



DEPARTMENT OF CHEMISTRY

COURSE PLAN - PART I			
Name of the programme and specialization	B.Tech. I (Civil Engineering)		
Course Title	Chemistry		
Course Code	CHIR11	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2022	Section (if, applicable)	B
Name of Faculty	Dr. Sunandan Sarkar	Department	Chemistry
Official Email	ssarkar@nitt.edu	Telephone No.	9153484492
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Electrochemistry and Corrosion Cell EMF- its measurement and applications - concentration cell - electrode electrolyte concentration cell - concentration cell with and without transference - Dry corrosion and wet corrosion, mechanisms, types of corrosion, Differential metal corrosion, differential aeration corrosion, intergranular, Passivity, Pitting, Polarization - Chemical conversion coatings and organic coatings- Paints, enamels.</p> <p>Phase rule Definition of terms – phase- components- degree of freedom- derivation of Gibbs phase rule – one component system – H₂O, CO₂, Sulfur – Two-component system – Eutectic systems – reduced phase rule - Pb-Ag system – Compound Formation with congruent melting – Zn- Mg Alloy system- Copper-nickel alloy system - systems with incongruent melting – Na₂SO₄- H₂O system and simple three-component systems.</p> <p>Water Sources, Hard & soft water, Estimation of hardness by EDTA method, Scale & Sludge- Caustic embrittlement - softening of water, zeolite process & demineralization by ion exchangers, boiler feed-water, internal treatment methods-specifications for drinking water, BIS & WHO standards, treatment of water for domestic use, desalination - Reverse osmosis & Electrodialysis.</p> <p>Spectroscopy Interaction of electromagnetic radiation with matter, Electronic spectroscopy - Theory of electronic transitions, instrumentation, Beers Lambert law, Woodward FIESER rule, applications. IR spectroscopy - Fundamentals, Instrumentation, and applications, Raman</p>			



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

spectroscopy – Fundamentals and applications.

Polymers and Composites

Concept of macromolecules- Tacticity- Classification of Polymers- Types of Polymerization Mechanism- - Ziegler Natta Polymerization - Effect of Polymer structure on properties - Important addition and condensation polymers –synthesis and properties – Molecular mass determination of polymers- Static and dynamic methods, Light scattering- Rubbers –Vulcanization – Synthetic rubbers – Conducting polymers- Composite materials.

References & Text Books

1. P.C. Jain, M. Jain, Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi, 2005.
2. P. Atkins, J.D. Paula, Physical Chemistry, Oxford University Press, 2002.
3. B.R. Puri, L.R. Sharma, M.S. Pathania, Principles of Physical Chemistry, Vishal Publishing Company, 2008
4. F.W. Billmeyer, Textbook of Polymer Science, 3rd Edition, Wiley. N.Y. 1991.
5. S.S. Darer, S.S. Umare, A Text Book of Engineering Chemistry, S. Chand Publishing, 2011.

COURSE OBJECTIVES

To introduce the student's basic principles of Electrochemistry and Corrosion. They will be familiar with phase rule & its applications. Students will know about the essential requirements of water and its importance in day-to-day life. To provide students with a brief outline of the types and applications of polymers. Finally, students will be equipped with the usage of spectroscopy in potential applications

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
At the end, the students should be able to:	
1. Students will learn about the Electrochemistry and phase rule.	1, 3, 4
2. They will be familiarized with the importance of polymer and its application in industries.	1, 3, 4
3. Additionally, a brief introduction in the area of water, spectroscopy will be very useful for the students in future endeavour.	1, 3, 4

COURSE PLAN – PART II

COURSE OVERVIEW

This course is offered to first year B.Tech. (Civil Engineering) students (section B). This is a 3 credit theory course and three theory classes will be conducted per week. If required, extra classes will be arranged.

COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
-------	--------------------	-------	------------------



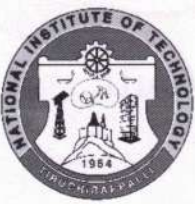
1	Week-1 (15 th November onwards)	Electrochemistry and Corrosion Basic of Electrochemistry.	Chalk & Talk (C&T)
2	Week-2	Cell EMF- its measurement and applications	C&T
3	Week-3	Concentration cell - electrode electrolyte concentration cell - concentration cell with and without transference	C&T
4	Week-4	Dry corrosion and wet corrosion, mechanisms, types of corrosion, Differential metal corrosion, differential aeration corrosion intergranular, Passivity, Pitting, Polarization - Chemical conversion coatings and organic coatings- Paints, enamels.	C&T
5	Week-5	Phase rule Definition of terms – phase- components- degree of freedom- derivation of Gibbs phase rule – one component system – H ₂ O, CO ₂ , Sulfur, Two- component system, Eutectic systems – reduced phase rule - Pb-Ag system	C&T
6	Week-6	Compound Formation with congruent melting – Zn- Mg, Alloy system - Copper-nickel alloy system - systems with incongruent melting – Na ₂ SO ₄ - H ₂ O system and simple three-component systems.	C&T
7	Week-7	Polymers and Composites Concept of macromolecules- Tacticity- Classification of Polymers Types of Polymerization Mechanism- - Ziegler Natta Polymerization - Effect of Polymer structure on properties	C&T
8	Week-8	Important addition and condensation polymers – synthesis and properties. Molecular mass determination of polymers- Static and dynamic methods, Light scattering- Rubbers – Vulcanization – Synthetic rubbers – Conducting polymers- Composite materials.	C&T
9	Week-9	Spectroscopy Interaction of electromagnetic radiation with matter, Electronic spectroscopy - Theory of electronic transitions, instrumentation, Beers Lambert law,	C&T
10	Week-10	Woodward FIESER rule, applications. IR spectroscopy - Fundamentals, Instrumentation, and applications, Raman spectroscopy – Fundamentals and applications.	C&T
11	Week-11	Water Sources, Hard & soft water, Estimation of hardness by EDTA method, Scale & Sludge- Caustic embrittlement - softening of water,	C&T
12	Week-12	zeolite process & demineralization by ion exchangers, boiler feed water, internal treatment	C&T



NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI

methods-specifications for drinking water, BIS & WHO standards, treatment of water for domestic use, desalination - Reverse osmosis & Electrodialysis.

COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Test I	III week of December	1 Hr.	20
2	Test II	III week of January	1 Hr.	20
3	Assignment/Viva	IV week of January	1 Week	10
CPA	Compensation Assessment*	I week of February	1 Hr.	20
6	Final Assessment *	III week of February	3 hrs.	50
*mandatory; refer to guidelines on page 4				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
1. Feedback from students during class committee meetings. 2. Anonymous feedback through questionnaire at the end of the semester.				
COURSE POLICY (including compensation assessment to be specified)				
MODE OF CORRESPONDENCE (email/ phone etc) ssarkar@nitt.edu; Tel. No.:9153484492 COMPENSATION ASSESSMENT POLICY 1. This assessment is for those students who missed Test I/II due to genuine reasons. 2. Compensation assessment will be conducted during the I week of February.				
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.				



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

- 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

FOR APPROVAL

S. Sarkar 1/12/2022
Dr. Sunandan Sarkar
Course Faculty _____ CC- Chairperson _____ HOD _____
Dr. R. Senthilkumar



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 2022: 35% *or class average/2, whichever is maximum* 1/3

- 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.