

## DEPARTMENT OF CHEMISTRY

### NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	I B.Tech. (Production Engineering)		
Course Title	Chemistry		
Course Code	CHIR11	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2019	Section (if, applicable)	A
Name of Faculty	Dr. Suryanarayanan C Dr. Nitin Padalwar	Department	Chemistry
Email	nitinbpadalwar@gmail.com csn@nitt@nitt.edu	Telephone No.	+91-9444377376
Name of Course Coordinator	Dr. Nitin Padalwar		
E-mail	nitinbpadalwar@gmail.com	Telephone No.	+91-9444377376
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
<b>Syllabus (approved in BoS)</b>			
<p><b>Unit 1: Electrochemistry and Corrosion</b></p> <p>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></p> <p>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></p> <p>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;</p>			

Electrodialysis.

#### **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

#### **Reference 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)**

- 📖 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 endeavour

#### **COURSE PLAN – PART II**

##### **COURSE OVERVIEW**

This is a 3 credit course offered to I year B.Tech students. 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 August	<b>Unit 1</b> Cell EMF- its measurement and applications - concentration cell - electrode electrolyte concentration cell - concentration cell with and without transference	C&T, PPT
2	IV week of August	Dry corrosion and wet corrosion, mechanisms, types of corrosion, Differential metal corrosion, differential aeration corrosion	C&T, PPT
3	I week of September	Intergranular corrosion Passivity, Pitting, Polarization Chemical conversion coatings and organic coatings- Paints, enamels.	C&T, PPT
4	II week of September	<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	C&T, PPT
5	III week of September	Two-component system – Eutectic systems-reduced phase rule - Pb-Ag system – Compound Formation with congruent melting Zn- Mg Alloy system	C&T, PPT
6	IV week of September	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.	C&T, PPT
7	I week of October	<b>Unit 3</b> Sources, Hard & soft water, Estimation of hardness by EDTA method, Scale & Sludge- Caustic embrittlement	C&T, PPT
8	II week of October	Softening of water, zeolite process & demineralization by ion exchangers Boiler feed water, internal treatment methods-specifications for drinking water, BIS & WHO standards	C&T, PPT
9	III week of October	Treatment of water for domestic use, desalination - Reverse osmosis & Electrodialysis. <b>Unit 4</b> Interaction of electromagnetic radiation with matter, Electronic spectroscopy	C&T, PPT

10	IV week of October	Theory of electronic transitions, instrumentation, Beers Lambert law, Woodward FIESER rule, applications	C&T, PPT
11	I week of November	IR spectroscopy - Fundamentals, Instrumentation, and applications, Raman spectroscopy – Fundamentals and applications	C&T, PPT
12	II week of November	<b>Unit 5</b> Concept of macromolecules- Tacticity- Classification of Polymers- Types of Polymerization. Mechanism- - Ziegler Natta Polymerization	C&T, PPT
13	III week of November	Effect of Polymer structure on properties - Important addition and condensation polymers –synthesis and properties	C&T, PPT
14	IV week of November	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
1	Test-I	I week of October	50 minutes	20
2	Quiz/seminar/assignment-1	II week of October	One week	5
3	Test-2	I week of November	50 minutes	20
4	Quiz/seminar/assignment-2	II week of November	One week	5
CPA	Compensation Assessment	IV week of November	50 minutes	20
5	Final Assessment	I week of December	3 hours	50

**Total (100)**

#### **COURSE EXIT SURVEY**

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

#### **COURSE POLICY**

##### **MODE OF CORRESPONDENCE (email/ phone etc)**

E-mail: nitinbpadalwar@gmail.com / Phone: +91-9444377376

##### **COMPENSATION ASSESSMENT POLICY**

For those students who missed Test I or Test II due to genuine reasons, Compensation assessment will be conducted during 26-29 November 2019.

##### **ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)**

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

## **FOR APPROVAL**

*C. Suryanarayana*

[C. SURYANARAYANAN]

*NB*

Dr. Nitin B. Padalwar

Course Faculty \_\_\_\_\_

CC-Chairperson \_\_\_\_\_

*[Signature]*

HOD \_\_\_\_\_

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