

## ENGINEERING CHEMISTRY - II

|                   |                    |                         |      |
|-------------------|--------------------|-------------------------|------|
| Lectures          | : 3 periods / week | Sessional Marks         | : 40 |
| Tutorials         | : 1 period / week  | Semester End Exam Marks | : 60 |
| Semester End Exam | : 3 hrs            | Credits                 | : 3  |

### Course Objectives:

- To acquire knowledge on various polymers and their mechanisms.
- To study the mechanisms, different types and factors influencing corrosion.
- To acquire knowledge on latest analytical techniques.
- To know the importance of green chemistry related to environmental management.

### Course Outcomes:

- Students know the utility of plastics in automobile, electronics, electrical and other fields.
- Students can relate corrosion and environment and suggest methods to prevent corrosion.
- Knowledge acquired on fuels gives good foundation for engineering students.
- Can analyse substances using techniques like Spectrophotometry, Colorimetry, Conductometry and Potentiometry.
- Able to design new techniques based on green chemistry principles.

### UNIT-I: (Text book-1 & 2)

#### Polymers:

Monomer functionality, degree of polymerization, Tacticity, classification of polymerization-addition, condensation and co-polymerization, mechanism of free radical polymerization.

#### Plastics-

Thermoplastic and thermosetting resins, preparation, properties and uses of Bakelite, polyesters, Teflon and PVC. Compounding of plastics.

Conducting polymers: Introduction, examples and applications, Polyacetylene- mechanism of conduction .

#### Rubber-

Processing of latex, Drawbacks of natural rubber- Vulcanization, Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber.

### UNIT-II: (Textbook-1)

#### Corrosion and its control:

Introduction, dry corrosion, electrochemical theory of corrosion, Types of corrosion- differential aeration, galvanic (galvanic series), Intergranular and Stress Factors affecting corrosion-oxidizers, pH, over voltage and temperature.

Protection methods: Cathodic protection, (Impressed current and sacrificial anode) corrosion inhibitors- types and mechanism of inhibition, metallic coatings-Galvanization, Tinning, Electroplating (Cu) and electro less plating (Ni)

### UNIT-III:

#### Fuels:

Classification of fuels, calorific value, LCV and HCV-units and determination (Bomb calorimeter), Coal-Ranking, proximate and ultimate analysis, carbonization of coal-types (using Beehive oven), Metallurgical coke-properties and uses.

Petroleum based: Fractional distillation, cracking-fixed bed, reforming, composition and uses of petrol, diesel, CNG and LPG.

### UNIT-IV: (Text book-1 & 2)

#### Analytical Techniques:

Spectroscopy- Beer-Lambert's law, UV and IR-principles, Instrumentation (block diagram), Colorimetry- estimation of Iron, Conductometric (HCl vs NaOH) and potentiometric titrations (Fe(II)vs  $K_2Cr_2O_7$ )

#### Green Chemistry:

Introduction, Principles and applications.

#### TEXT BOOKS:

1. Engineering Chemistry, P.C. Jain and Monika Jain, 15<sup>th</sup> Edition, 2008, Dhanpat Rai Publishing Company, New Delhi.
2. A Text Book of Engineering Chemistry, Shashi Chawla, 3<sup>rd</sup> Edition, 2009, Dhanpat Rai and Co.(P) Ltd., New Delhi.

#### REFERENCE BOOKS:

1. A Text Book of Engineering Chemistry, S.S. Dara and S.S. Umare, 12<sup>th</sup> Edition, 2010, S.Chand and Co.Ltd.
2. Principles of Polymer Science, P.Bahadur and N.V. Sastry, Narora Publishing House

#### WEB REFERENCES:

<http://www.wiziq.com/tutorial/>

<http://www.chem1.com/acad/webtext/states/polymers.html>

<http://freevidelectures.com/Course/3029/Modern-Instrumental-Methods-of-Analysis>

<http://www.cdeep.iitb.ac.in/nptel/Core%20Science/>