV: Chemical Equilibrium	20
	<ul style="list-style-type: none"> Introduction ; Le Chatelier's Principle; Equilibrium constant from Thermodynamic Constants; Acid-Base Concept; Weak acid and Weak base and their salts; Solubility Product; pH and pOH, Buffer Solution, Buffer Action.. 	
5	Module V: Polymers	20
	<ul style="list-style-type: none"> Introduction; Polymerization; Addition and Condensation Polymerization. Thermosetting and Thermoplastic Polymers. Molecular Weight of Polymer; Rubber, Plastic and Fiber; Preparation. Properties and uses of PMMA, Polyester, Epoxy Resins and Bakelite, Silicone Polymers. 	

List of Experiments:

- To determine the percentage composition of a given mixture of NaCl and NaOH, 8 gms of which is dissolved per liter of the solution.
- Determination of acidity of the given industrial effluent water titrimetrically.
- Determination of the amount of NaCO₃ and NaHCO₃ in a mixture of NaCO₃ and NaHCO₃
- To determine the number of water molecules of crystallization in Mohr's salt (ferrous ammonium sulphate) provided standard potassium dichromate solution (0.1N) using diphenylamine as internal indicator.
- To determine the ferrous content in the supplied sample of iron ore by titrimetric analysis against standard K₂Cr₂O₇ solution using potassium ferricyanide [K₃Fe(CN)₆] as external indicator.
- (a) To determine the surface tension of a given liquid by drop number method.
- To determine the composition of a liquid mixture A and B (acetic acid and water) by surface tension method.
- Preparation of Urea-formaldehyde polymer.
- Determination of molecular weight of a polymer (polystyrene) by using viscometric method.
 - Determination of heat capacity of a calorimeter.
 - Determination of heat of neutralization of hydrochloric acid with sodium hydroxide.

- To determine the Rf Value of plant pigments using paper chromatography.

Student Learning Outcomes:

The student will be able to

- The student will be able to describe and comprehend the fundamental concepts of Chemistry.
- The student will be well versed in theoretical and practical aspects of Chemistry as well as its application in industry and academics

Pedagogy for Course Delivery:

The course will be delivered by lectures and numericals by assignments. Tutorials will be conducted to solve students problems.

Assessment/ Examination Scheme:

	Continuous Assessment/ Internal Assessment				End Term Examination		Total
Theory Assessment	HA	S/V/Q	CT	AT	EE	-	TT
75%	05	05	15	05	70	-	100

Practical Assessment	LR	P	V/Q	AT	EX	Viva	TP
25%	0	15	10	05	50	20	100

Abbreviations:

CT – Class Test, S- Seminar, V- Viva, Q- Quiz, HA- Home Assignment, TT- Total Theory

LR- Lab record, EX-Experiment, P – Performance, TP- Total Practical

The total marks (out of 100) shall be the weighted average of TT and TP in the ratio of theory and lab credit units i.e. 3:1

Text & References:

- Engineering Chemistry Jain & Jain
- Engineering Chemistry Sunita Rattan
- Engineering Chemistry Shashi Chawla
- Organic Mechanism, Morrison and Boyd
- Physical Chemistry, Puri Sharma and Pathania
- Organic Chemistry Vol-I, IL Finar
- Organic Chemistry Vol-II, IL Finar
- Physical Chemistry, Atkins Peter, Paula Julio
- A guide to mechanism in organic chemistry, Peter Sykes.
- Theory and Practices in Chemistry- Narula & Virmani

- Experiments in Applied Chemistry- Sunita Rattan, Kataria & Sons
 - Experimental Chemistry-Shashi Chawla, Dhanpat Rai Publications
 - Comprehensive Experimental Chemistry, V. K. Ahluwalia, New Age Publication, Delhi
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