



Department of Chemistry

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. (Chemical Engineering)		
Course Title	Chemistry		
Course Code	CHIR11	No. of Credits	3 (Theory)
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2023		
Name of Faculty	Dr. S. Anandan	Department	Chemistry
E-mail	sanand@nitt.edu	Telephone No.	+91-9444052074 (M)
Name of Course Coordinator	Dr. Sarat Chandra Babu		
E-mail	sarat@nitt.edu	Telephone No.	
Course Type	<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>			

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.

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

COURSE OUTCOME • Students will learn about the Electrochemistry and phase rule. • They will be familiarized with the importance of polymer and its application in industries. • Additionally, a brief introduction in the area of water, spectroscopy will be very useful for the students in future endeavor.

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.

COURSE OUTCOMES (CO)

Course Outcomes	Programme Outcomes (PO) (Enter Nos only)
Students will learn about the:	
1. Fundamentals of Electrochemistry and corrosion in real world problems.	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 & Composites	1, 2, 3, 7

COURSE PLAN – PART II

COURSE OVERVIEW

This course is offered to I Year B. Tech. (Chemical Engineering) students. This is a theory course for 3 credit points. 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	Topic	Mode of Delivery
1	IV-week of August and I-week September 2023	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.	C&T, PPT
2	II-IV week of September 2023	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 – 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, PPT
3	II- III week of October 2023	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.	C&T, PPT
4	III -IV week of October 2023	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.	C&T, PPT

5	II-IV week of November 2023	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	C&T, PPT

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
Theory				
1	Assignment/Surprise Test/ QuiZ	II week of September	One week	5
2	Test I	I week of October	60 minutes	20
3	Assignment/Surprise Test/ QuiZ	I week of November	One week	5
4	Test II	II week of November	60 minutes	20
	<i>Compensation Assessment</i>	<i>III week of November</i>	<i>60 minutes</i>	<i>20</i>
6	Final Assessment	II week of December	3 hours	50

COURSE EXIT SURVEY

1. Feedback from students during class committee meetings.
2. Anonymous feedback through a questionnaire at the end of the semester.

COURSE POLICY

MODE OF CORRESPONDENCE (email/ phone etc)

sanand@nitt.edu; Tel. No.:+91-9444052074

COMPENSATION ASSESSMENT POLICY

1. This assessment is for those students who missed Test I or Test II due to genuine reasons
2. Compensation assessment will be conducted during the *I week of December 2023*.

ATTENDANCE POLICY

- **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 programs.

ADDITIONAL INFORMATION

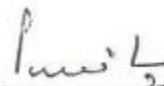
The faculty will be available for consultation at times as per the intimation by the faculty.

FOR APPROVAL



Dr. S. ANANDAN, M.Sc., Ph.D.,
Professor
Nanomaterials & Solar Energy
Conversion Lab
Department of Chemistry
National Institute of Technology
Tiruchirappalli - 620 015, India

Dr. S. Anandan
Course Faculty:

CC-Chairperson

 28/8/23

HOD

 28/8/23