

Course Name : All Branches of Diploma in Engineering and Technology

**Course Code : EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/ CE/CS/CR/ CO/CM/IF/
EE/EP/CH/CT/PS/CD/ED/EI/CV/MH/FE/IU/MD**

Semester : First

Subject Title : Basic Chemistry

Subject Code : 9002

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	50@	--	--	150

RATIONALE:

Chemistry is a basic science subject which is essential to all engineering courses. It gives knowledge of engineering materials, their properties, related applications & selection of materials for engineering applications.

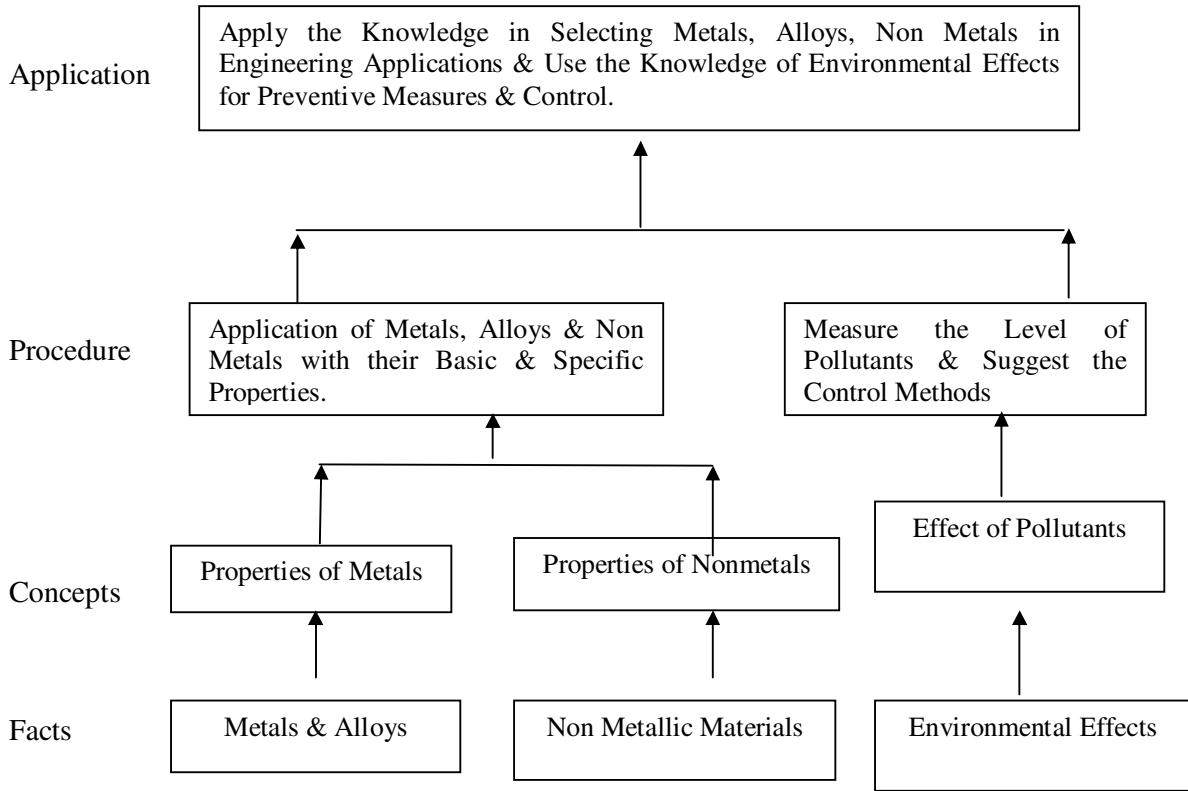
Due to technological progress there are hazardous effects on environment & human life. The core knowledge of environmental effects will bring awareness in students about the precautions & preventions to be taken to reduce the ill effects.

This subject will generate curiosity of carrying out further development in engineering fields.

OBJECTIVES:

1. To draw the atomic structure of different elements.
2. To represent the formation of molecules schematically.
3. To describe the mechanism of electrolysis.
4. To identify the properties of metals & alloys related to engineering applications.
5. To identify the properties of non metallic materials, related to engineering applications.
6. To compare the effects of pollutants on environments & to suggest preventive measures & safety.

LEARNING STRUCTURE:



