AQUEOUS CORROSION AND ITS CONTROL

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TYPE OF COURSE : New | Both | UG/PG
COURSE DURATION : 12 weeks (20 Jul' 20 - 9 Oct' 20)
EXAM DATE : 17 Oct 2020

INTENDED AUDIENCE : Metallurgical Engineering and Materials Science, but is open to other engineering branches
INDUSTRIES APPLICABLE TO : Oil and Gas Industries, Manufacturing

COURSE OUTLINE :
Corrosion failures of components cuts across all the industries and cost a national about 3.5% of its GDP. In addition, it affects environments, scant resources, safety and reliability of components. Effective control of corrosion requires basic understanding of electrochemical principles, metallurgical aspects and a clear perspective of the industrial problem. This course comprehensively addresses these aspects.

ABOUT INSTRUCTOR :
Prof. V. S. Raja taught several courses related to corrosion over the last 32 years. He published a book on Corrosion Failure Analysis: basics, Case Studies and Solutions. Also edited a book on Stress Corrosion Cracking: Theory and Practice. He is passionate about teaching & recipient of the Prof. SP. Sukhatme award for excellence in teaching.

COURSE PLAN :
- Week 1: Introduction to the course and Importance of corrosion
- Week 2: Can we predict of corrosion of a metal? Electrochemical Equilibrium and Thermodynamics of corrosion. Pourbaix diagrams and identification of stability regions
- Week 3: Concepts of Electrochemical Kinetics, exchange current density charge transfer and diffusion controlled
- Week 5: Uniform corrosion and the factors affecting them and the control measures, concept of localized corrosion
- Week 6: Galvanic Corrosion: Mechanism, factors affecting galvanic corrosion, prevention methods, typical industrial problems and methods of evaluation
- Week 7: Crevice Corrosion: Mechanism, factors affecting crevice corrosion, prevention methods, typical industrial problems and methods of evaluation
- Week 8: Pitting Corrosion: Mechanism, factors affecting pitting corrosion, prevention methods, typical industrial problems and methods of evaluation
- Week 9: Intergranular Corrosion: Mechanism, factors affecting intergranular corrosion, weld decay, knife line attack. Role of welding techniques, parameters and other material conditions on weld decay
- Week 10: Industrial problems of weld decay, intergranular corrosion of other alloys, test methods and selection rationale
- Week 11: Dealloying: Mechanism, factors affecting alloying prevention methods, typical industrial problems Flow assisted Corrosion, Erosion Corrosion, Cavitation damage: Mechanism, factors affecting these corrosion, prevention methods, typical industrial problems
- Week 12: Environmentally assisted cracking: Stress corrosion cracking and Hydrogen Damage Mechanism, factors affecting cracking of metals, prevention methods, typical industrial problems and methods of evaluation