EC/CE/EE/ CS/IT/ME-109	CHEMISTRY OF ENGINEERING MATERIALS	L	T	P	C
		4	-	-	3

COURSE OBJECTIVES:

1. To acquire knowledge on formation of polymers and conditions to act as conducting polymers.
2. To gain knowledge on the chemistry of some important plastics and rubbers commonly used.
3. To understand parameters related to efficiency of various fuels
4. To gain knowledge on the characteristics of refractories and lubricants.
5. To understand the requirements and chemistry of explosives and utility of liquid crystals

COURSE OUTCOMES:

After successful completion of the course, the students

1. demonstrate formation of polymers and the utility of conducting polymers in electronics, electrical and other fields.
2. illustrate usage of plastics and elastomers in day to day life and in fields like automobile, electronics, etc.
3. Classify fuels based on calorific values.
4. Select appropriate lubricant for a given system, and explain the characteristics and utility of refractories.
5. Analyze the characteristics of liquid crystals and explosives.

UNIT I *Text Book-1 & 2* **(12)**

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

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

UNIT II *Text Book-1* **(12)**

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

Rubber - Processing of latex, Drawbacks of natural rubber - Vulcanization, Chemistry of Synthetic rubbers- Buna-S and Buna-N, polyurethane rubber and silicone rubber, epoxy resin (adhesive)

UNIT III *Text Book-1* **(12)**

Fuels: Classification of fuels, calorific value - LCV and HCV-units and determination by 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, octane number and cetane number of liquid fuels, composition and uses of petrol, diesel, CNG and LPG.

UNIT IV *Text Book-1 & 2* **(12)**

Refractories: Characteristics, classification, properties and their significance-refractoriness, strength of refractoriness under load, dimensional stability, thermal spalling, thermal expansion, thermal conductivity, porosity Common refractory bricks- silica, fire clay and carborundum.

Lubricants: Classification, functions, properties of lubricants - Viscosity, Viscosity index, Flash point, Fire point, Cloud point, Pour point, Oilyness. Solid lubricants - Graphite and Molybdenum sulphide, Additives, determination of viscosity by Red wood viscometer.

UNIT V *Text Book-1* **(12)**

Liquid crystals: Structure of liquid crystal forming compounds, Classification and applications.

Explosives: Characteristics, terms related to explosives, classification-primary, low and high explosives. Manufacture of gun powder, lead azide, nitroglycerine and RDX

LEARNING RESOURCES:

TEXT BOOK(s):

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

REFERENCE BOOK(s):

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

WEB RESOURCES:

1. http://www.chem1.com/acad/webtext/states/polymers.html
2. http://www.nptel.ac.in/courses/104105039/
3. http://freevideolectures.com/Course/3070/Science-and-Technology-of-Polymers