NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF MME

COURSE PLAN – PART I			
Name of the programme and specialization	**M.Tech. (Industrial Metallurgy, Welding Engineering, Materials Science and Engineering)**		
Course Title	**Corrosion Engineering**		
Course Code	**MT 613**	**No. of Credits**	**3**
Course Code of Pre-requisite subject(s)	**-**		
Session	**January 2021**	**Section (if, applicable)**	**NA**
Name of Faculty	**Prof.S.Natarajan**	**Department**	**MME**
Official Email	**sn@nitt.edu**	**Telephone No.**	**9843164261**
Name of Course Coordinator(s) (if, applicable)	**Prof. S.P.Kumaresh Babu**		
Official E-mail	**babu@nitt.edu**	**Telephone No.**	**9487438564, 9486001136**
Course Type (please tick appropriately)	- **Core course**	☐ **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 fatique, dealloying, high temperature oxidation-origin and mechanism with specific examples.

Corrosion testing and monitoring: Non-Elecrochemical and Electrochemical methods: weight loss method, Tafel Linear polarization and Impedance techniques, Lab, semi plant & field tests, susceptibility tests.

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, Corrosion map of India.

COURSE OBJECTIVES
To provide a technical exposure on principles of corrosion phenomenon, its various forms, corrosion testing and monitoring, susceptibility tests, corrosion preventive methods / mitigation and some case studies in engineering field / industriial scenario.
MAPPING OF COs with POs

Course Outcomes	**Programme Outcomes (PO)** (Enter Numbers only)
1. To become familiar with the thermodynamic and kinetic principles of corrosion phenomenon with working practice to solve numerical problems.	**1 & 2**
2. To become familiar with different forms of corrosion in terms of their origin, mechanism of occurrence, influence of metallurgical and environmental effects, their preventive methods with industrial examples along with practice on numerical problems.	**1 &2**
3. To understand principles involved in methodology in corrosion testing and monitoring: experiments on how to determine the corrosion rate by weight loss method, electrical resistance method, galvanic corrosion, pitting corrosion, stress corrosion cracking. Potentio-static polarization experiments (Tafel,LPR and Impedence), susceptibility tests,salt spray tests.	**1 , 2, 3 & 9**
4. To Understand experiments on how to Estimate the corrosion resistance by IGC susceptibility test through metallography, electron microscopy and coating thickness measurements	**5, 9 & 10**
5. To gain a good knowledge and exposure on case studies pertinent to corrosion and its control in power plants, process industries ,etc.,and the Indian scenario in combating corrosion.	**11**

COURSE PLAN – PART II
COURSE OVERVIEW
This course will eventually provide a comprehensive knowedge to the student in principles and practice involved in the Phenomenon of Corrosion and its Prevention.
COURSE TEACHING AND LEARNING ACTIVITIES **(** Add more rows)

S.No.	**Week/Contact Hours**	**Topic**	**Mode of Delivery**
1	1st, 2ndweek	Principles of corrosion phenomenon: Thermodynamics and kinetics: emf/galvanic series, Pourbaix diagram, exchange current density, passivity, Evans diagram, flade potential.	Online mode

2	3rd week	Numerical Problems Practice	Online mode
3	4th , 5th week	Different forms of corrosion: atmospheric/uniform, pitting crevice, intergranular, stree corrosion, corrosion fatique, dealloying, high temperature oxidation-origin and mechanism with specific examples.	Online mode
4	6th, 7th week	Numerical Problems Practice & Cycle Test 1	Online mode
5	8th, 9thweek	Corrosion testing and monitoring: Non-Elecrochemical and Electrochemical methods: weight loss method, Tafel Linear polarization and Impedance techniques, Lab, semi plant & field tests, susceptibility test.	Online mode
6	10th, 11th week	Numerical Problems Practice	Online mode
7	12th , 13th week	Corrosion prevention through design, coatings, inhibitors, cathodic, anodic protection, specific applications, economics of corrosion control.	Online mode
8	14th , 15th 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.	Online mode
9	16th / 17th week	Compensation / Final Examination	Online mode

COURSE ASSESSMENT METHODS (shall range from 4 to 6**)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment-1 (Cycle Test)	6th week	1 hour	20
2	Assessment-2 (Assisgnment-1)	10th week	-	25
3	Assessment-3 (Assignment-2)	15th week	-	25
4	Compensation (Re-test)	16th week	1 hour	20
5	Assessment 4 Final Assessment * (end-semester exam)	17th week	2 hours	30

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

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

1. Students can contact the faculty through mail at any stage in the course duration in case he/she finds difficulty in understanding the concept.
2. Student knowledge about the subject covered will be judged through marks obtained in examination.
3. They can always feel free to interact with the faculty during class and also can provide their constructive comments for the betterment of teaching-learning process.

COURSE POLICY (including compensation assessment to be specified**)**

1. **Examination**
   a) Students who have missed the cycle test on genuine grounds (which will be assessed by the teacher and ONLY when found satisfied at his end) , will be allowed for the the compensation test.
   b) The compensation test will be conducted for 20 marks on the date stipulated by the teacher. This will be before the end-semester exam.
   c) Students should submit assignments on or before the last date mentioned as a deadline. In case students fail to submit within the last date, he/she will get zero marks for the same.

2. **Attendance**
   a) The minimum attendance for appearing for the final examination is as per INSTITUTE POLICY.
   b) The institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades. All assessment of a course will be done on the basis of marks
   c) The passing mark should be x/2 or Xmax/3 whichever is less where x is the mean of the class and Xmax is the maximum mark in the class
   d) The letter grades and the corresponding grade points are as follows:

Letter	S	A	B	C	D	E
Grade	10	9	8	7	6	5

1. Students scoring less than minimum passing mark in the assessments defined in the course plan shall be deemed to have not successfully completed the course and be given an 'F' grade
2. Students awarded F grade may appear for re-examination
3. All students who earn a minimum of 5 grade points in a course is declared to have successfully completed the course.

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	CC- Chairperson	HOD

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.

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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.