Content: Theory

Chapter No.	Name of the Topic	Hours	Marks
01	<p>Atomic Structure Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars, & their distinction with suitable examples, Bohr’s Theory, Definition, Shape & Distinction between Orbits & Orbitals, Hund’s Rule, Filling Up of the Orbitals by Aufbau’s Principles (till Atomic no. 30), Pauli’s exclusion principle Valency – Definition, types (Electrovalency & Covalency), Distinction, Octet Rule, Duplet Rule, Formation of Electrovalent & Covalent Compounds e.g. NaCl, CaCl₂, MgO, AlCl₃, CO₂, H₂O, Cl₂, NH₃, C₂H₄, N₂, C₂H₂.</p>	08	14
02	<p>Electrochemistry Atom, Ion, Definition Ionisation & Electrolytic Dissociation, Arrhenius Theory of Ionisation, Significance of the Terms Involved in Electrolysis. Such as Conductors, Insulators or Dielectrics, Electrolyte, Non Electrolyte, Electrolysis, Electrolytic Cell, Electrodes, Current Density, Temperature, Mechanism of Electrolysis – Primary & Secondary Reactions at Cathode & Anode, Electrochemical Series for Cations & Anions, Electrolysis of CuSO₄ Solution by using Cu Electrode & Platinum Electrode, Electrolysis of NaOH solution & fused NaCl, Faraday’s first & second law of Electrolysis & Numericals, Electrochemical Cells & Batteries, Definition, Types (Primary & Secondary Cells), e.g. Construction, Working & Applications of Dry Cell / Laclanche Cell & Lead – Acid Storage Cell, Applications of Electrolysis such as Electroplating & Electro refining, Electrometallurgy & electrotyping Conductivity of Electrolyte – Ohms Law, Definition & Units of Specific Conductivity, Equivalent Conductivity, specific resistance</p>	09	16
03	<p>Metals & Alloys Metals Occurrence of Metals, Definition Metallurgy, Mineral, Ore, Gangue, Flux & Slag, Mechanical Properties, Processing of Ore, Stages of Extraction of Metals from its Ores in Detail i.e. Concentration, Reduction, refining. Physical Properties & Applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Co, Ag, W. Mks:10</p> <p>Alloys Definition of Alloy, Purposes of Making alloy Preparation Methods, Classification of Alloys such as Ferrous & Non Ferrous, examples. Composition, Properties & Applications of Alnico, Duralumin, Dutch Metal, German Silver / Nickel Silver, Gun Metal, Monel metal, Wood’s Metal, Babbitt Metal. Mks: 08</p>	11	18
04	<p>Non Metallic Materials Plastics</p>	07	12

	<p>Definition of Plastic, Formation of Plastic by Addition & Condensation Polymerisation by giving e.g. of Polyethylene & Bachelite plastic Respectively, Types of Plastic, Thermosoftening & Thermosetting Plastic, with Definition, Distinction & e.g., Compounding of Plastics – Resins, Fillers, Plasticizers, Accelerators, Pigments, Engineering Applications of Plastic based on their Properties. Mks: 04</p> <p>Rubber Natural Rubber: Its Processing, Drawbacks of Natural Rubber, Vulcanisation of Rubber with Chemical Reaction. Synthetic Rubber: Definition, & e.g., Distinction Between Natural & Synthetic Rubber. Mks: 04</p> <p>Thermal Insulating Materials Definition, Characteristics & Applications of Glass Wool, Thermocole, Asbestos, Cork. Mks: 04</p>		
05	<p>Environmental Effects (Awareness Level) Introduction, Definition, Causes of Pollution, Types of Pollution, Such as Air & Water Pollution. Mks: 04</p> <p>Air Pollution Definition, Types of Air Pollutions their Sources & Effects, Such as Gases, Particulates, Deforestation, Radio Active Gases, Control of Air Pollution, Air Pollution Due to Internal Combustion Engine & Its Control Methods, Causes & Effects of Ozone Depletion & Green House Effects. Mks: 08</p> <p>Water Pollution Definition, Causes & Methods of Preventing Water Pollution, Types of Waste such as Domestic Waste, Industrial Waste, their Physical & Biological Characteristics, BOD, COD, Biomedical Waste & E – Waste, their Origin, Effects & Control Measures. Preventive Environmental Management (PEM) Activities. Mks: 08</p>	13	20
Total		48	80

Practical:

Intellectual Skills: 1. Analyze given solution
2. Interpret the results

Motor Skills : 1. Observe Chemical Reactions
2. Measure the quantities Accurately
3. Handle the apparatus carefully

List of Experiments:

01 – 07 Qualitative Analysis of **Seven Solutions**, Containing One Basic & One Acidic Radical Listed below

Basic Radicals:

Pb^{+2} , Cu^{+2} , Al^{+3} , Fe^{+2} , Fe^{+3} , Cr^{+3} , Zn^{+2} , Ni^{+2} , Ca^{+2} , Ba^{+2} , Mg^{+2} , K^{+} , NH_4^{+} .

Acidic Radicals:

Cl^{-} , Br^{-} , I^{-} , CO_3^{-2} , SO_4^{-2} , NO_3^{-} .

06 To Determine E.C.E. of Cu by Using CuSO_4 Solution & Copper Electrode

07 To Determine the % of Fe in the Given Ferrous Alloy by KMnO_4 Method.

08 To Prepare a Chart Showing Application of Metals like Fe, Cu, Al, Cr, Ni, Sn, Pb, Co.

09 To Prepare Phenol Formaldehyde Resin (Bakelite)

10 To Determine Carbon Monoxide Content in Emission from Petrol Vehicle.

11 To Determine Dissolved Oxygen in a Water Sample.

Learning Resources:

Books:

Sr. No.	Author	Name of the book	Publisher
01	Jain & Jain	Engineering Chemistry	Dhanpat Rai and Sons
02	S. S. Dara	Engineering Chemistry	S. Chand Publication
03	B. K. Sharma	Industrial Chemistry	Goel Publication
04	S. S. Dara	Environmental Chemistry & Pollution Control	S. Chand Publication

