

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI Metallurgical Engineering

Subject Name: **Electrometallurgy & Corrosion**

Subject Code: **162105**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
3	1	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1	Basics of Electrochemistry Faradays' laws of electrolysis, current efficiency, current density, electrode potentials, Thermodynamics and Kinetics of Electrode Processes- Polarization Curves, Concept of Over-Potential, Kinetics Of Passivity and Transpassivity, Nernst's Equation, Emf Series, Evan's Corrosion Diagram, Galvanic Series. Pourbiac Diagram for Metal Water System, Applications and Limitations	12
2	Forms of Corrosion The relevance of corrosion studies, forms of corrosion, Uniform Corrosion, Galvanic Corrosion, Crevice Corrosion, Pitting Corrosion, Intergranular Corrosion, Selective Leaching, Erosion Corrosion, stress cracking corrosion, Hydrogen Damage	12
3	High Temperature Corrosion High Temperature Corrosion in Different Atmosphere, Effect of Doping, Alloying Elements, Coating Methods for High Temperature Corrosion Protection, Pilling Bedworth Ratio and its applications	05
4	Corrosion Protection Principles of Protection, Selection of Suitable Design, Inhibition, Coating Methods, Anodic protection and Cathodic protection	08
5	Electro deposition Classification and mechanism of electrodeposition processes. Electroplating of copper, Nickel and Chromium. Principles of Alloy plating and electroless plating, Anodising, Galvanizing	06

6	Factors affecting Corrosion Environment affecting corrosion, effects of soil, chemicals, moisture and atmospheric gases, temperature and velocity, metallurgical factors	03
7	Corrosion Testing Physical and Electrochemical Methods such as ASTM standard methods like G-8, G-5, G-1 and their equivalents, Surface Preparation, Exposure Technique, Corrosion Rate Measurements	04
8	Material Selection to Combat Corrosion Specific Corrosion Applications Such as Marine Industry, Petrochemical Industry, High Temperature Service, Chemical Industry, Automobile	04

Text Book:

1. Corrosion Engineering, 2nd ed., M. Fontana Mc Graw Hill, 1987

Reference Books:

1. Corrosion and Corrosion Control, 3rd ed., H.H.Uhlig Wiley, 1986
2. Principles and Prevention of Corrosion, 2nd intl. Ed., D.R. Jones Prentice Hall International Singapore
3. Corrosion Volume I & II, 1994, L.L.Shrier, Butterworths, London
4. An introduction to electrometallurgy- Satya Narayan & Rajendra Sharan, Standard Publishers & Distributors, New Delhi
5. Electroplating by Lowenheim
6. An introduction to metallic corrosion & its prevention by Rajnarain