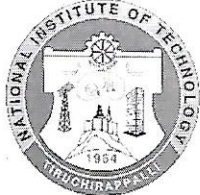


DEPARTMENT OF CHEMISTRY

COURSE PLAN – PART I			
Name of the programme and specialization	B. Tech. (ECE)		
Course Title	Chemistry (Theory)		
Course Code	CHIR11	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	January 2023	Section (if, applicable)	A
Name of Faculty	Dr. R. Karvembu	Department	Chemistry
Official Email	kar@nitt.edu	Telephone No.	+91-9442268653 (M)
Name of Course Coordinator(s) (if, applicable)	Dr. R. Karvembu		
Official E-mail	kar@nitt.edu	Telephone No.	91-9442268653 (M)
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
<b>Syllabus (approved in BoS)</b>			
<p><b>Theory (Units):</b></p> <p><b>Unit 1: 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>Unit 2: 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>Unit 3: 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>			



**Unit 4: 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 spectroscopy –Fundamentals and applications.

**Unit 5: 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 and Textbooks**

1. P. C. Jain and M. Jain, *Engineering Chemistry*, Dhanpat Rai Publishing Company, New Delhi, 2005.
2. P. W. Atkins and J. de Paula, *Physical Chemistry*, Oxford University Press, 2002.
3. B. R. Puri, L. R. Sharma and M. S. Pathania, *Principles of Physical Chemistry*, Vishal Publishing Company, 2008.
4. F.W. Billmayer, *Textbook of Polymer Science*, 3<sup>rd</sup> Editon, Wiley, N.Y., 1991.
5. S. S. Darer, S. S. Umare, *A Textbook of Engineering Chemistry*, S. Chand Publishing, 2011.

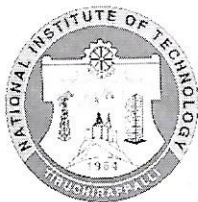
**COURSE OBJECTIVES**

To introduce the basic principles of Electrochemistry and Corrosion. They will be familiar with phase rule and 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**

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
Students will learn about the:	
1. Fundamentals of Electrochemistry and Corrosion	1, 2, 4, 5
2. Importance of Phase rule	1, 2, 5, 7
3. Applications of Water Chemistry	1, 3, 5, 6
4. Basic concepts of Spectroscopy	1, 2, 5, 6, 7
5. Theory and applications of Polymers and Composites.	1, 2, 3, 7





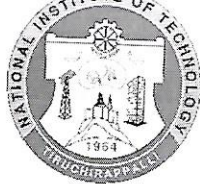
**COURSE PLAN – PART II**

**COURSE OVERVIEW**

This is a three credit course offered to I year B.Tech. (ECE) Students. This course is a theory (3 credit) course. Three theory classes will be conducted per week. This course provides a thorough understanding of the subject through lectures, tutorials and demonstrations.

**COURSE TEACHING AND LEARNING ACTIVITIES**

S. No.	Week/Contact Hours	Topic	Mode of Delivery
1	III week of March	<b>Unit 1:</b> Cell EMF-its measurement and applications -concentration cell - electrode, electrolyte concentration cell-concentration cell with and without transference	Chalk & Talk
2	IV week of March	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.	Chalk & Talk
3	I week of April	<b>Unit 2:</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	Chalk & Talk
4	II week of April	Reduced phase rule -Pb-Ag system – Compound Formation with congruent melting –Zn-Mg Alloy system-Copper-nickel alloy system	Chalk & Talk
5	III week of April	Systems with incongruent melting – Na <sub>2</sub> SO <sub>4</sub> -H <sub>2</sub> O system and simple three-component systems.	Chalk & Talk
6	IV week of April	<b>Unit 3:</b> 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-	Chalk & Talk
7	I week of May	Specifications for drinking water- BIS & WHO standards, treatment of water for domestic use, desalination -Reverse osmosis & Electrodialysis	Chalk & Talk



8	II week of May	<b>Unit 4:</b> Interaction of electromagnetic radiation with matter, Electronic spectroscopy - Theory of electronic transitions, instrumentation.	Chalk & Talk
9	III week of May	Beers Lambert law, Woodward FIESER rule, applications. IR spectroscopy -Fundamentals, Instrumentation and applications, Raman spectroscopy -Fundamentals and applications.	Chalk & Talk
10	IV week of May	<b>Unit 5:</b> Concept of macromolecules-Tacticity - Classification of Polymers-Types of Polymerization-Mechanism--Ziegler Natta Polymerization	Chalk & Talk
11	I week of June	Effect of Polymer structure on properties- Molecular mass determination of polymers. Static and dynamic methods, Light scattering--Important addition and condensation polymers -synthesis and properties	Chalk & Talk
12	II week of June	Rubbers -Vulcanization -Synthetic rubbers -Conducting polymers-Composite materials	Chalk & Talk

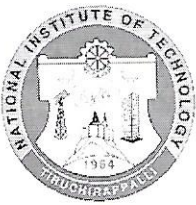
**COURSE ASSESSMENT METHODS** (shall range from 4 to 6)

S. No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment-1	II week of April	One week	05
2	Test-I	IV week of April	60 minutes	20
3	Assignment-2	II week of May	One week	05
4	Test-2	IV week of May	60 minutes	20
5	CPA	III week of June	60 minutes	20
6	Final Assessment	I week of July	3 hours	50

**Total (100 Marks)**

**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)

E-mail: [kar@nitt.edu](mailto:kar@nitt.edu) / Phone: +91-9442268653

**COMPENSATION ASSESSMENT POLICY**

For those students who missed Test I and Test II due to genuine reasons, Compensation assessment will be conducted during III week of June 2023.

**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**

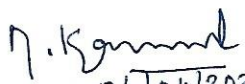
- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark. The departmental 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**

The respective faculty will be available for consultation at times as per the intimation by the faculty.

**FOR APPROVAL**

Course Faculty

  
06/04/2023

CC- Chairperson

  
06/04/23

HOD

  
06/04/2023