

## ENGINEERING CHEMISTRY

(Common to CSE, IT, CE, ECE during I B.Tech, I Semester)

(Common to EEE, AE, ME during I B.Tech, II Semester)

Course Code(s): CE1T3, CS1T3, IT1T3, EC1T4, AE2T3, EE2T3, ME2T3

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

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### Course Objectives:

- To acquire knowledge about desalination of brackish water and treatment of municipal water.
- To gain the knowledge of conducting polymers, bio-degradable polymers and fiber reinforced plastics.
- To learn significance of green chemistry and green synthesis and the synthesis of nano materials.
- To understand mechanism of corrosion and preventive methods.
- To understand concept of semi conductivity, superconductivity and liquid crystal and solar energy.

### Course Outcomes:

After studying this course, students will be able to

1. develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
2. Substitute metals with conducting polymers and also produce cheaper biodegradable polymers to reduce environmental pollution.
3. Design economically and new methods of synthesis nano materials.
4. Apply their knowledge for protection of different metals from corrosion .
5. Have the knowledge of converting solar energy into most needy electrical energy efficiently and economically to reduce the environmental pollution.

### **UNIT – I**

#### **A)WATER TECHNOLOGY:-**

Introduction, Hardness of water, types of hardness(permanent and temporary)- Degree of hardness-Numericals-determination of hardness by EDTA Method-softening methods (lime-soda, ion exchange and zeolite process)

#### **B)WATER TREATMENT:-**

Desalination-reverse osmosis-electrodialysis. Municipal water treatment-removal of micro organisms- by irradiation of UV radiation- bleaching powder process-chlorination-break point of chlorination-By using chloramine-By using ozone.

### **UNIT - II**

#### **A)POLYMERS:-**

Introduction - Types of polymers (addition and condensation)- mechanism of addition polymerization (free radical, ionic) – Classification - Stereospecific polymers - Ziegler Natta catalysis - Properties of polymers – Conducting Polymers-Engineering applications – Biodegradable polymers - Individual polymers(Preparation,Properties, Uses of Poly Styrene, PVC, PTFE, Bakelite's, Cellulose derivatives, PolyCarbonates).

## **B)PLASTICS :-**

Types –Compounding of plastics- Moulding(Injection, compression, blow film extrusion and extrusion moulding)- Fiber reinforced plastics (Glass and carbon) – Bullet Proof Plastics– Properties of plastics – Engineering applications.

### **UNIT - III**

#### **A)GREEN CHEMISTRY:-**

Introduction – Principle of green chemistry, methods of green synthesis (aqueous phase,super critical fluid extraction method, phase transfer catalyst, micro wave induced method,ultra sound method.

#### **B)NANO MATERIALS:-**

Introduction to Nanomaterials-preparation of few Nano materials(Carbon Nano Tubes,Fullerenes etc)-Properties of Nano materials- Engineering applications.

### **UNIT – IV**

#### **A)CORROSION :-**

Defination, causes and consequences of corrosion-mechanism of dry and wet corrosion-galvanicseries,Factors influencing rate of corrosion passivity of metal, types of corrosion (galvonic,differential Aeration,pitting,crevice and stress corrosion). B)**CORROSION CONTROL:-**

Cathodic protection(sacrificial anodic protection and Impressed current cathodic protection) and Application of protective coating-metallic coatings (galvanization and tinning) organic coatings (paints (mechanism not required),varnishes,lacquers and enamels).

### **UNIT - V**

#### **A)SEMICONDUCTORS & SUPERCONDUCTIVITY**

SEMICONDUCTORS-Definition –Types of semiconductors (Stiochiometric,Non Stiochiometric ,Organic, Controlled Valency Semiconductors,Doping)-applications SUPERCONDUCTIVITY– Definition-Preparation –Properties –Engineering Applications.

#### **B)LIQUID CRYSTALS & SOLAR ENERGY:-**

LIQUID CRYSTALS-Definition –Types - applications in LCD and Engineering Applications.

#### **SOLAR ENERGY:**

Introduction – harnessing solar energy – solar heaters – photo voltaic cells – solar reflection –green house concepts.

## **Learning Resources**

### **Text Books**

1. A text book of Engineeringchemistry – byN.KrishnaMurthy N.Y.S.Murthy Dr.V.Anuradha.
2. A text book of Engineering chemistry –II by D.Srinivasulu, Srivastava, Roliverma.
3. A text book of Engineering chemistry by JAIN & JAIN.
4. A text book of Engineering chemistry by C.P.Murthy, C.V.Agarwal. Andra Naidu.

### **Reference Books**

1. A text book of Engineering chemistry by S.S.DARA.
2. A text book of Engineering chemistry by Dr.C.Daniel Yesudian

**e-learning resources:**

<http://nptel.ac.in/courses.php>

<http://jntuk-coerd.in/>