Engineering Chemistry-II
[KAS 202T]

L	T	P	End Semester	Sessional	Total(s)	Credit's
02	01	0	50	25	75	02

Course Outcomes (COs): (*The designed chemistry syllabus for engineering graduates at entry level (B.Tech. I & II semesters, I year) focuses on the students' need to understand the basic concept of chemistry with special emphasis on solid-state, electrochemistry & corrosion spectroscopic techniques, organometallic & polymer chemistry, and fuels. The content of the curriculum corresponds in a broad aspect to the need for national and global perspectives. After completing their studies, students acquire a sufficient basic understanding of chemistry that will help them to seek employment in the chemical-pharmaceutical industry or a career in a university degree in interdisciplinary courses such as materials science, nanotechnology, bio-nanotechnology, and instrumentation. Especially electrochemistry, organometallics, and fuel topics are of high relevance to provide students with knowledge of their application in drug discovery, energy conversion, and energy quality, especially green energy for environmental sustainability. In addition, the course is supported by experimental concepts based on the need of the curriculum both from a national and global perspective to analytically conduct the experiments to determine the concentration of the sample, measure the viscosity and surface tension of the liquid sample, and rate determination of the basic reaction through their kinetics study).*

After the completion of the course, students are expected to have the ability to:

CO1	*Classify the fundamentals of solid materials, X-ray analysis, and diverse applications of nanomaterials.*	**K2, K4**
CO2	*Apply basic scientific knowledge and fundamental aspects of cell functioning, equations in addressing electrochemistry problems, and corrosion control approaches.*	**K1, K3**
CO3	*Explain a fundamental understanding of spectrochemical techniques for the identification and structural elucidation of simple organic compounds.*	**K5**
CO4	*Introduction of basic understanding of polymeric material and Grignard synthesis.*	**K4**
CO5	*Applications of basic knowledge of fuels and techniques in the determination of fuel efficiency*	**K1, K3**

Unit I: Solid State **[08]**

Elementary ideas of solid state, band theory of solids, unit cell (cubic system), point defects in solid, techniques for structure determination of solid material (e.g., Bragg's equation), structure and use of graphite &fullerenes, nanomaterials, and their application in drug delivery systems.

Unit II: Electrochemistry and Corrosion **[08]**

Nernst's equation and application, EMF of the cell, a relation of EMF with thermodynamic functions (ΔH, ΔG, and ΔS), Li-ion battery (LIB).

Corrosion
Types, cause, effect, and prevention.

Unit III: Spectroscopic Techniques **[08]**

Elementary ideas of Lambert & Beer's Laws, basic principle and application of UV, IR, and Visible spectroscopy.

Unit IV: Organometallics & Polymers **[08]**

General methods of synthesis of organometallic compounds (i.e., Grignard reagent) and their applications. Basic concepts & classification of polymers, biodegradable polymers, preparation, properties, and application of industrially important polymers (i.e., Buna-S, Buna-N, Neoprene, Nylon-6, Nylon-6,6, and Terylene, etc.).

UNIT V: Fuels **[08]**

Classification of fuels, calorific value of fuels, net calorific value, gross calorific value, determination of calorific value (using Bomb calorimeter), analysis of coal.

Reference Book:

1. University Chemistry by B.H. Mahan
2. Engineering Chemistry by Satya Prakash
3. Polymer Chemistry by W.Billmeyer
4. Engineering Chemistry by S.S Dara