ELECTROCHEMISTRY AND CORROSION

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	FMC 204	Electrochemistry and Corrosion	3	0	0	9

Course Objective
Fundamentals of electrochemical cells and its applications in metals finishing, batteries, effluent treatment, and corrosion in metals and alloys
Learning Outcomes
Thermodynamics and kinetics of electrochemical reactions. • Principles of electrochemical cell design. • Industrial applications: electrochemical metal finishing and effluent treatment. • Battery characteristics and components, types of batteries. • Fundamentals and types of corrosion and corrosion protection in metals.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Electrochemical cells;Faraday's law; half-cell potential; EMF series; Nernst equation	4	Knowledge of the thermodynamics of electrochemical reacitons.
2	Concept of overpotential; activation overpotential; exchange current density; polarization diagram; mass transfer in electrochemical systems; concentration overpotential; limiting current density; current distribution; principles of cell design; electrochemical measurements.	10	Understanding charge and mass transfer kinetics in electrochemical reaction and principles of cell design.
3	Electroplating of metals and alloys; electroless deposition; anodizing; electropolishing;electropickling; electrophoretic painting; electroforming.	6	Principles and practice of metal finishing operations.
4	Battery characteristics; battery components; types of batteries: Pb-acid, Mn-C; lithium ion; fuel cells	8	Knowledge of the fundamentals and types of batteries
5	Eco-cell; fluidized bed electrode; electrodialysis; electrofiltration.	2	Principles and applications of electrochemical effluent treatment.
6	Principles of corrosion in metals and alloys; mixed potential; types of corrosion: galvanic corrosion, crevice corrosion, pitting corrosion, stress corrosion, intergranular corrosion, high temperature corrosion; corrosion kinetics; corrosion protection	12	Fundamentals of corrosion, types of corrosion, principles and practice of corrosion protection
	Total	42	

Text Books:

S. No.	Resource/Book Name	Author(s)/Editor(s)	Publisher
1	Corrosion Engineering	Mars G. Fontana	McGraw Hill

Reference Books:

S. No.	Resource/Book Name	Author(s)/Editor(s)	Publisher
1	Electrochemical methods – fundamentals and applications	Allen J. Bard and Larry R. Faulkner	John Wiley & Sons
2	Modern Electrochemistry	John O'M Bockris, Amulya K.N. Reddy	Kluwer Academic Publishers