

CHEMISTRY

(Common to all Branches)

Course Code: 13BC1101

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Course Educational Objectives:

The course attempts impart a sound knowledge on the principles of chemistry involving different application oriented topics to required for all engineering branches.

Course Outcomes :

The student should able to apply

- ❖ The principles involved in corrosion and its control
- ❖ Treatment of water for industrial purpose and concepts of energy storage devices.
- ❖ Utilisation of polymer engineering materials towards different applications.

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 Lachanche 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**(12 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, corrosion and pitting, 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, Condensation polymerization, Preparation, properties and uses of polythene, PVC, Teflon, nylons-6,6, Polyester, Bakelite and Silicones.

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

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**(12 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, Chemical aspects of scale and sludge formation in boilers, caustic embrittlement, boiler corrosion, priming and foaming, Municipal water treatment-sedimentation, coagulation,

and filtration, Desalination of brackish water, Water softening methods- lime -soda method, zeolite method and ion exchange process.

UNIT-V:

(16 Lectures)

ENGINEERING MATERIALS:

Fuels- classification, characteristics of fuel, calorific value –determination of calorific value by bomb calorimeter and Junkers gas calorimeter, theoretical calculation of calorific value, Types and Analysis of coal - Proximate and ultimate analysis of coal, Manufacture of coke- 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.

Refractories- Classification and properties of refractories, Failures of refractory materials.

Lubricants-friction, lubrication, functions of lubricants, mechanism of lubrication-thick film, thin film and extreme pressure lubrication, types of lubricants- solid, semisolid and liquid lubricants and 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, 2004.

REFERENCES:

- 1, S.S. Dara, “*A Text book of Engineering Chemistry*”, 11th Edition, S.Chand & Co, 2006.
2. C. Parameswara Murthy, C.V. Agarwal and Andhra Naidu, “*A Text Book of Engineering Chemistry*”, 1st Edition, B.S. Publications, 2006.

