

UCH841 CORROSION ENGINEERING

L	T	P	Cr
3	0	0	3.0

Basic concepts: Definition and importance, Electrochemical nature and forms of corrosion, Corrosion rate and its determination.

Electrochemical thermodynamics and kinetics: Electrode potentials, Potential-pH (Pourbiax) diagrams, Reference electrodes and experimental measurements, Faraday's laws, Electrochemical polarization, Mixed potential theory, Experimental polarization curves, Instrumentation and experimental procedure.

Galvanic and concentration cell corrosion: Basic concepts, Experimental measurements, and determination of rates of galvanic corrosion, Concentration cells.

Corrosion measurement through polarization techniques: Tafel extrapolation plots, Polarization resistance method, Instrumental methods and Errors in measurement of polarization resistance, Commercial corrosion probes, Other methods of determining polarization curves.

Passivity: Basic concepts of passivity, Properties of passive films, Experimental measurement, Applications of Potentiostatic Anodic Polarization, Anodic protection.

Pitting and crevice corrosion: Basic concepts, Mechanisms of pitting and crevice corrosion, Secondary forms of crevice corrosion, Localized pitting, Metallurgical features and corrosion: Inter-granular corrosion, Weldment corrosion, De-alloying and dezincification.

Environmental induced cracking: Stress corrosion cracking, Corrosion fatigue cracking, Hydrogen induced cracking, Some case studies, Methods of prevention and testing, Erosion, Fretting and Wear.

Environmental factors and corrosion: Corrosion in water and Aaqueous Ssolutions, Corrosion in sulphur bearing solutions, Microbiologically induced corrosion, Corrosion in soil, Corrosion of concrete, Corrosion in acidic and alkaline process streams.

Atmospheric and elevated temperature corrosion: Atmospheric corrosion and its prevention, Oxidation at elevated temperatures, Alloying, Oxidising environments.

Prevention and control of corrosion: Cathodic protection, Coatings and inhibitors, Material selection and design.

Text Books:

1. Fontana, M.G., Corrosion Engineering, Tata McGraw-Hill (2005).
2. Jones, D.A., Principal and Protection of Corrosion, Prentice-Hall (1995).

Reference Books:

1. Pierre R. Roberge, Corrosion engineering: principles and practice, McGraw-Hill (2008).
2. Mantell, C.L., Electrochemical Engineering, McGraw-Hill, New York, (1960).
3. Sastri, V.S., Ghali, E. and Elboujdaïni, M., Corrosion prevention and protection: practical solutions, John Wiley and Sons (2007).

Approved by the 74th meeting of the Senate (Feb 19, 2011)