VASAVI COLLEGE OF ENGINEERING

(AUTONOMOUS)
9-5-81, Ibrahimbagh, Hyderabad, Telangana -500031
DEPARTMENT OF CHEMISTRY

(NEW CBCS)

SYLLABUS FOR THE SEMESTER-I
ENGINEERING CHEMISTRY
(Common to all branches of B. E.I year)

Instruction : 2+1 hours per week	Semester End Exam Marks : 50	Subject Reference Code : BS
Credits : 2	Sessional Marks : 25	Duration of semester End Exam : 3 Hours

OBJECTIVES	OUTCOMES
The course will enable the students to:	**At the end of the course students should be able to:**
1. Describe the requirements of water for domestic and industrial uses. 2. Discuss different types of polymers and their applications 3. Emphasize upon the quantity and quality of fossil fuels and need for bio- diesel 4. Enrich with the concepts of corrosion and factors 5. Get acquainted with various corrosion control methods.	1. Select suitable method of water treatment for specific purpose 2. Choose the appropriate polymer as per requirement 3. Suggest the better fuels for required output. 4. Identify the type and gravity of corrosion. 5. Suggest& adapt suitable corrosion control methods

UNIT-I: Water Chemistry

Hardness of water- types and its units (PPM, Degree Clarke & Degree French). Degree of hardness-numericals. Determination of hardness of water by EDTA method -numericals. Alkalinity of water and its determination- Numericals. Effects of hardness in boilers- scales, sludge, causes and their prevention by Calgon & blow down processes Softening of water by Reverse Osmosis. Specifications of potable water. Water treatment for drinking purpose- Coagulation, Sedimentation, Filtration, Sterilization by a) Chlorination- Break Point Chlorination. b) Ozonolysis.

UNIT-II: Polymers

Definition, Degree of polymerization, Functionality of monomers & its effect on the structure of polymers. Classification of polymers-a) Homo and Co-polymers, b) Homo chain and Hetero chain polymers.
c) Plastics, Elastomers, Fibers & Resins d) Thermoplastics & Thermosets.
Types of Polymerisation - Addition and Condensation polymerization.

Plastics:

Preparation, properties and uses of A) Aramid, B) Bakelite
C) Polymethylmethaacrylate (PMMA) and D) Polycarbonate

Elastomers:

Natural rubber- Structure – Vulcanization and merits.
Artificial Rubbers: Preparation, properties and uses of Buna-S, Butyl and Silicone rubbers.

Biodegradable polymers: Introduction and advantages. Polylactic acid- Preparation and applications.

UNIT-III: Chemical Fuels

Introduction, classification, requisites of a good fuel. Advantages and disadvantages of solid, liquid & gaseous fuels. Calorific value (CV)-HCV, LCV (Definition and relationship), Dulongs formula-Numericals.

Solid Fuels: Proximate & Ultimate analysis of coal and their significance. Chemistry of combustion-Numericals by volume- weight and weight-weight method.

Liquid Fuels: Composition and CV of Gasoline, Fixed bed catalytic cracking method, Knocking and its significance-, Octane number, Enhancement of quality of gasoline by reforming and anti knock agents. Leaded & unleaded petrol. Catalytic converters and their role in reducing the toxicity of exhaust emissions, Power alcohol, Diesel-composition, CV, Cetane number.

Gaseous Fuels: Composition and applications of CNG, LPG.

Bio-diesel: Source and chemistry of Transesterification.

UNIT-IV: Corrosion Science

Concept, Definition, Gravity of corrosion-Types of corrosion (Dry & Wet), Pilling – Bed worth rule, effect of nature of oxide layer on rate of dry corrosion. Mechanism of electro chemical (wet) corrosion. Formation of anodic and cathodic areas-Differential aeration corrosion (Pitting, Water line & Crevice corrosion) and Galvanic corrosion - Galvanic series.

Factors influencing corrosion

a. Nature of metal: 1.Relative position of metal in galvanic series. 2. Over Voltage 3.Relative areas of anode & cathode 4.Nature of corrosion product.

b. Nature of environment: 1.Temperature 2. P^H 3. Humidity.

UNIT-V: Corrosion Control methods

A) Corrosion Inhibitors- Anodic and cathodic inhibitors.

B) Protective coatings i) Organic coatings- Paint-its constituents and their functions.

ii) Metallic Coatings (Anodic & Cathodic), Methods of application of metallic coatings-Hot dipping (Galvanization process), Principle of Electro plating & Electroless plating and their differences. Electroplating (Cu coating on Fe), Electroless plating (Ni coating on Insulators)

C) Cathodic protection, Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP).

Learning resources:

1. PC Jain, M Jain *Engineering Chemistry*, Dhanapathi Rai &sons (16th edition), New Delhi.

2. Sashi Chawla, Text book of *Engineering Chemistry, Dhanapathi* Rai &sons, New Delhi.

3. O.G. PALANNA, *Engineering Chemistry,* TMH Edition.

4. JC Kuriacose and J Rajaram, *Chemistry in Engineering and Technology* TMH, New Delhi.

5. SS Dara, S Chand &sons, *Engineering Chemistry*, New Delhi.

6. Puri, Sharma and Pathania *Principles of physical chemistry,* Vishal Publishing Co.

7. PL Soni and op Dharmarha, S Chand &sons, *Text book of PhysicalChemistry*, New Delhi.

8. S. Glasstone and D Lewis, *Elements of Physical Chemistry.*

9. Fred W. Billmeyer Jr., *Textbook of Polymer Science.*

10. Shikha Agarwal, *Engineering Chemistry,* Cambridge University Press, 2015.

11. Wikipedia