

TH -3 - ENGINEERING CHEMISTRY



Periods / Week : 05
Total Periods : 75
Examination : 03 Hours

Theory : 80 Marks
I.A. : 20 Marks

Sl. NO.	TOPICS	PERIOD
1.	Physical Chemistry	25
2.	Inorganic Chemistry	10
3.	Organic Chemistry	05
4.	Industrial Chemistry	20
5.	Environmental Chemistry	15
	TOTAL :	75

Topic wise distribution of Periods

Objectives :

Chemistry is concerned with the changes of matter with its environment and is an ever-growing subject. So the aim of teaching Engineering Chemistry in Diploma Courses is to acquaint the student with the basic Chemistry of different materials used in industry and to equip the students with the basic principles of chemical changes taking place on different aspects connected to Engineering fields. They also develop right attitudes to cope up with the continuous flow of new technology.

1. Physical Chemistry :

- 1.0 Define symbol, valency and chemical formula. Balancing of chemical equation by
 - i) Hit and trial Method
 - ii) Partial Equation Method
- 1.1 State General concept of : Atomic Structure, Rutherford's atomic model, Bohr's atomic model, Bohr-Bury Scheme, Electronic configuration Quantum No., Aufbau's principles, Hund's rule and Pauli's exclusion principles. Define Atomic weight, Molecular Weight, Equivalent weight. Define Chemical Bond such as Electrovalent, Co-valent co-ordinate covalent bond with example.

- 1.2
- Define Arrhenius Lowry Bronsted and Lewis Theory for Acid and Base with examples.
 - Define Salt, Neutralisation of Acid and Base, Equivalent weight of Acid, Base and Salt, (Definition and simple problems)
 - Define Standard, Normal, Molar, Molal solution and Normality, Molarity, Molality.
 - Define pH of the solution , Importance of pH in industries, Define Buffer solution and Types of Buffer Solution.

1.3 **Electrochemistry :**
Electrolyte, Electrolysis, Electrolytic cell, Faradays first Law and 2nd law of electrolysis. (Definition only) Industrial applications of Electrolysis : Electroplating (Chromium and Zinc) Electro-refining, Electrotyping, Electrometallurgy. Preliminary idea about dielectric.

1.4 Define types of Primary and Secondary Cell (No equation). Definition of corrosion. Types of corrosion: – Atmospheric corrosion, Water line corrosion.

Protection of Corrosion by:-

1. Alloying 2. Galvanization.

2. **Inorganic Chemistry :**

2.0 **Metallurgy: -** Define minerals, Ores, Flux, Slag, General method of extraction of metal: Dressing, concentration, calcinations, roasting, smelting, refining of ore, occurrence and uses of Iron and Aluminum.

2.1 **Alloys:** Define Ferro and Non-Ferro Alloys, Composition and uses of Brass, Bronze, Bell metal, Steel Alnico, German Silver, Duralumin.

3. **Organic Chemistry :**

3.0 **Hydrocarbons:** Saturated and unsaturated hydrocarbons, aliphatic and aromatic hydrocarbons.

3.1 IUPAC system of Nomenclature of Alkane, Alkene, Alkyne, Alkylhalide.

4. **Industrial Chemistry :**

4.0 **Water: -** Explain sources of water. Define soft and hard water. Types of hardness. (Temporary and Permanent) Removal of hardness by Lime soda and Ion exchange method. Drinking water, mineral water, Chlorination of water and desalination of water (Definition only)



- 4.2 **Lubricants** : Define Lubricant, Types of Lubricant, Uses of lubricant, Purpose of lubrication, Define fire point, flash point, Pour point, Cloud point. Viscosity, Viscosity Index
- 4.3 **Fuel** : - Definition, Classification of Fuel. Define calorific value of fuel. Choice of good fuel. Composition and uses of –
 Solid : (Wood, Lignite, Bituminous and anthracite coal).
 Liquid : (Kerosene, Petrol, Diesel). Light Diesel oil (LDO), Low sulfur Heavy Stock (LSHS), Furnace oil, High speed Diesel (HSD) (Definition and uses only).
 Gaseous : (Producer and water gas). Elementary idea about LPG and CNG gases.
- 4.4 **Polymer** :
- 4.4.0 Define Monomer, Polymer, Homopolymer, Co-polymer and Degree of Polymerization;
- 4.4.1 Composition and uses of thermoplastic like Polythene, Polyvinyl chloride, Polystyrene and Thermosetting Plastic like Bakelite;
- 4.4.2 **Rubber** : Natural and Synthetic Rubber composition and uses of Buna-S and Buna-N vulcanization of Rubber.
- 4.4.3 **Adhesives** : Define adhesives. Uses of adhesives.

5. Environmental Chemistry :

- 5.0 Explain the structure of atmosphere – (a) Troposphere (b) Stratosphere.
- 5.1 Define with example – Pollutant, Contaminant Receptor, Pathway of Pollutant, Types of Pollutant.
- 5.2 Define water pollution and explain the sources of water pollution and its effects on human health.
- 5.3 Define Air Pollution with four major air pollutants and its effect on human health.
- 5.4 Explain briefly: Green house effect, Depletion of Ozone layer, Acid rain. Global warming.

Books Recommended :

1. Text book of Intermediate Chemistry, Part-I and Part-II. By Nanda, Das, Sharma, Kalyani Publishers.
2. Engineering Chemistry. Jain and Jain. Dhanpatray & Sons.

Reference Book :

1. Environmental Chemistry by A.K. Dey.
2. Chemistry in Engineering by J.C. Kuriacose & J. Rajaram; Tata Mcraw-Hill Publishing Company limited, New Delhi.
3. Engineering Chemistry by Dr. . Rabindra & Prof. B. K. Mishra; Kumar & Kumar Publishers (P) Ltd. Bangalore.
4. A text book of Engg. Chemistry by S. S. Dara (S. Chand Publication)





ENGG CHEMISTRY PRACTICAL

Periods/Weeks : 04 Periods End Exam. : 25 Marks
Total Periods : 60 Periods Sessional : 25 Marks
: 04 Hours.

1. Preparation and Study of Carbon dioxide and Ammonia Gas.
2. Identification of Basic Radicals: Magnesium Zinc, Ammonium, Copper, Aluminum Copper, Sodium, Calcium, Lead, Cadmium.
Identification of Acid Radicals : Carbonate Chloride, Sulphide, Sulphate, Nitrate.
3. Identification of unknown salt in –
 - a) Lime stone (Calcium Carbonate)
 - b) Pollutant (Lead Nitrate or Cadmium Carbonate).
 - c) Fertilizer (Ammonium Sulphate).
 - d) Electrolyte (Ammonium Chloride).
 - e) Fungicide (Copper sulphate)
 - f) Co-agulant (Aluminium Sulphate).
 - g) Mordant (Zinc Sulphate)
 - h) Gypsum (Calcium sulphate)
 - i) Epsom (Magnesium sulphate)
 - j) Washing soda (Sodium carbonate).
4. Titration of N/10 solution of an alkali with a standard solution of an acid.
5. Estimation of calcium present in water with EDTA (Ethylene Diamine Tetra Acetic Acid).
6. Determine the Acid value of Lubricant (Demonstration).
7. Determination of pH value of water by pH meter (Demonstration purpose).
8. Estimation of Ferrous-Ion in Mohr's Salt (Demonstration purpose).

Books Recommended :

1. Practical Intermediate Chemistry By Dr. Bichitrananda Nanda.
2. Laboratory Manual on Engineering Chemistry By Dr. Sudharani, Dhanpat Rai Publication Company.