



Branch Name:	Civil Engineering
Program Code	ET401
Course Name:	Basic Chemistry
Course Code:	2ET4000203
Pre-requisite Course:	

COURSE OBJECTIVE:

1. Understand the different types of chemical bonds and battery.
2. Describe the different types of corrosion and its prevention.
3. Analysis of the Temporary and permanent hardness of water.
4. Classify different properties of Polymers, Elastomers & Adhesives.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
03	00	02	04	60	40	20	30

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 1.3.1 Types 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	Electro Chemistry & Electrochemical Source of Energy 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	07	15



	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 2.5 Batteries: An electrochemical source of energy 2.5.1 Types of Batteries :-Primary, Secondary and fuel Batteries. 2.5.2 Dry cell- construction and working. 2.5.3 Lead acid storage cell- -construction and Working. 2.5.4 Nickel/Cadmium battery –construction and Working. 2.5.5 Fuel cell- definition example H₂/O₂ fuel cell [green fuel cell] - solar cells		
UNIT-3	Corrosion of Metals & its Prevention 3.1 Definition 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, 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 Cathodic protection 3.7.5 Modification in design and choice of material	06	16
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.	7	16



	6.5 Synthesis, properties and application of 6.5.1 Polyethylene 6.5.2 Polypropylene 6.5.3 Polyvinyl chloride 6.5.4 Teflon 6.5.4 Polystyrene 6.5.5 Phenol formaldehyde 6.5.6 Acrylonitrile 6.5.7 Epoxy Resin 6.7 Elastomers 6.8 Natural rubber and its properties 6.9 Vulcanization of Rubber 6.10 Definition of adhesives and Examples		
UNIT-7	Paints, Varnishes & Insulators 7.1 Definition of paints and Varnishes 7.2 Purpose of oil paint 7.3 Characteristics of oil paints 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

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

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITE:

1. <https://gshala.schoolnetindia.com/>
2. <https://www.pw.live/study/auth?url=>
3. <https://www.khanacademy.org/science/chemistry>
4. <https://chemistrydocs.com/chemdraw>
5. <https://nptel.ac.in/>



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.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Able to understand, learn and uses of the properties of compound form with different types of chemical bonds and battery.	L-1 Remember L-2 Understand L-3 Apply
CLO2	List, apply and test the various type of corrosion and It's prevention.	L-1 Remember L-3 Apply L-5 Evaluate
CLO3	Analyze & solve the Softening of Water methods.	L-3 Apply L-4 Analyze
CLO4	Able to understand, Synthesis, Properties and application of polymer and elastomers.	L-2 Understand L-3 Apply L-6 Create
CLO5	Able to differentiate and learn Paints, Varnishes & Insulators	L-1 Remember L-4 Analyze
CLO6	Able to List and Explain about manufacture of Portland cement.	L-1 Remember L-2 Understand



Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes(POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	H	L		L	M										
CLO2	M	M		L	M	L	H			L	L				
CLO3	L	L					M	L							
CLO4	M			M	L	M					M				
CLO5	L				L		M			L					
CLO6	L			H				M							

H:High, M:Medium, L:Low