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| **B. TECH 1st SEMESTER** | **L** | **T** | **P** | **C** |
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| **16BS1T02: Engineering Chemistry** | | | | |

**COURSE OBJECTIVES**

1. For prospective engineers knowledge about water used in industries (boilers etc) and for drinking purposes is useful hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.
2. Knowledge of galvanic cells , electrode potentials is necessary for engineers to understand corrosion problem and its control, also this knowledge helps in understanding modern bio-sensors, fuel cells improve them.
3. The problem associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them.
4. A board understanding of the more important fuels employed on a large scale is necessary for engineer to understand energy – related problems and solve them.
5. Plastics are materials used very widely an engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics/elastomers helps in selecting suitable materials for different purpose.
6. With the knowledge available now, future engineers should know at least some of the Engineering materials that are becoming available. Hence some of them are introduced here.

**COURSE OUTCOMES**

1. Student able to understand how to produce soft water & potable water by various methods.
2. Student can learn about nature and working various electrodes and cells.
3. Student can able to understand how to protect metals from the environment
4. Student can understand the importance of fuels and characteristics and HCV & LCV.
5. Student can understand the properties of polymers & their applications in our day today life.
6. Student can understand the building materials, solar materials and nanomaterials and principles of green chemistry.

**Syllabus**

**UNIT- I**

**WATER TECHNOLOGY:** Hard Water – Estimation of Hardness By EDTA Method – **Potable Water**- Sterilization and Disinfection – Boiler Feed Water – **Boiler Troubles** – Priming And Foaming , Scale Formation, Boiler Corrosion, Caustic Embrittlement – **Softening of**  **Water** - By Lime Soda, Zeolite Processes – Ion Exchange Process – Desalination Process by - Reverse Osmosis – Electro Dialysis.

**UNIT- II**

**ELECTRO CHEMISTRY :** Electro Potential –Determination of single electrode potential –Standard electrode potential - Nernst Equation(problems)–Electro Chemical cell (Galvanic Cell) -**Reference Electrodes**-Standard Hydrogen Electrode, Calomel Electrode Determination of pH and conductivity – Applications (Strong Acid Vs Strong Base) - **Batteries** – Primary Cell: Dry Cell – Secondary Cell: Lead Acid Accumulator, Lithium Ion Battery – **Fuel Cells** – Hydrogen – Oxygen Fuel Cell, Methanol – Oxygen Fuel Cell.

**UNIT- III**

**CORROSION:** Introduction - **Theories of Corrosion**(i) Dry Corrosion (Pilling Bed worth rule) (ii) Wet Corrosion – Galvanic Series – **Types of Corrosion**: Galvanic Corrosion, Differential Aeration Corrosion, Pitting Corrosion, Stress Corrosion – Factors Influencing Corrosion – Nature of The Metal , Nature of The Environment – **Corrosion Control**: Material Selection & Design –Cathodic Protection- Surface Coatings – Methods of Applications on Metals -Hot Dipping , Electroplating, Electroless Plating – Paints – Their Constituents & Their Function.

**UNIT-IV**

**FUELS:** Introduction to Fuels – Classification – **Solid Fuels** Merits & Demerits - Calorific Value – HCV and LCV – Bomb Calorimeter - Problems Based on Calorific Values – Analysis of Coal (Proximate and Ultimate Analysis) – Numerical Problems Based on Analysis – **Liquid Fuels** Merits & Demerits – Petroleum – Refining – Cracking(types) –Petrol – Diesel Knocking – Octane Number, Cetane Number - **Gaseous Fuels** Merits & Demerits – Natural Gas – LPG, CNG.

**UNIT-V**

**POLYMERS SCIENCES & TECHNOLOGY : POLYMERS**- introduction – Types of Polymers – Mechanism of Polymerization (Addition and Condensation) – Determination of Molecular weight by weight and number average methods - Individual Polymers (Preparation Properties and uses of PS, PVC and Bakelite) – Biodegradable polymers – Ziegler Natta Catalysis.

**PLASTIC**S – Types – Compounding of Plastics – Moulding (Four Types) - Bullet Proof Plastics – Engineering Applications.

**RUBBER &ELASTOMERS**: Introduction –Preparation – Vulcanization – Compounding of Rubber – Preparation, Properties Uses of Buna-S, Buna-N and Thiokol-Engineering Applications.

**UNIT- VI**

**ENGINEERING MATERIALS, GREEN AND NANO CHEMISTRY : Refractories** (Types, Properties Applications) – **Cement**-Hardening and Setting-Deteriorations of cement concrete – **Solar Energy Materials –** Introduction - Advantages and Disadvantages – Construction and Working of Photovoltaic cell – Solar Reflectors - **Carbon Nano tubes** - Preparation (Arc discharge, Laser Ablation, Chemical Vapor Deposition (CVD) methods), Properties & Applications – **Green Chemistry** – Principles -Engineering Applications.

**Text Books:**

1. N. Y. S. Murthy, V. Anuradha, K Ramana Rao” A Text Book of Engineering Chemistry”, Matuthi.
2. K.Sesha Maheswaramma and Mridula chugh (2013) A Text Book of Engineering Chemistry, Pearson Publications.

**Reference Books:**

1. Shashi Chawal “A Text Book of Engineering Chemistry, Dhanpat Rai Publishing company Ltd.
2. S. S. Dara (2013) Text Book of Engineering Chemistry, S. Chand Technical Series.