7th Semester	RMM7D001	Corrosion and Degradation of Materials	L-T-P 3-0-0	3 Credits

Module I: **(09 hours)**

Introduction, 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: **(10 hours)**

Different forms of corrosion-uniform attack, galvanic, crevice, pitting, intergranular, stress corrosion cracking -their characteristic features, causes and remedial measures. Principles of corrosion prevention-material selectioncontrol of environment including inhibitors

Module III: **(08 hours)**

Cathodic and anodic protection, coatings and design considerations. Corrosion testing methods. Introduction tohigh temperature corrosion, Pilling- Bedworth ratio, oxidation kinetics, oxide defect structures.

Module IV: **(09 hours)**

Considerations in high temperature alloy design, prevention of high temperature corrosion -use of coatings.Hydrogen Damage-Sources, Types of damage, Mechanisms and preventive methods, Liquid metal attack -liquid metal embrittlement, preventive measures.

Books:

[1] M. G. Fontana : Corrosion Engineering , 3rd edition, Mc Graw Hill International, 1987.
[2] U. K. Chatterjee, S. K. Bose and S. K. Roy: Environmental Degradation of Metals, Marcel Dekker, 2001

Digital Learning Resources:

Course Name: Introduction to Corrosion Failure and Analysis
Course Link: https://nptel.ac.in/courses/113/104/113104101/
Course Instructor: Prof. Kallol Mondal, IIT, Kanpur

Course Name: Advance Corrosion Engineering
Course Link: https://nptel.ac.in/courses/113/108/113108051/
Course Instructor: Prof. K.A. Natarajan, IISc Bangalore