

DEPARTMENT OF CHEMISTRY

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	Chemistry-II		
Course Code	CHI R13 (A)	No. of Credits	4 (Theory -3 + Lab -1)
Course Code of Pre-requisite subject(s)	Nil		
Session	January 2018	Section (if, applicable)	ECE A
Name of Faculty	Dr. V.M BIJU	Department	Chemistry
Email	vmbiju@nitt.edu	Telephone No.	+91-9443843076
Name of Course Coordinator(s) (if, applicable)	Dr. V.M.BIJU (Both Theory and Lab)		
E-mail	vmbiju@nitt.edu	Telephone No.	+91-9443843076
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		

Syllabus (approved in BoS)

Unit-1 (Electrochemistry)

Conductivity of electrolytes- Specific, molar and equivalent conductivity, Nernst equation for electrode potential, EMF series, hydrogen electrode, calomel electrode, glass electrode, Electrolytic and galvanic cells, cell EMF, its measurement and applications, Weston standard cell, reversible and irreversible cells, concentration cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference.

Unit-2 (Corrosion)

Dry corrosion and wet corrosion, mechanisms, types of corrosion, DMC, DAC, stress, inter granular, atmospheric and soil corrosion, Passivity, Polarization, over potential and its significance, Factors affecting corrosion, protection from corrosion by metallic coatings, electroplating, electroless plating and cathodic protection, Chemical conversion coatings and organic coatings- Paints, enamels.

Unit-3 (Batteries)

Different types of batteries-Primary, Secondary & Flow battery and Fuel cell. Working principle and uses-Laclanche cell, alkaline battery, nicad battery, lithium battery & Mercury battery. Fuel cell- Theory, working and application. Different types of fuel cells-H₂/O₂, propane-oxygen, PEFC and SOFC. Lead Acid storage cell-charging & discharging principle, operation and uses. Solar battery- its working principle.

Unit-4 (Solid State)

Types of solids -close packing of atoms and ions -bcc , fcc structures of rock salt -cesium chloride- spinel - normal and inverse spinels, Stoichiometric Defect, controlled valency & Chalcogen semiconductors, Non-elemental semiconducting Materials, Preparation of Semiconductors-steps followed during the preparation of highly pure materials and further treatments. Semiconductor Devices-p-n junction diode.

Unit-5 (Polymer)

Nomenclature, functionality, classification, methods of polymerization, mechanism of polymerization, molecular weight determination-Viscometry, light scattering methods. Plastics-Moulding constituents of a plastics and moulding of plastics into articles. Important

thermoplastics and thermosetting resins- synthesis & applications of PVA,FLUON, PC, Kevlar, ABS polymer, phenolic & amino resins, epoxy resins and polyurethanes. Conductive polymers.

COURSE OBJECTIVES

To introduce the basic principles, importance and applications of electrochemistry, corrosion and batteries, solid state chemistry and polymers to the I year B.Tech. (ECE) students.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Students would become familiar with the:	
1. Basic concepts of electrochemistry	
2. Types, Mechanism and protection of corrosion	
3. Principle, construction and Advantages of different batteries.	
4. Packing of atoms and ions, Semiconducting materials, devices	
5. Importance of polymers	

COURSE PLAN – PART II



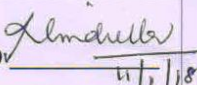
COURSE OVERVIEW

This is a four credit course offered to I year B.Tech Electrical and Communication Engineering Students (ECE-A section) students. This course is a combination of theory (3 credit) and practicals (1 credit). Three theory classes will be conducted per week and one lab session (3 h) will be held during alternate 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	II week of January	<u>Unit-I</u> Conductivity of electrolytes-Specific, molar and equivalent conductivity, Nernst equation for electrode potential, EMF series, cell EMF, its measurement and applications.	C&T, PPT
2	III week of January	Hydrogen electrode, calomel electrode, glass electrode, Electrolytic and galvanic cells, Weston standard cell, reversible and irreversible cells.	C&T, PPT
3	IV week of January	Concentration cell, electrode (hydrogen gas electrode) and electrolyte concentration cell, concentration cell with and without transference.	C&T, PPT

4	I week of February	Unit-II Dry corrosion and wet corrosion, mechanisms, types of corrosion, DMC, DAC, stress, inter granular, atmospheric and soil corrosion,	C&T, PPT
5	II week of February	Passivity, Polarization, over potential and its significance, Factors affecting corrosion, protection from corrosion by metallic coatings,	C&T, PPT
6	III week of February	electroplating, electroless plating and cathodic protection, Chemical conversion coatings and organic coatings- Paints, enamels.	C&T, PPT
7	IV week of February	Unit-III Different types of batteries-Primary, Secondary & Flow battery and Fuel cell. Working principle and uses-La clanche cell, alkaline battery, nicad battery, lithium battery & Mercury battery.	C&T, PPT
8	I week of March	Fuel cell- Theory, working and application. Different types of fuel cells-H ₂ /O ₂ , propane-oxygen, PEFC and SOFC.	C&T, PPT
9	II week of March	Lead Acid storage cell-charging & discharging principle, operation and uses. Solar battery- its working principle.	C&T, PPT
10	III week of March	Unit-IV Types of solids - close packing of atoms and ions - bcc, fcc structures of rock salt - cesium chloride- spinel - normal and inverse spinels, Stoichiometric Defect.	C&T, PPT
11	IV week of March	Controlled valency & Chalcogen semiconductors, Non-elemental semiconducting Materials, Preparation of Semiconductors.	C&T, PPT
12	I week of April	Steps followed during the preparation of highly pure materials and further treatments. Semiconductor Devices- p-n junction diode.	C&T, PPT
13	II week of April	Unit-V Nomenclature, functionality, classification, methods of polymerization, mechanism of polymerization, molecular weight determination - Viscometry, light scattering methods.	C&T, PPT
14	III week of April	Plastics-Moulding constituents of a plastics and moulding of plastics into articles. Important thermoplastics and thermosetting resins- synthesis &	C&T, PPT

		applications of PVA.		
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
Theory				
1	Test-I	III week of February	60 minutes	15
2	Quiz/seminar/G.D./ assignment	IV week of March	One week	5
3	Test-2	III week of April	60 minutes	15
CPA	Compensation Assessment*	III week of April	60 minutes	15
4	Final Assessment *	IV week of April	3 hours	40
Practical				
5	Regular class experiments	All practical classes	3 hours per experiment	25
Theory (75) + Practical (25) = Total (100)				
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 (preferred mode of correspondence with students, policy on attendance, compensation assessment, , academic honesty and plagiarism etc.)				
MODE OF CORRESPONDENCE (email/ phone etc.) E-mail: vmbiju@nitt.edu/ Phone: +91-9443843076				
ATTENDANCE 75% attendance is compulsory for appearing final assessment.				
COMPENSATION ASSESSMENT For those students who missed Test I and Test II due to genuine reasons, retest will be conducted during 16-20, April 2018.				
ACADEMIC HONESTY & PLAGIARISM Nil				
ADDITIONAL INFORMATION The respective faculty will be available for consultation at times as per the intimation by the faculty.				
FOR APPROVAL				
Course Faculty		CC-Chairperson		HOD  11/1/18