



FACULTY OF ENGINEERING & TECHNOLOGY

First Year Bachelor of Engineering

Course Code: 102000105

Course Title: CHEMISTRY

Type of Course: Basic Science Courses

Course Objectives: To empower students with basic principles of Chemical Sciences.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Internal		External		Total
				Theory	J/V/P*	Theory	J/V/P*	
4	0	2	5	40 / 14	20 / 7	60 / 21	30 / 10	150 / 52

* J: Jury; V: Viva; P: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to basic concepts: Introduction to Chemical Sciences: Periodic properties, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries; Acids and bases, Formation of molecules and compounds: Kossel-Lewis approach to Chemical Bonding, Lewis Representations of Simple Molecules and Ions, Types of Bonds, Structure and General properties.	5
2	Water Technology: Introduction, Sources of water, Impurities in water, Hardness of Water, and its types, Drawbacks of hard water- Boiler Problems, Softening of water (External & Internal treatments), Waste water treatments, Drinking water and requirements, Domestic water treatments, Desalination of Brackish water.	7
3	Metals, Alloys and Corrosion: Introduction, General properties of Metals, Definition and purpose of alloying, Classification of alloys. Alloys: Fe and Steels, Cu, Al, Pb and their industrial applications. Introduction to Corrosion, Theories of corrosion, Mechanism and types of corrosion, Corrosion prevention methodologies – Protective coatings, Inhibitors, Cathodic protection.	6
4	Polymers: Introduction, Classification based on Source, Structure, Molecular forces. Functionality and Tacticity, Polymerization and its mechanism, Thermoplastics and Thermosetting polymers. Definition of Rubber, Types of Rubber, Vulcanization of rubber. Application of Rubber. Biodegradable Polymers, Commercially important polymers- PE, PP, PS, PVC, ABS, PMMA, Glyptal and their uses.	8



5	Fuel and Combustion: Definition, Types of fuel-Merits & Demerits and their applications. Calorific Value, Characteristics of good fuel. Analysis of fuel – ultimate and proximate analysis, LPG, Natural gas, Biogas.	5
6	Nanomaterials: Introduction, Sources, Properties and application of fullerenes, fullerols, Metal based nanoparticles, Carbon nanotubes and nanowires. Synthesis: Top down and Bottom up approaches, Nanoelectronics. Applications of nanomaterial in catalysis, textile and medicine.	5
7	Agro-chemicals and plant nutrients: Introduction to natural products, Role and types of Vitamins, Proteins and Nutrients and their requirements, General extraction and separation techniques. Role and classification of Plant nutrients with their requirements,	5
8	Chemical aspect of Biotechnology: Introduction, Scope, importance and application, Benefits through biotechnology – Agriculture, Food quality, Medicines; Fermentation processes: Preparation of Ethanol and Acetic acid, Enzymes and its application in industries.	6
9	Analytical Techniques: Measurement and understanding of pH, Conductance, and Potential. Principles of IR, UV-Visible and NMR Spectroscopy techniques and their applications. Introduction to Chromatography techniques: Principles of GC, HPLC and their applications.	6

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						R: Remembering; U: Understanding; A: Application, N: Analyze; E: Evaluate; C: Create
R	U	A	N	E	C	
10%	50%	20%	10%	10%	0%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Co.
2	Essential of Physical Chemistry by Bahl and Tuli., S Chand & Co. Ltd, New Delhi.
3	Engineering Chemistry by Marry Jane & Shultz, Cengage Learning Publisher
4	Engineering Chemistry by N. Krishnamurthy, P. Vallinaygam and D. Madhavan, Prentice Hall of India Pvt. Ltd.
5	Engineering Chemistry by K. Sessa Maheswaramma and Mridula Chugh, Pearson India Education Pvt. Ltd.
6	Engineering Chemistry by B K. Sharma, Krishna Prakashan Media (P) Ltd.
7	A textbook of Engineering Chemistry by Shashi Chawla, Dhanpatrai Publishing Co. Ltd.
8	Fundamentals of Biotechnology by B D Singh, Kalyani Publisher. New Delhi.



Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Relate periodic properties and analyze bonding, structure and properties of chemicals	10
CO-2	Importance of basic requirements of water and nutrients in living organisms	10
CO-3	Describe the importance and relevance of chemistry in our everyday life	10
CO-4	Select the appropriate chemical material and utilization of it.	50
CO-5	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	10
CO-6	Interpret the methods of science as a logical means of problem solving	10

List of Practicals / Tutorials:

1. Analysis of Steel Sample.
2. Analysis of Pyrolusite Ore.
3. Analysis of Brass Alloy.
4. Estimation of Hardness.
5. Gravimetric Analysis of decomposition of Na_2CO_3 & NaHCO_3 .
6. Determination of Concentration of Unknown Solution using pH meter
7. To study Wet Corrosion loss of Steel by weight loss method using electrochemical theory.
8. Stress Corrosion Cracking of Brass in NH_3 Solution.
9. To determine Alkalinity of a given Water Sample.
10. Determination of Saponification Value of Oil.
11. Determination of chloride content of water
12. Study of decomposition reaction of ZnCO_3 by Gravimetric analysis.
13. To determine the moisture content in coal.

Supplementary learning Material:

1	Vogel's textbook of Quantitative Chemical Analysis, by Arthur I Vogel, Revised by Jeffery et al, Publisher: Addison Wesley, Longman Ltd, England
2	Laboratory Manual of Engineering Chemistry, by S K. Bhasin & Sudha Rani. Publisher: Dhanpat Rai Publishing Company Ltd.
3	Engineering Chemistry with Laboratory Experiments, by M S. Kaurav. Publisher: PHI Learning Pvt. Ltd. New Delhi.
4	Engineering Chemistry with Laboratory Experiments, by R. P. Mani & Mishra. Publisher: Cen cage Publisher.



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