

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

NAAC Accredited with A++ Grade

Subject Name: Engineering Chemistry

Subject code: 3000002

B.Tech. (First / Second year) with effect from 01.07.2023

Course Objectives: Enable the students to become familiar with the concepts of Modern Engineering Chemistry. Develop and understanding of complex topics in correlation to Chemical analysis and application, so that they could be applied to the engineering and applications.

UNIT – I Chemistry of Water Analysis

Source and impurities, alkalinity, pH, hardness of water, interrelationship between alkalinity and hardness, degree of hardness, Standards of water for drinking purposes, Methods of water softening: lime- soda process, zeolite and ion exchange resin process. Boiler troubles and prevention. Simple numerical problems on water softening based on lime soda process and water analysis.

UNIT –II Chemistry of Engineering Material

Lubricants-Introduction, functions of lubricants, types and classification of lubricants, solid lubricants, semi-solid lubricants, liquid lubricants, synthetic lubricants, mechanism of lubrication, physical & chemical properties, testing of lubricants, types of greases, application of lubricants,

Cement: introduction & raw materials, gypsum cement, Types of cement, Methods of manufacturing cement: Wet process, Dry process, Semi-dry process. Chemistry of setting & Hardening of cement, **Refractory**. Introduction, classification of refractories and properties of refractories with reference to Refractoriness, RUL, Porosity, Thermal Spalling.

UNIT – III Chemicals of Industrial Importance

Fuels- Definition & Classification of fuels and their comparison. Calorific values, Determination of calorific value by Bomb calorimeter. Proximate and ultimate analysis of coal and their significance, knocking, anti-knocking compounds, octane & cetane number, simple numerical problems based on fuels.

UNIT – IV Polymers of Engineering Importance

Introduction, types and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization and their mechanism, Classification of plastic, important thermoplastic resins Nylon 66, Teflon, & important thermosetting resins Phenolic resin, Amino resin. Moulding of plastics. Natural & synthetic rubbers, Vulcanization, styrene rubber.

UNIT – V Standard Methods of Chemical Analysis

Introduction to Chromatography- Principle of Chromatography, Introduction of Thin layer, paper and Gas Chromatography.

Introduction to Spectroscopy- Theory of Ultra-Violet, and Visible Spectroscopy, Chromophore, Auxochrome, concept and intensity shifts, The Absorption law. Instrumentation and Applications of ultraviolet-visible spectroscopy.

Course outcomes: After studying the course of Engineering Chemistry the student will be able to:

CO1 Select the best technique for Industrial and domestic water treatment.

CO2 Describe the types, properties and application of advance engineering material like lubricants, Cement, refractory.

CO3 Distinguish the chemistry of various fuels and their combustion.

CO4 Describe polymerization mechanism and types of polymers, their properties and applications.

CO5 Explain the concept of chromatography and spectroscopy for various engineering application.

Reference Books: -

- Engineering Chemistry- P.C.Jain and Monika Jain, Dhanpat Rai Publishing Co (P) Ltd, 2013
- Engineering Chemistry - B.K. Sharma, Krishna Publication, 2015
- A Text Book of Engineering Chemistry - S. S. Dara & A.K. Singh, S. Chand Publication, 2015.
- Applied Chemistry - Theory and Practice, O.P. Viramani, A.K. Narula, New Age Pub, 2008.
- Polymer Science – Ghosh, Tata McGraw Hill.2010
- Chemistry for Environmental Engineering - Sawyer, McCarty and Parkin – McGraw Hill, International.2003
- Industrial Chemistry - B.K. Sharma, GOEL Publishing house 2011