SANKALCHAND PATEL UNIVERSITY
।। अथातो ज्ञानजिज्ञासा ।।

Faculty of Engineering and Technology
First Year Diploma Engineering
In Effect from Academic Year 2020-21

Subject Code: 1ET4000204	**Subject Title: Basic Chemistry**
Pre-Requisite	--

RATIONALE:

Science is the foundation for all technical courses. The Basic aim of teaching science is to develop in the students the habit of scientific inquiry, ability to establish the cause and effect, relationship. Chemistry forms the part of applied science. The study of basic concepts of chemistry like chemical bonding, corrosion, water treatment, and different engineering materials like polymers, paints, lubricants, cement, refractories, water treatment and batteries etc. will help the students understanding engineering subjects where the emphasis is laid on the application of these concepts.

Chemistry is concerned with the changes in structure and properties of matter. Many of the chemical process involve in engineering activities. Teaching of chemistry should be aimed at developing the right type of aptitude in the students and the ability to predict the result under given condition thus good foundation in basic science will help the students in their self-development, to cope up with continuous flow of innovations.

COURSE OBJECTIVE:

1. Describe the different types of chemical bonds.
2. Understand the various types of catalysis and catalyst.
3. Learn the Concepts of Electro Chemistry.
4. Describe the different types of corrosion and its prevention.
5. Analysis of the hard and soft water.
6. Understand the different methods for removal hardness in water.
7. Describe the constituents of cements.
8. Classify different properties of Polymers, Elastomers & Adhesives.
9. Identify the properties and uses of Paints, Varnishes & Insulators.
10. Understand the Electrochemical Energy Sources.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				**Evaluation Scheme (Marks)**				Total (Marks)
Lecture	Tutorial	Practical	Credit	Theory		Practical		
				University Assessment	Continuous Assessment	University Assessment	Continuous assessment	
3	-	2	4	60	40	20	30	150

DETAILS OF COURSE CONTENTS:

SR. NO.	TOPIC	TOTAL HOURS	WEIGHTAGE
UNIT-1	**Chemical Bonding and Catalysis** Introduction 1.1 Theory of Valence 1.2 Types of chemical bonds 1.2.1 Electrovalent bond & its characteristics 1.2.2 Covalent bond & its characteristics 1.2.3 Co- ordinate bond & its characteristics 1.2.4 Hydrogen bond, its types and Significance 1.2.5 Metallic bond, Explanation of Metallic Properties. 1.3 Catalysis 1.3.1Types of catalysis 1.4 Types of Catalyst 1.4.1 Positive Catalyst 1.4.2 Negative Catalyst 1.4.3 Auto-catalyst 1.5 Catalytic Promoter and Catalytic inhibitor	**07**	**17**
UNIT-2	**Concepts of Electro Chemistry** 2.1 Introduction 2.2 Arrhenius theory of ionization 2.3 Degree of ionization 2.3.1 Factors affecting the degree of ionization 2.4 Definition of pH 2.4.1 pH of acid, base and neutral solution 2.4.2 pH calculations of acid, base and salt solution at different concentration 2.4.3 Importance of pH in various fields	**05**	**13**
UNIT-3	**Corrosion of Metals & its Prevention** 3.1Definition of corrosion 3.2 Types of corrosion 3.3 Pitting corrosion 3.4 Waterline corrosion 3.5 Crevice corrosion 3.6 Factors affecting the rate of corrosion,-Nature of film, Nature of Environment, PH of Solution, Area of cathode & anode , Temperature, Moisture,	**07**	**16**

