

Course Name : 03 Years Diploma Engineering

Semester : Second

Subject Title : Engineering Chemistry-II

Subject Code : 204 / 207

Teaching and Examination Scheme:

Teaching Scheme			Examination					
L	T	P	Full Marks.	External Exam Marks	Internal Exam Marks	External Pas Marks	Total Pass Marks	Duration of External Exams
03			100	80	20	26	40	3 Hrs
Practical		2	50	40	10	13	20	4 Hrs

NOTE:

Internal marks will be allotted on the basis of two snap tests and 2 assignment of equal marks to be conducted by the faculty teaching the subject.

RATIONALE:

This syllabus of chemistry of 2ND semester for all the branches of Diploma Engineering has been given the name "Engineering Chemistry". In this it is intended to make students learn about the Engineering Materials and their appropriate uses, Lubrication process and protection of machines in different working environments, quality of water and its treatment as per the requirement, corrosion and its control by various methods.

OBEJECTIVE:

The student will be able to:

1. Suggest the appropriate use of metals, alloys and non-metallic material in engineering.
2. Knowledge of corrosion of metal and control methods.
3. Knowledge of choosing suitable lubricants for smooth running machines.
4. Implementing the knowledge and utilization of water and water treatment to serve the requisites of a particular use.

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
1.	<p>Electrochemistry:</p> <p>Conductivity of Electrolytes – Concept of Ohms Law, Specific Conductance, Specific Resistance, Equivalent Conductivity & Molar Conductance, Variation of Specific, Molar and Equivalent Conductance with dilution. Concept of: Cell Constant, PH, POH and Buffer solution. Numerical based on PH and POH. Application of PH and Buffer solution.</p>	04	08
2.	<p><u>Metals and Alloys</u></p> <p>2.1 Metals: Definition of Metallurgy, Brief introduction of the terms involved in metallurgy. <u>Metallurgy of Iron:</u> Resources of Fe, Important Ores of Iron, Extraction process, Smelting in Blast Furnace, Chemical Reactions in Blast Furnace. Composition of Pig Iron. Engineering applications of Pig Iron, Cast Iron, wrought Iron or Malleable Iron.</p> <p><u>Metallurgy of Copper:</u> Important ores of Copper, Extraction of Copper from chief ore. Engineering properties of Copper and applications.</p> <p><u>Metallurgy of Aluminium:</u> Important Ores of Aluminium, Extraction of Aluminium from Alumina by Electrolytic Reduction Process, Electrolytic Refining of Aluminium, Engineering Properties of Aluminium & Uses.</p> <p>2.2 Alloys: <u>Ferrous Alloys</u> Various methods of steel making, Composition, Properties & Applications of Plain Carbon Steel (Low Carbon, medium Carbon, High Carbon & Very Hard Steel) & Effect of Various Alloying Elements (Cr, W, V, Ni, Mn, Mo, Si) etc. on Steel. <u>Non-Ferrous Alloys:</u> <u>Copper Alloys</u>–Brass, Bronze, Nickel Silver or German Silver, their Composition, Properties & Applications. <u>Aluminium Alloys</u> – Duralumin, Magnalium, their Composition, Properties & Applications <u>Other Alloys:</u> Definition, Compositions, Properties & Applications of Soft Solder, Tinmann’s Solder, Brazing Alloy, Plumber’s Solder, Rose Metal.</p>	12	24
3	<p><u>Non-Metallic Engineering Matrerial</u></p> <p>3.1 Ceramics: Definition, Properties & Engineering Applications, Types – Structural Ceramics, Facing Material, Refractories, Fine Ceramics, Special Ceramics.</p> <p>3.2 Refractories:</p>	06	12

	<p>Definition, Properties, Applications & Uses of Fire Clay Bricks, Silica Bricks and Masonry Bricks.</p> <p>3.3 Composite Materials: Definition, Properties, Advantages, Applications & Examples.</p> <p>3.4 Adhesives: (Marks 4) Definition, Characteristics, Advantages of adhesives, examples such as phenol-formaldehyde resin, urea formaldehyde resin, epoxy resin- their properties and applications as an adhesives.</p>		
4	<p>Water: Characteristics, Sources, Impurities, Hard & Soft Water, Causes of Hardness, Types of Hardness, Degree of Hardness, Boiler and Steam Generation, Scale & Sludge Formation – Causes, Disadvantage, Softening Methods such as Boiling, Clark’s, Soda Ash, Lime Soda, Zeolite & Ion Exchange Methods with Principle Chemical Reactions. Plumbo solvency & its Removal. Numerical Problems.</p>	5	10
5	<p>Corrosion: Definition of Corrosion, Types of Corrosion (Dry and Wet chemical Corrosion) and their mechanism. Protection of metal from corrosion (Corrosion Control). Application of Protective Coatings like metal coating such as Galvanising, Tinning, Metal Spraying, Sherardizing, Electroplating and Metal Cladding.</p> <p>Paints & Varnishes: Paints Definition, Characteristics of Good Paint, Constituents & their functions & Examples, Methods of Applications. Introduction to Chemical Resistant Paints, Heat Resistance Paint, Cellulose Paint, Luminous Paints, Emulsion Paints, Metal Paints, Cement Paints, Water Paint or Distempers. Varnishes: Definition, Characteristics, Constituents, Types, Composition, Properties & Application of Japans, Enamels, Lacquers.</p>	09	16
6	<p>Lubricant and Lubrication: Lubricant – Definition, Classification with examples. Functions of lubricant, Lubrication – Mechanism of Lubrication (Fluid Film, Boundary and Extreme Pressure). Physical Characteristics of Lubricants Such as Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, and Cloud & Pour Point, Chemical Characteristics such as Acid Value or Neutralization Number, Emulsification, Saponification Value, Selection of Lubricants, Characteristics of Transformer oil.</p>	06	10
Total		42	80

List of Practical:

1	To determine neutralization point of Fatty Acid and ammonium hydroxide. Calculate normality and strength of Fatty Acids.
2	To determine the equivalent conductivity of precipitation of BaCl_2 with H_2SO_4 by titrating method. Also find the normality and strength of BaCl_2 Solution.
3	To verify Faraday's second law of electrolysis.
4	To determine PH of given solution by universal indicator and PH meter.
5	To determine the strength of given hydrochloric acid solution by titrating it against sodium hydroxide solution by using PH meter.
6	To determine thinner content in Oil paint.
7	To determine the flash and fire point of a given sample of lubricating oil.
8	To prepare Phenol formaldehyde resin (Bakelite)
9	To determine viscosity of given lubricating oil.
10	To determine the alkalinity of given sample of water to decide the suitability of water for use in industry, steam generation, etc.
11	To determine degree of hardness of water by EDTA method to find the suitability of water in industrial and domestic use.
12	Study of fire clay bricks and furnaces.

Learning Resources Books:

Sl. No	Authors	Nameofthebook	Publisher
1	Jain&Jain	EngineeringChemistry	DhanpatRaiandSons
2	S.S.Dara	EngineeringChemistry	S. ChandPublication
3	B. K.Sharma	IndustrialChemistry	GoelPublication
4	S.S.Dara	EnvironmentalChemistry &PollutionControl	S. ChandPublication
5	VedprakashMehta	Polytechnicchemistry	JainBrothers