

11.12.2021

I Semester

ENGINEERING CHEMISTRY			
Course Code	21CHE12/22	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3Hour

Course Objectives: The course will enable the students to

CLO1: Impart the basic knowledge of chemistry and its principles involved in electrochemistry, energy storage devices and its commercial applications.

CLO2: Understand the basic principles of corrosion and its prevention, metal finishing and its technological importance

CLO3: Master the knowledge of synthesis, properties and utilization of engineering materials like polymers & Nano materials.

CLO4: Apply the knowledge of Green Chemistry principles for production of chemical compounds. understanding the concepts of alternative energy sources.

CLO5: Understand the basic concepts of water chemistry & theory, basic principle and applications of volumetric analysis and analytical instruments.

Pedagogy (General Instructions):

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
2. Show Video/animation films to explain methods of synthesis of nanomaterials.
4. Encourage collaborative (Group Learning) Learning in the class
5. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
7. Topics will be introduced in a multiple representation.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

Electrochemistry and energy storage systems:

Electrochemistry: Introduction, EMF of cell, Free Energy, Single electrode potential-Derivation of Nernst equation, Numerical problems based on Nernst Equation.

Reference Electrodes: Introduction, construction, working and applications of calomel electrode, ion selective electrodes: Introduction, construction, working and applications of Glass electrode, determination of pH using Glass electrode.

Energy storage Systems: Introduction, Classification of batteries (primary, secondary and reserved batteries). Construction, working and applications of Li-ion batteries. Advantages of Li-ion battery as an electrochemical energy system for electric vehicles. Recycling of Lithium-ion batteries, Introduction, brief discussion on direct cycling method, Sodium-ion battery-Introduction.

Pedagogy

Electrochemistry and energy systems-chalk and talk method, power point presentation,

Practical topic: Determination of pKa value of weak acid using glass electrode.

Energy storage Systems-Power point presentation, youtube videos for Li-ion battery construction and working. Recycling of Lithium-ion batteries, Introduction, brief discussion on direct cycling method

Self-study material: Construction and working of classical batteries like Zn-MnO₂ and Pb-PbO₂ batteries
Sodium-ion battery-Introduction.

Module-2