



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Department of Metallurgical and Materials Engineering

COURSE PLAN – PART I			
Name of the programme and specialization	M.Tech. Materials Science & Engineering		
Course Title	CORROSION ENGINEERING		
Course Code	MT 613	No. of Credits	3
Course Code of Pre-requisite subject(s)			
Session	July 2019	Section (if, applicable)	NA
Name of Faculty	Prof.S.Natarajan	Department	MME
Official Email	sn@nitt.edu	Telephone No.	9486001136
Name of Course Coordinator(s) (if, applicable)	Dr. N. RAMESH BABU		
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input type="checkbox"/> Core course	<input checked="" type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
Principles of corrosion phenomenon: Thermodynamics and kinetics: emf/galvanic series, Pourbaix diagram, exchange current density, passivity, Evans diagram, flade potential. Different forms of corrosion: atmospheric/uniform, pitting crevice, intergranular, stree corrosion, corrosion fatigue, dealloying, high temperature oxidation-origin and mechanism with specific examples. Corrosion testing and monitoring: Non-Electrochemical and Electrochemical methods: weight loss method, Tafel Linear polarization and Impedance techniques, Lab, semi plant & field tests, susceptibility test. Corrosion prevention through design, coatings, inhibitors, cathodic, anodic protection, specific applications, economics of corrosion control. Corrosion & its control in industries: Power, Process, Petrochemical, ship building, marine and fertilizer industries. Some case studies-Corrosion and its control in different engineering materials: concrete structures, duplex, super duplex stainless steels, ceramics, composites and polymers. Corrosion auditing in industries, Corrosionmap of India.			
COURSE OBJECTIVES			
To provide a technical exposure on principles of corrosion phenomenon, its various forms, susceptibility tests, mitigation and some case studies in engineering field.			
MAPPING OF COs with POs			
Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)		
At the end of this course, the student will			
1. Be thorough with the basics principles of thermodynamic and kinetics of corrosion phenomenon.	1 & 2		



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2	Familiarize with different forms of corrosion in terms of their origin, salient features, mechanisms and preventive methods	1 & 3
3.	Understand theoretical concepts and experiments on how to determine the corrosion rate by weight loss method, electrical resistance method, potentiostatic polarization experiment and atmospheric corrosion using color indicator method	1, 4, 5 & 6
4.	Understand experiments on how to Analyze galvanic corrosion, pitting corrosion and stress corrosion cracking	1, 4, 5 & 6
5.	Understand experiments on how to Estimate the corrosion resistance by IGC susceptibility test, salt spray test and coating thickness	1, 4 & 8
6.	Get a comprehensive outline exposure on case studies pertinent to corrosion and its control in power plants, process industries and national scenario.	1, 4, 8 & 11

COURSE PLAN – PART II			
COURSE OVERVIEW			
Introduction about the concepts of Corrosion Engineering and develop expertise on how to apply the concepts in practical scenarios.			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1 st , 2 nd week	Principles of corrosion phenomenon: Thermodynamics and kinetics: emf/galvanic series, Pourbaix diagram, exchange current density, passivity, Evans diagram, flade potential.	Chalk talk and PPT presentations
2	3 rd week	Numerical Problems Practice	Chalk talk and PPT presentations
3	4 th , 5 th week	Different forms of corrosion: atmospheric/uniform, pitting crevice, intergranular, stress corrosion, corrosion fatigue, dealloying, high temperature oxidation-origin and mechanism with specific examples.	Chalk talk and PPT presentations
4	6 th , 7 th week	Numerical Problems Practice & Cycle Test 1	Chalk talk and PPT presentations



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5	8 th , 9 th week	Corrosion testing and monitoring: Non-Electrochemical and Electrochemical methods: weight loss method, Tafel Linear polarization and Impedance techniques, Lab, semi plant & field tests, susceptibility test.	Chalk talk and PPT presentations
6	10 th , 11 th week	Numerical Problems Practice	Chalk talk and PPT presentations
7	12 th , 13 th week	Corrosion prevention through design, coatings, inhibitors, cathodic, anodic protection, specific applications, economics of corrosion control.	Chalk talk and PPT presentations
8	14 th , 15 th week	Corrosion & its control in industries: Power, Process, Petrochemical, ship building, marine and fertilizer industries. Some case studies- Corrosion and its control in different engineering materials: concrete structures, duplex, super duplex stainless steels, ceramics, composites and polymers. Corrosion auditing in industries, Corrosion map of India.	Chalk talk and PPT presentations
9	16 th week	Final Examination	

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment I	7th week	1 hour	20
2	Assessment II			20
3	Assignments	13th week	1 hour	10
4	Final Exam	16th week	3 hours	50
CPA	Compensation Assessment*		1 hour	20
5				
6	Final Assessment *		3 hours	50

***mandatory; refer to guidelines on page 4**



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COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

From the performance of the students both in tests and end semester examination.

COURSE POLICY (including compensation assessment to be specified)

To facilitate the students to develop expertise on how to apply the concepts in practical scenarios

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- * At least 75% attendance in each course is mandatory.
- * A maximum of 10% shall be allowed under On Duty (OD) category.
- * Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- * Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- * Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- * The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- * The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

NIL

FOR APPROVAL

Course Faculty *S. Natarajan* CC- Chairperson

NRP

HOD

S. J. Jeyaraj
06.08.19



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.