

## 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 and electro 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 and applications - 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 FuelCell.

**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.

REFERENCES:

**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 towards Innovation, Publisher: Springer, 1st Edition, 2019.

5. B.K.Sharma “Engineering chemistry” Krishna Prakasan Media (P) Ltd., Meerut (2014).

#### Course Outcome

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

