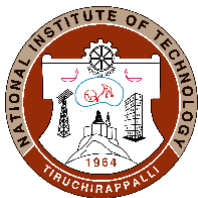




**NATIONAL INSTITUTE OF TECHNOLOGY,  
TIRUCHIRAPPALLI**

**DEPARTMENT OF CHEMISTRY**

COURSE PLAN - PART I			
<b>Name of the programme and specialization</b>	B.Tech. I (Production Engineering)		
<b>Course Title</b>	Chemistry		
<b>Course Code</b>	CHIR11	<b>No. of Credits</b>	3
<b>Course Code of Pre-requisite subject(s)</b>	Nil		
<b>Session</b>	July 2020	<b>Section (if, applicable)</b>	B
<b>Name of Faculty</b>	Dr. Sunandan Sarkar	<b>Department</b>	Chemistry
<b>Official Email</b>	<a href="mailto:ssarkar@nitt.edu">ssarkar@nitt.edu</a>	<b>Telephone No.</b>	9153484492
<b>Name of Course Coordinator(s) (if, applicable)</b>			
<b>Official E-mail</b>		<b>Telephone No.</b>	
<b>Course Type</b> (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
<b>Syllabus (approved in BoS)</b>			
<p><b>Electrochemistry and Corrosion</b>            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><b>Phase rule</b>            Definition of terms – phase- components- degree of freedom- derivation of Gibbs phase rule – one component system – H<sub>2</sub>O, CO<sub>2</sub>, 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 – Na<sub>2</sub>SO<sub>4</sub>- H<sub>2</sub>O system and simple three-component systems.</p> <p><b>Water</b>            Sources, Hard &amp; soft water, Estimation of hardness by EDTA method, Scale &amp; Sludge- Caustic embrittlement - softening of water, zeolite process &amp; demineralization by ion exchangers, boiler feed water, internal treatment methods-specifications for drinking water, BIS &amp; WHO standards, treatment of water for domestic use, desalination - Reverse osmosis &amp; Electrodialysis.</p> <p><b>Spectroscopy</b>            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>			



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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 industrial applications

### **MAPPING OF COs with POs**

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

### **COURSE PLAN – PART II**

#### **COURSE OVERVIEW**

This course is offered to first year B.Tech. (Civil Engineering) students. 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**

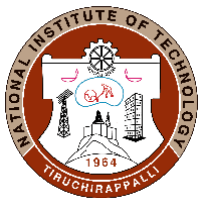
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<b>S.No.</b>	<b>Week/Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>



## NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

<b>1</b>	II week of December	<b>Electrochemistry and Corrosion</b> Cell EMF- its measurement and applications, concentration cell - electrode electrolyte concentration cell	Online
<b>2</b>	III week of December	- concentration cell with and without transference Dry corrosion and wet corrosion, mechanisms, types of corrosion, Differential metal corrosion, differential aeration corrosion,	Online
<b>3</b>	IV week of December	intergranular, Passivity, Pitting, Polarization - Chemical conversion coatings and organic coatings- Paints, enamels.	Online
<b>4</b>	I week of January	<b>Phase rule</b> Definition of terms – phase- components- degree of freedom- derivation of Gibbs phase rule – one component system – H <sub>2</sub> O, CO <sub>2</sub> , Sulfur, Two- component system, Eutectic systems – reduced phase rule - Pb-Ag system	Online
<b>5</b>	II week of January	Compound Formation with congruent melting – Zn- Mg, Alloy system - Copper-nickel alloy system - systems with incongruent melting – Na <sub>2</sub> SO <sub>4</sub> - H <sub>2</sub> O system and simple three-component systems.	Online
<b>6</b>	III week of January	<b>Polymers and Composites</b> 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	Online
<b>7</b>	IV week of January	Molecular mass determination of polymers- Static and dynamic methods, Light scattering- Rubbers – Vulcanization – Synthetic rubbers – Conducting polymers- Composite materials.	Online
<b>8</b>	I week of February	<b>Spectroscopy</b> Interaction of electromagnetic radiation with matter, Electronic spectroscopy - Theory of electronic transitions, instrumentation, Beers Lambert law,	Online
<b>9</b>	II week of February	Woodward FIESER rule, applications. IR spectroscopy - Fundamentals, Instrumentation, and applications, Raman spectroscopy – Fundamentals and applications.	Online
<b>10</b>	III week of February	<b>Water</b> Sources, Hard & soft water, Estimation of hardness by EDTA method, Scale & Sludge- Caustic embrittlement - softening of water,	Online
<b>11</b>	IV week of February	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.	Online



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<b>COURSE ASSESSMENT METHODS (shall range from 4 to 6)</b>				
<b>S.No.</b>	<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
1	Test I	II week of January	60 minutes	25
2	Test II	I week of February	60 minutes	25
3	Assignment/Viva	III week of February	4 Days	20
CPA	Compensation Assessment*	I week of March	60 minutes	25
6	Final Assessment *	II week of March	2 hours	30
<b>*mandatory; refer to guidelines on page 4</b>				
<b>COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)</b>				
1. Feedback from students during class committee meetings. 2. Anonymous feedback through questionnaire at the end of the semester.				
<b>COURSE POLICY (including compensation assessment to be specified)</b>				
<b><u>MODE OF CORRESPONDENCE (email/ phone etc)</u></b> <b><u>ssarkar@nitt.edu; Tel. No.:9153484492</u></b> <b><u>COMPENSATION ASSESSMENT POLICY</u></b> <b><u>1. This assessment is for those students who missed Test I/II due to genuine reasons.</u></b> <b><u>2. Compensation assessment will be conducted during the I week of March.</u></b>				
<b><u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)</b>  <ul style="list-style-type: none"><li>➤ At least 75% attendance in each course is mandatory.</li><li>➤ A maximum of 10% shall be allowed under On Duty (OD) category.</li><li>➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.</li></ul>				
<b><u>ACADEMIC DISHONESTY &amp; PLAGIARISM</u></b>				



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- 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. Sarthar*  
Course Faculty \_\_\_\_\_ CC- Chairperson *[Signature]* HOD *[Signature]*



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### 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.