SYLLABUS

24 CY101- Engineering Chemistry

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UNIT-1 WATER TREATMENT (9)

Water Sources- Water Quality parameters - Hardness of water – types-units and calcium carbonate equivalent. -Determination of hardness of water by EDTA method. Scale and sludge, caustic embrittlement, priming and foaming and boiler corrosion. Water softening methods – internal and external conditioning –zeolite process and ion exchange process. Desalination – reverse osmosis andelectro dialysis- Municipal water treatment and waste water treatment process.

UNIT -II CHEMISTRY OF ENGINEERING MATERIALS (9)

Adhesives: Introduction- requisites of a good adhesive-adhesive action- industrial applications of adhesives.

Insulating Materials: Introduction- requirements- Glass and ceramics - preparation, properties andapplications - fabrication of ceramic ware.

Lubricants-Classification of lubricants with examples-characteristics of a good lubricants - mechanism of lubrication (thick film, thin film and extreme pressure) - properties of lubricants: viscosity, cloud point, pour point, flash point and fire point**.**

Electronic materials: Introduction-types, properties and applications of semiconducting materials and transistors, materials used in IC's, fibers and cables- properties and applications, organic solar cells - types and applications.

UNIT-III ELECTRO CHEMISTRY (9)

Introduction – Electrode potential – Nernst equation and problems - Electrochemical series - Conductometric titrations (acid - base & precipitation titration)

Electrodes: Construction, working and applications of Standard and reference electrode (Hydrogen & Calomel) – Ion selective (glass electrode) – determination of pH using glass electrode.

Batteries and Fuel Cells – Types of batteries —dry cell -Lead Storage battery–Nickel-Cadmium Battery – Lithium battery – Battery hazards - Biological Batteries. Fuel Cells – Hydrogen-Oxygen Fuel Cell.

UNIT IV -CORROSION AND ITS CONTROL (9)

Corrosion – causes, factors, types, Chemical and Electrochemical Corrosion (Galvanic, Differential aeration) –galvanic series-factors influencing rate of corrosion-measurement of corrosion. Determination of corrosion rate by weight loss method.

Control Methods-Electrochemical protection – Sacrificial Anodic method – Impressed Current Cathodic Protection – Corrosion Inhibitors – Bio corrosion Protective Coatings – Paints, Constituents, Functions- Surface coating - Surface preparation for metallic coatings, Electroplating and Electro-less Plating- ceramic coatings, thermal vaporization coating, HVOF coating

UNIT V- FUELS AND COMBUSTION (9)

Fuels: Introduction: Classification of fuels; solid fuel -Coal and coke: Analysis of coal (proximate and ultimate), Carbonization, Manufacture of metallurgical coke (Otto Hoffmann method). Liquid fuels -Manufacture of synthetic petrol –hydrogenation of coal (Bergius process), Knocking – octane number, diesel oil – cetane number; Power alcohol and biodiesel.

Combustion of fuels: Introduction: Calorific value – higher and lower calorific values, Theoretical calculation of calorific value by Dulong's formula - Ignition temperature: spontaneous ignition temperature, Explosive range; Flue gas analysis – ORSAT Method.

Total: 45 Periods

Text Books:

1. Jain P.C. and Jain M, Engineering Chemistry, Dhanpat Rai Publishing Company, New Delhi, 17th Edition,2021.
2. Dara S S and Umare S.S, A Text Book of Engineering Chemistry, S.Chand & Company Limited, 20thEdition, 2018.

Reference Books:

1. Benjamin M. M, Water Chemistry, Waveland Press, 2nd Edition, 2019.

2. Cicek V, Corrosion Engineering, Springer Publishing, 1st Edition, 2021.
3. Shahinpoor. M, Fundamentals of Smart Materials, Publisher: Royal Society of Chemistry, 1st Edition,2020.
4. Berg H, Bernhardsson S, and Johansson P, Electric Vehicle Batteries: Moving from Research towardsInnovation, Publisher: Springer, 1st Edition, 2019.
5. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2014).
6. Course Outcome

CO No.	Course Outcomes	Highest cognitive level
CO1	Analyze the water quality parameters and choose appropriate water treatment methods for use in industries and daily life.	K4
CO2	Make use of the applications of the materials in different engineering disciplines.	K3
CO3	Utilize the principles of electrochemistry and find the materials for energy conversion and storage.	K4
CO4	Determine the corrosion rate to propose suitable protection methods for environmental considerations	K3
CO5	Choose suitable fuels for engineering processes and automobile applications.	K3