

CHEMISTRY

(Common to all Branches)

Course Code: **15BC1101**

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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 devices.
- 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.