

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

METALLURGY ENGINEERING

Subject Name: **Industrial Corrosion and its Prevention (Institute Elective-II)**

Subject Code: **152105**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No.	Course content
1.	General: Corrosion of metals and alloys, Electrochemical principles applied to corrosion, Electrode potential, EMF series, Nernst equation, Anodic and cathodic reactions.
2.	Corrosion Kinetics: Polarisation. Types, Tafel Equation and plot, Limiting current density, Exchange current density, Corrosion rate expressions.
3.	Classification of Corrosion: Wet and Dry. Chemical and Electrochemical, Eight forms of corrosion- Uniform, Galvanic, Pitting, Crevice, Erosion corrosion, Inter Granular Corrosion (IGC). Selective leaching. Stress corrosion.
4.	Cooling Water Corrosion and Treatment: Cooling water. Quality of natural water. Formation of deposits. Corrosion in power equipments. Deaeration. Deoxygenation. Corrosion of different alloys and metals in water. Prevention of corrosion by inhibitor addition / treatment.
5.	High Temperature Corrosion: Oxidation corrosion with flue gases. Oxides of carbon, sulphur containing gases. Sulphidation. Corrosion in air, Corrosion by molten salts.
6.	Corrosion Testing Methods: Laboratory and field tests. Preparation of samples for corrosion tests. NACIS and ASTM standards for corrosion tests.
7.	Coatings: Metallic coating. Noble and active (sacrificial) coating. Inorganic / ceramic and organic / resin coatings for corrosion control.
8.	Other Corrosion Control Methods: Proper material selection. Design aspects. Cathodic and anodic protection.

Reference Books:

1. Corrosion Engineering, Mars. G. Fontana and Nobert D. Green (McGraw-Hill).
2. An Introduction to Electrometallurgy, Satya Narayan and Rajendra Sharan, (Std. Pub. & Dist.).
3. Corrosion and Corrosion Control, An Introduction to Corrosion Science and Engineering, Herbert H. Uhlig, (John Wiley & Sons).
4. Corrosion, Vol. 1 & 2., L. L. Shreir, R. A. Jarman and G. T. Burstein,(Butterworth Heinemann).