

PMT6J001 CORROSION AND DEGRADATION OF MATERIALS

Module I (12 Hours)

Technological importance of corrosion study, corrosion as non equilibrium process, corrosion rate expressions, electrochemical principles of corrosion-cell analogy, concept of single electrode potential, reference electrodes, e.m.f. and galvanic series-their uses in corrosion studies, polarization, passivity.

Module II (12 Hours)

Different forms of corrosion-uniform attack, galvanic, crevice, pitting, intergranular, selective leaching, erosion, stress corrosion cracking-their characteristic features, causes and remedial measures. Principles of corrosion prevention-material selection control of environment including inhibitors, cathodic and anodic protection, coatings and design considerations. Corrosion testing methods.

Module III (14 Hours)

Introduction to high temperature corrosion, Pilling-Bedworth ratio, oxidation kinetics, oxide defect structures, Wagner-Hauffe valence approach in alloy oxidation, catastrophic oxidation, internal oxidation.

Considerations in high temperature alloy design, prevention of high temperature corrosion -use of coatings.

Liquid metal attack - liquid metal embrittlement, preventive measures. Chemical degradation of non-metallic materials like rubbers, plastics, ceramics etc. Hydrogen damage - types, characteristics, mechanism and preventive measures.

Books for reference:

1. *Corrosion Engineering* by Fontana, M.G., McGraw-Hill.
2. *Corrosion & Corrosion Control* by H.H. Uhlig, John Wiley & Sons.
3. *Introduction to Metallic Corrosion* by Evans.
4. *Introduction to Electrochemistry* by S.Glasstone.
5. *An Introduction to Science of Corrosion & its Inhibition* by S.N. Banerjee, Oxonian Press Pvt. Ltd.