# 17SH1203 - ENGINEERING CHEMISTRY

(Common for EEE, ECE, CSE & IT Branches)

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| **Course Category:** | Basic Sciences | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture - Tutorial - Practical:** | 3-0-0 |
| **Prerequisite:** | Fundamental concepts of Chemistry | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |
| **Objectives** | Students undergoing this course are expected to understand:   * To strengthen the fundamentals of Chemistry and then build an interface of theoretical and experimental concepts with their industrial/ engineering applications. * The extension of fundamentals of Electrochemistry to energy storage devices such as batteries and fuel cells is one such example. * To know the factors effecting the rate of corrosion and its prevention. * To design engineering materials and solve problems related to them. * To understand various water softening methods. * To understand preparation of polymers and their applications. | | |

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| **Course Outcomes** | On successful completion of this course students will be able to: | |
| CO1 | Understand the electrochemical sources of energy |
| CO2 | Identify and investigate means of protecting metal against corrosion. |
| CO3 | Understand industrially based engineering materials |
| CO4 | Understand the classification of fuels and their analysis |
| CO5 | Know the disadvantages of hard water and ability to remove hardness by using various methods |
| CO6 | Understand the basics of polymers and their preparation and uses in engineering field |
| **Course Content** | UNIT-I  **Electro Chemistry:** Single electrode potential-explanation and measurement Reference electrodes-hydrogen gas electrode-calomel electrode-glass electrode  **Electrochemical cells:** Lead-Acid storage cells  **Batteries:** Li-ion Batteries  **Fuel Cells:** Hydrogen - Oxygen fuel cell Conductometric titration of strong acid and strong base  UNIT-II  **Corrosion:** Definition-classification- theories of corrosion-factors affecting the corrosion- Prevention methods of corrosion-metallic coatings (Electroplating, cementation) and cathodic protection.  UNIT-III  **Chemistry of Engineering Materials:** Electrical insulators: Definition-classification-Characteristics- Application of electrical insulating materials (solid, liquid and gaseous insulators).  **Refractories:** Classification- properties and applications of refractories.  **Lubricants:** Lubricant-Lubrication-classification of lubricants-Properties and applications of lubricating oils.  UNIT-IV  **Fuel Technology:** Classifications of Fuels - Characteristics of fuels - Calorific value – determination – Bomb calorimeter – Boy’s gas calorimeter - Theoretical calculation of calorific value.  **Solid Fuels:** coal-analysis of coal.  **Liquid Fuels:** Petroleum-refining of petroleum - Synthetic petrol – Fischer Tropch’s synthesis  **Gaseous Fuel:** Flue gas analysis by Orsat’s apparatus.  UNIT-V  **Water Treatment:** Impurities in water-Hardness of water-Estimation of hardness by EDTA method-Estimation of dissolved oxygen-alkalinity-chlorides in water  **Industrial Use of Water:** For steam generation-troubles in boilers-scale and sludge-priming and foaming-caustic embrittlement-boiler corrosion  **Softening Methods of Hard Water:** Lime-soda process- Zeolite process-Ion exchange method.  UNIT-VI  **Polymers:** Introduction to polymers- Polymerization process-types of polymerization.  **Elastomers:** natural rubber – vulcanization of rubber – compounding of rubber- Synthetic rubbers: preparation, properties and engineering applications of Buna – N, Neoprene, Thiokol and silicon rubbers  **Plastomers:** Thermosetting and thermoplastics- Preparation, properties and engineering applications of PVC, Bakelite, Nylons and Urea-Formaldehyde | |
| **Text Books and References** | Text Books:   1. Engineering Chemistry, First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013. 2. A Text Book of Engineering Chemistry, 15th Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.REFERENCES | |
| Reference Books:   1. A Text book of Engineering Chemistry, 12th Edition, SS Dhara, Uma, S. Chand Publications, New Delhi, 2010. 2. Engineering Chemistry, First edition, K.B. Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited, 2010. 3. Engineering Chemistry, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013. | |