5. CORROSION SCIENCE AND ENGINEERING

Module I (12 hours)

Electrochemical and thermodynamic principles - Nernst equation and electrode potential of metals, standard electrodes and reference electrodes, E.M.F. and galvanic series, Pourbaix diagram and its importance for iron, aluminium and magnesium

Module II (14 hours)

Exchange current density, different forms of polarisation: activation, concentration, resistance polarisation, overpotential, Tafel equation, electrochemical behaviour of active-passive metals, Flade potential, theories of passivity

Atmospheric, pitting, dealloying, stress corrosion cracking, intergranular corrosion, corrosion fatigue, fretting corrosion, high temperature oxidation, catastrophic and internal oxidation

Module III (10 hours)

Corrosion prevention, design improvement, cathodic and anodic protection, coatings (metallic and non-metallic), and corrosion inhibitors - economic aspects of corrosion control and corrosion auditing in industries - corrosion map of India

Text and Reference Books:

1. Fontana M. G, Greene N. D, 'Corrosion Engineering', McGraw Hill, 2nd Edition, 1978
2. Raj Narayan, 'An Introduction to Metallic Corrosion and its Prevention', Oxford and IBH, 1983
3. Denny Jones, 'Principles and Prevention of Corrosion', Prentice Hall of India, 1996.