

## Engineering Chemistry

<b>Course Code</b>	20BS1202	<b>Year</b>	I	<b>Semester</b>	II
<b>Course Category</b>	Basic Science	<b>Branch</b>	CSE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Nil
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

## Course Outcomes

Upon successful completion of the course, the student will be able to

CO1	Understand the basic principles related to renewable energy sources, energy systems, metal finishing and materials (L2)
CO2	Apply the knowledge of energy transformation principles to classify and describe the working of electrodes and cells (L3)
CO3	Apply suitable methods for metal finishing and advanced techniques for the characterization of nano materials (L3)
CO4	Analyse the performance of different electrochemical techniques, energy conversion systems, polymers and nano materials in their respective applications (L4)
CO5	Make an effective report on various concepts and technologies related to Engineering chemistry.

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	√						√					√	√	
CO3	√						√					√	√	
CO4	√						√					√	√	
CO5	√						√			√		√	√	

## Syllabus

Unit No.	Syllabus	Mapped CO's
1	<b>ELECTROCHEMICAL ENERGY SYSTEMS</b> Introduction-Origin of electrode potential, Electrode Potentials, Measurement of Electrode Potentials, Nernst Equation for a single electrode, EMF of a cell, Types of Electrodes or Half Cells-Hydrogen and Calomel electrode, Electrochemical Cell, Galvanic Cell vs Electrolytic Cell, Electrochemical conventions, Types of Ion Selective Electrodes- glass membrane electrode, polymer membrane electrodes, solid state electrodes, gas sensing electrodes (classification only), Concentration Cells.	CO1,CO2, CO4,CO5
2	<b>BATTERY TECHNOLOGY</b> Basic concepts, battery characteristics, classification of batteries, Important applications of batteries, Classical batteries-dry/Leclanche cell, Modern batteries-zinc air, lithium cells-Li Mno <sub>2</sub> cell- challenges of battery technology. Fuel cells- Introduction - classification of fuel cells – hydrogen and oxygen fuel cell, propane and oxygen fuel cell- Merits of fuel cell.	CO1,CO2, CO4,CO5
3	<b>RENEWABLE SOURCES OF ENERGY</b> Introduction- sources of renewable energy Solar energy – Introduction - Physical and Chemical properties of Silicon- Production of Solar Grade Silicon from Quartz - Doping of Silicon- p and n type semi conductors- PV cell / solar cell- Manufacturing of Photovoltaic Cells using Chemical Vapor Deposition Technique-applications of solar energy	CO1,CO2, CO4,CO5

4	<b>METAL FINISHING</b> Technological importance of metal finishing, methods of metal finishing, manufacturing of electronic components, electrochemical techniques of forming, machining and etching, electrolytic cell, principle of electroplating, nature of electrodeposits, electroplating process, Electroplating of chromium, gold etc. Electroless plating of copper, nickel	CO1,CO3, CO4,CO5
5	<b>POLYMERS &amp; NANOMATERIALS</b> Polymers: Introduction thermoplastic and thermo setting resins, Preparation, properties and uses of polystyrene and Polyphosphazines., differences between Nanomaterials: Introduction to nanomaterial: nanoparticles, nanocluster, carbon nanotube (CNT) and nanowires. Chemical synthesis of nanomaterials: sol-gel method. Characterization: Principle and applications of scanning electron microscope (SEM) and transmission electron microscope (TEM).	CO1,CO3, CO4,CO5

### Learning Resources

#### Text Books

1. P.C. Jain and M. Jain, Engineering Chemistry, 15/e, DhanapatRai& Sons, Delhi (2014).
2. B.K. Sharma, Engineering Chemistry, Krishna Prakashan, Meerut.
3. O G Palanna, Engineering Chemistry, Tata McGraw Hill (2009).

#### Reference Books

1. Sashichawla, A Textbook of Engineering Chemistry, DhanapathRai and sons, (2003)
2. B.S Murthy and P. Shankar, A Text Book of NanoScience and NanoTechnology, University Press (2013).
3. S.S. Dara, A Textbook of Engineering Chemistry, S.Chand& Co, (2010)
4. N.Krishna Murthy and Anuradha, A text book of Engineering Chemistry, M murthyPublications (2014).
5. K. SesaMaheshwaramma and Mridula Chugh, Engineering Chemistry, Pearson India Edn services, (2016).

#### e- Resources & other digital material

1. <https://nptel.ac.in/courses/105105178/>
2. <http://202.53.81.118/course/view.php?id=82>