CHEMISTRY
(Common to all Branches)

Course Code: 15BC1101

L	T	P	C
3	0	0	3

Course Outcomes:

At the end of the course, students will be able to:

CO 1 Recall the principles; explain the working and design of energy storage devises.

CO 2 Extend the principles involved in corrosion to predict and prevent the corrosion in real life system.

CO 3 Classify the polymers and can apply to specific purposes.

CO 4 Analyze and determine the water quality and prescribe the remedial measures for domestic as well as industrial usage.

CO 5 Recite, explain and classify the characteristics of various engineering materials and explain their functioning

UNIT-I: (10 Lectures)

ELECTROCHEMICAL CELLS

Electrode potential, Nernst equation, EMF of electrochemical cell, Reference electrodes-Standard hydrogen electrode, calomel electrode. Electrochemical series, Concentration cell, Construction of glass electrode, determination of p^H of given solution using glass electrode

Batteries-Primary cell-Dry or Leclanche cell, alkaline battery; secondary cells (storage batteries or accumulators) – Lead-acid Accumulator, Nickel-cadmium battery, Lithium ion battery (LIB) and redox flow battery.

Fuel cells - hydrogen - oxygen fuel cell, phosphoric acid fuel cell, solid oxide fuel cells

UNIT-II: (10 Lectures)

CORROSION AND ITS CONTROL

Introduction - Direct chemical corrosion and electrochemical corrosion and its mechanisms, Types of electrochemical corrosion-Differential aeration corrosion, galvanic corrosion, concentration cell corrosion, pitting corrosion and stress corrosion, Galvanic series, passivity, factors influencing corrosion.

Corrosion control-proper designing, cathodic protection-sacrificial anodic protection and impressed current cathodic protection, modifying the environment and use of inhibitors.

Protective coatings- Anodic and cathodic coatings, Hot dipping-Galvanizing and Tinning, Metal cladding, Electroplating, Electroless plating, cementation or diffusion coatings

UNIT-III: (10 Lectures)

POLYMER TECHNOLOGY

Polymerization, classification, degree of polymerization, functionality and tacticity of polymer, Types of polymerization addition and condensation polymerization, Mechanism of addition polymerization. Preparation, properties and uses of polythene, PVC, Teflon, nylons-6,6, Bakelite and Silicones.

Plastics- Thermo plastics and thermosetting plastics, compounding of plastics.

Elastomers-Natural and synthetic rubbers, Manufacture, properties and applications of natural rubber-vulcanization, compounding of rubber, Synthetic rubbers-Preparation, properties and applications of Buna-S and Buna-N.

UNIT-IV: (10 Lectures)

WATER TECHNOLOGY

Introduction-characteristics imparted by impurities, hardness of water –Temporary and permanent hardness- units, Determination of hardness by EDTA method, Disadvantages of hard water, Boiler troubles - scale and sludge, caustic embrittlement, boiler corrosion, priming and foaming. Municipal water treatment, Desalination of brackish

water, Water softening methods - lime-soda method, zeolite method and ion exchange process.

UNIT-V: (10 Lectures)

ENGINEERING MATERIALS

Fuels: classification, characteristics of fuel, calorific value-determination of calorific value by Bomb calorimeter, Analysis of coal - Proximate and ultimate analysis of coal, Petroleum: classification based on sources of petroleum, Refining of petroleum, Knocking, octane value, cetane value, Cracking-thermal cracking and catalytic cracking-fixed bed & moving bed catalytic cracking, reforming.

Cement: Classification of cement, chemical composition functions of ingredients in Portland cement Manufacture of Portland cement-raw materials, setting and hardening of Portland cement.

Lubricants-friction, lubrication, functions of lubrication, mechanism of lubrication-thick film, thin film and extreme pressure lubrication, types of lubricants- solid, semisolid and liquid lubricants- their properties.

TEXT BOOKS:

1. Jain& Jain, *"A text book of Engineering Chemistry"*, 15th Edition, Dhanapat Roy Publishing Company, 2010
2. Sasichawla, , *"Engineering chemistry"*, 3rd Edition, Dhanapat Roy Publishing Company, 2006

REFERENCE BOOKS:

1. S.S.Dara, *"Engineering Chemistry"*, 11th Edition, S.Chand & Co, 2006
2. M.M.Uppal, *"Engineering Chemistry"*, 6th Edition, Khanna Publishers, 2001