	Purity of metal 3.7 Corrosion Control 3.7.1 Modification of environment 3.7.2 Modification of the properties of metal 3.7.3 Use of protective coatings 3.7.4 Anodic and Catholic protection 3.7.5 Modification in design and choice of material		
UNIT-4	**Water Treatment** 4.1 Hard water and soft water 4.2 Types of hardness of water 4.2.1 Salts producing hardness of water. 4.2.2 Method to express the hardness of water 4.3 Estimation of total hardness 4.3.1 Examples to calculate the hardness 4.4 Softening of Water 4.4.1 Basic of Permutit process 4.4.2 Basic of Ion Exchange process 4.4.3 Basic of Reverse Osmosis process	**5**	**10**
UNIT-5	**Basic about Cements** 5.1 Cement, Constituting compound in cement 5.2 Composition of Portland cement 5.3 Manufacture of Portland cement 5.4 Setting and Hardening of cement	**4**	**10**
UNIT-6.	**Polymers, Elastomers & Adhesives** 6.1 Introduction and Definition of Polymer and Monomer 6.2 Classification of Polymer 6.3 Classification on basis of monomers (homo-polymer and co-polymer) 6.4 Thermoplastics & Thermosetting plastics. 6.5 Synthesis, properties and application of 6.5.1 Polyethylene 6.5.2 Polypropylene 6.5.3 Polyvinyl chloride 6.5.4 Teflon 6.5.5 Polystyrene 6.5.6 Phenol formaldehyde 6.5.7 Acrylonitrile 6.5.8 Epoxy Resin 6.6 Elastomers 6.7 Natural rubber and its properties 6.8 Vulcanization of Rubber 6.9 Definition of adhesives and Examples	**8**	**18**

UNIT-7	**Paints, Varnishes & Insulators** 7.1 Definition of paints and Varnishes 7.2 Purpose of oil paint 7.3 Characteristics of oil pains 7.4 Ingredients of paints 7.5 Function and Examples of each ingredients 7.6 Varnish and its types 7.7 Difference between paints and varnishes 7.8 Definition of Insulators 7.9 Characteristics of Insulators 7.10 Classification of insulators 7.11 Properties and Application of 7.11.1 Glass wool 7.11.2 Thermocol	**6**	**16**

COURSE OUTCOME:

The students will be able to

1. Explain various properties of material depending upon bond formation
2. Comprehend the crystal structure of metal and properties reflected by packing of atoms
3. List the industrial applications of catalyst
4. Explain theory of ionization and factors affecting it.
5. Comprehend the different factors affecting rate of corrosion.
6. Explain the types and degree of Hardness.
7. Apply the water treatment for drinking water.
8. Explain setting and hardening chemistry of cement.
9. Describe the construction and working of various batteries.
10. Classify polymers based on different properties
11. Describe the properties and uses of Polymers, elastomers &adhesives.
12. Describe different Ingredients of paints and varnish.

LIST OF PRACTICAL:

Minimum Ten Experiments should be performed from the following list of experiments.

1. Find out strength of given acidic solution using standard solution of Base.
2. Standardize $KMnO_4$ solution by preparing standard oxalic acid and to estimate ferrous ions.
3. Standardize $Na_2S_2O_3$ solution by preparing and standard potassium dichromate to estimate percentage of copper from brass.
4. Determine the viscosity of given lubricating oil by using Red-wood Viscometer.
5. Determine total alkalinity of water sample.
6. To Determine PH-Values of given samples of Solution by using Universal Indicator and pH meter.
7. Determine the total hardness of water by EDTA method.
8. Prepare (any one) polystyrene, urea formaldehyde, phenol formaldehyde Characterization.
9. Determine Acid Value of given lubricating Oil.
10. Determine percentage of moisture in given sample of coal by proximate analysis.
11. Study of corrosion of metals in medium of different pH.
12. Determine moisture content of a given sample of coal.
13. Study of Corrosion of Metals in the different Mediums.
14. Study of Dry cell- construction and working.
15. Determine the COD of given water sample.

LIST OF REFERENCES:

1. Engineering Chemistry by JAIN & JAIN
2. A Text Book of Polytechnic Chemistry by V.P. Mehta
3. A Text Book of Applied Chemistry by J. Rajaram
4. Engineering Chemistry by S.S.Dara