

VASAVI COLLEGE OF ENGINEERING

(AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad, Telangana -500031

DEPARTMENT OF CHEMISTRY
ENGINEERING CHEMISTRY-IISYLLABUS FOR THE SEMESTER-II
(For ECE, CSE & IT branches)

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|----------------------------------|------------------------------|---|
| Instruction : 3 periods per week | Semester End Exam Marks : 70 | Subject Reference Code : CH1230 |
| Credits : 3 | Sessional Marks : 30 | Duration of semester End Exam : 3 Hours |

| COURSE OBJECTIVES | COURSE OUTCOMES |
|---|--|
| The course will enable the students to: | At the end of the course students should be able to: |
| 1. To study variation of electrode potential and EMF with variation of concentration, Temperature and to acquaint with applications of Galvanic Cell. 2. To classify and compare various types of batteries. 3. To apply concepts of electrochemical principles in corrosion and its control. 4. The behavior of composition of heterogeneous equilibria. 5. To appraise few engineering materials. | 1. Construct the galvanic cell and to evaluate the effect of change in concentration on EMF and pH 2. Select the battery for particular purpose based on chemical nature. 3. Realise the gravity and type of corrosion suggest suitable control method 4. Apply the principle of phase rule to heterogeneous equilibria. 5. Get expose to basic concepts of engineering materials such as Lubricants, Liquid crystals, Nano materials and Refractories |

UNIT-I: Electro Chemistry (09)

Types of conductors, Types of Conductance (Specific conductance, Equivalent conductance & Molar conductance) and their relationship. Electrolytic and Galvanic cells. Electrode potential, IUPAC convention of Cell notation, Cell reaction, EMF, Electro chemical series – applications, Nernst equation, Numericals. Reversible & Irreversible cells. Types of electrodes, Calomel Electrode (CE), Quinhydrone and Glass Electrode (GE). Determination of P^H using Quinhydrone and Glass Electrodes.

UNIT-II: Battery Technology (8)

Definition, Types, Primary cell- Zn-C cell and Zn-alkaline cell

Secondary cells: -Ni-Cd battery, Lead-acid battery, Li – ion battery- charging & discharging reactions - applications.

Fuel cells: phosphoric acid fuel cell - applications.

UNIT-III: Corrosion & Its Control (8)

Concept, Gravity of corrosion-Types of corrosion (Dry & Wet), Mechanism of wet corrosion. Formation of anodic and cathodic areas-Differential aeration corrosion. and Galvanic corrosion- Factors influencing corrosion, Galvanic series.

Nature of metal: Relative areas of anode & cathode, Nature of corrosion product, Relative position of metal in galvanic series.

Nature of environment: Temperature, P^H , Humidity.

Corrosion control methods: Cathodic protection, Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP)- principle of electro plating & electro less plating and their differences (no plating process), Paint-its constituents and their Applications.

UNIT-IV: Phase rule (8)

Terms, Statement of phase rule, one component system-water system- Condensed phase rule, two component system-Lead- Silver (Pb-Ag) system, Pattinson's process, Copper -Nickel (Cu-Ni) system, Safety fuses and solders.

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UNIT-V: Chemistry of Engineering Materials (9)

a) Liquid Crystals (6)

Introduction, Classification of liquid crystals-Thermotropic and Lyotropic - Chemical constitution & liquid crystalline behavior. Molecular ordering in liquid crystals- Nematic, Smectic and Cholesteric - Applications.

b) Nano Materials

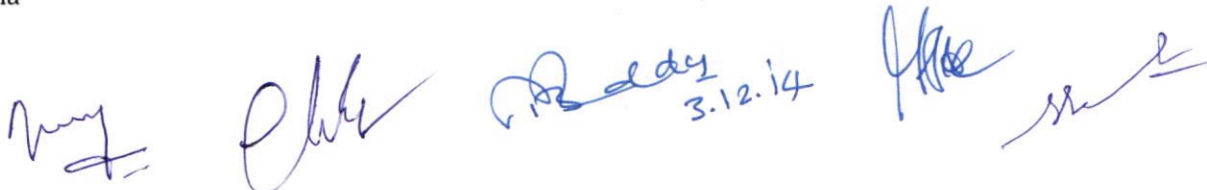
Introduction, preparation methods-(Vapor deposition & Sol-gel) - Applications.

c) Membrane technology:

Introduction, Synthesis of two membranes. Applications.

Learning resources:

1. Elements of Physical Chemistry by S. Glasstone and D Lewis
2. Principles of physical chemistry by Puri, Sharma and Pathania.
3. Text book of physical chemistry by PL Soni and op Dharmarha, s Chand & sons, new Delhi.
4. Engineering chemistry by PC Jain, M Jain Dhanpat Rai & sons (15th edition), New Delhi
5. Engineering chemistry by Sashi Chawla, Dhanpat Rai & sons, New Delhi.
6. Engineering chemistry by O.G. PALANNA, tmh, and New Delhi
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DEPARTMENT OF CHEMISTRY ENGINEERING CHEMISTRY-II

SYLLABUS FOR THE SEMESTER-II
(For EEE, Mech & Civil branches)

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| Credits : 3 | Sessional Marks : 30 | Duration of semester End Exam : 3 Hours |

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UNIT-V: Chemistry of Engineering Materials (9)

a) Lubricants

Definition, Mechanism of lubrication: Hydro dynamic-Boundary-Extreme pressure lubrication, , Classification: solid ,semi solid and liquid lubricants, Properties of lubricants:(Viscosity, viscosity index, Saponification number and iodine number).

b) Refractories:


Definition, Classification and Properties- Refractoriness, RUL, Thermal spalling and Porosity.

c) Membrane technology:

Introduction, Synthesis of two membranes. Applications.

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DEPARTMENT OF CHEMISTRY

CHEMISTRY LABORATORY -II

(Common to all branches of B. E.I year)

SYLLABUS FOR THE SEMESTER-II

| | | |
|----------------------------------|------------------------------|---|
| Instruction : 3 periods per week | Semester End Exam Marks : 50 | Subject Reference Code : CH1231 |
| Credits : 2 | Sessional Marks : 25 | Duration of semester End Exam : 3 Hours |

| COURSE OBJECTIVES | COURSE OUTCOMES |
|--|---|
| The course will enable the students to: 1. Describe the quantitative analytical techniques 2. Learn the working principle of the instruments 3. Apply the theoretical principles in experiments 4. Determine the saponification value of a lubricant 5. Examine the accuracy | At the end of the course students should be able to: 1. Analyze the given substance using conventional and instrumental volumetric techniques 2. Estimate the amount of substances by Potentiometry, pHmetry and colorimetry 3. Evaluate the data from the practical observations 4. Calculate saponification number of a lubricant 5. Calculate the percentage of error of the results obtained. |

Any EIGHT experiments

| S. No | Experiment |
|-------|---|
| 1 | Estimation of Iron by dichrometry |
| 2 | Estimation of Copper by Iodometry |
| 3 | Estimation of Dichromate by Iodometry |
| 4 | Estimation of Calcium in milk or lime by EDTA |
| 5 | Determination of saponification value of an oil / Acid value of an oil |
| 6 | Estimation of Phosphoric acid in soft drinks |
| | Potentiometry |
| 7 | Strong acid vs Strong base |
| 8 | Weak acid vs Strong base |
| 9 | Redox titration |
| | p^H metry |
| 10 | Strong acid vs Strong base (Determination of p ^{ka}) |
| 11 | Weak acid vs Strong base (Determination of p ^{ka}) |
| 12 | Colorimetry : Verification of Beer- Lamberts law - Determination of Iron |

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