VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) 9-5-81, Ibrahimbagh, Hyderabad, Telangana -500031 DEPARTMENT OF CHEMISTRY SYLLABUS FOR THE SEMESTER-II

APPLIED CHEMISTRY (For ECE, CSE & IT branches)

Instruction : 2+1hours per week	Semester I	End Exam Marks :	50	Subject Reference Code	: BS
Credits : 2	Sessional I	Marks :	25	Duration of semester End Exam	: 3 Hours

OBJECTIVES	OUTCOMES
The course will enable the students to:	At the end of the course students should be able to:
 To study types of conductance, variation of electrode potential and EMF. And to acquaint with applications of Galvanic Cell. To classify and compare various types of batteries. To appraise advanced engineering materials. Get acquainted with engineering materials like liquid crystals, membranes and nano materials. Expose to different high energy materials. 	 Construct the galvanic cell and to evaluate the effect of change in concentration on EMF and pH. Select the battery for particular purpose based on chemical nature. Suggest the suitable engineering materials for diversified applications. Apply the knowledge of liquid crystals, membranes and nano materials in engineering applications. Appreciate the applications & usage of high energy materials.

UNIT-I: Electro Chemistry

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Types of conductors, description of conductivity cell-cell constant, 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. Principle and applications of potentiometric titrations.

UNIT-II: Chemistry of Batteries

Definition, Types of batteries

Primary batteries Zn-Carbon battery and Zn-alkaline battery

Secondary batteries: Lead-acid battery, Ni-Cd battery- construction, charging & discharging reactions and their applications.

Modern Batteries: Li - ion batteries- construction, advantages and their applications.

Fuel cells: Concept of fuel cells and merits.

Construction and working of Molten carbonate fuel cell, phosphoric acid fuel cell, reactions and applications.

UNIT-III: Chemistry of Advanced Engineering Materials-I

a) Conducting polymers

Definition, Classification into extrinsic and intrinsic polymers. Mechanism of conduction in doped and undoped Polyacetylene & Polyaniline - Applications.

b) Composite materials

Introduction, advantages, constituents of composites. Types of composites-fiber reinforced composites(Glass, Carbon & Aramid). Layered composites- Applications.



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UNIT-IV: Chemistry of Advanced Engineering Materials -II

a) Liquid Crystals

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

b) Membrane technology:

Introduction, Definition, classification, working principle of membrane, casting methods-phase inversion, solvent evaporation method. Synthesis of poly phenylene oxide, poly ether sulphone and their casting. Applications of membranes.

c) Nano Materials

Introduction, preparation methods- (Vapor deposition & Sol-gel). Production of Carbon Nano tubes by Arc – Discharge method and their applications.

UNIT-V: Rocket Propellants & Explosives

- a) Rocket Propellants- Principle of rocket propulsion, classification, characteristics of good propellants.
- b) Explosives/ High energy materials- Introduction, classification, precautions during storage, preparation of lead azide, TNT, Nitro glycerine and RDX

Learning resources:

1. PC Jain, M Jain Engineering Chemistry, Dhanapathi Rai &sons (16th edition), New Delhi.

2. Sashi Chawla, Text book of Engineering Chemistry, Dhanapathi Rai &sons, New Delhi.

3. O.G. PALANNA, Engineering Chemistry, TMH Edition.

4. JC Kuriacose and J Rajaram, Chemistry in Engineering and Technology TMH, New Delhi.

5. SS Dara, S Chand &sons, Engineering Chemistry, New Delhi.

6. Puri, Sharma and Pathania Principles of physical chemistry, Vishal Publishing Co.

7. PL Soni and op Dharmarha, S Chand &sons, Text book of PhysicalChemistry, New Delhi.

8. S. Glasstone and D Lewis, Elements of Physical Chemistry.

9. Fred W. Billmeyer Jr., Textbook of Polymer Science.

10. Shikha Agarwal, Engineering Chemistry, Cambridge University Press, 2015.

11. Wikipedia.

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APPLIED CHEMISTRY

(For EEE, Mech & Civil branches)

Instruction:(2+1)periods per week	Semester End Exam Marks : 50	Subject Reference Code	: BS
Credits : 2	Sessional Marks : 25	Duration of semester End Exam	: 3 Hours

OBJECTIVES	OUTCOMES
The course will enable the students to:	At the end of the course students should be able to:
 To study types of conductance, variation of electrode potential and EMF. And to acquaint with applications of Galvanic Cell. To classify and compare various types of batteries. To appraise advanced engineering materials. Study The behavior of composition of heterogeneous equilibrium systems. Get acquainted with engineering materials like lubricants, refractories and insulators. 	 Construct the galvanic cell and to evaluate the effect of change in concentration on EMF and pH. Select the battery for particular purpose based on chemical nature. Suggest the suitable engineering materials for diversified applications. Apply the principle of phase rule to heterogeneous equilibrium systems. Apply the principles of lubricants, refractories and insulators in different engineering fields.

UNIT-I: Electro Chemistry

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Types of conductors, description of conductivity cell-cell constant, 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. Principle and applications of potentiometric titrations.

UNIT-II: Chemistry of Batteries

Definition, Types of batteries

Primary batteries Zn-Carbon battery and Zn-alkaline battery

Secondary batteries: Lead-acid battery, Ni-Cd battery- construction, charging & discharging reactions and their applications.

Modern Batteries: Li - ion batteries- construction, advantages and their applications.

Fuel cells: Concept of fuel cells and their merits.

Construction and working of Molten carbonate fuel cell, phosphoric acid fuel cell, reactions and applications.

UNIT-III: Phase rule

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, Lead – Tin system(Pb-Sn), Safety fuses and solders.

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UNIT-IV: Engineering Materials

,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 numberdetermination and its significance, iodine value - determination and its significance.

b) Refractories:

Definition, requirements of a good refractory, classification and properties- Refractoriness, Refractoriness under load (RUL), Thermal spalling and Porosity. Applications of refractories.

c) Insulators:

Thermal and electrical insulators- characteristics and applications.

UNIT-V: Advanced Engineering Materials

a) Conducting polymers

Definition, Classification : extrinsic and intrinsic polymers. Mechanism of conduction in doped and undoped Polyacetylene & Polyaniline - Applications.

b) Composite materials

Introduction, advantages, constituents of composites. Types of composites based on matrix and dispersed phases-Fiber Reinforced Composites(Glass, Carbon & Aramid). Layered composites- Applications.

Learning resources:

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4. JC Kuriacose and J Rajaram, Chemistry in Engineering and Technology TMH, New Delhi.

5. SS Dara, S Chand &sons, Engineering Chemistry, New Delhi.

6. Puri, Sharma and Pathania Principles of physical chemistry, Vishal Publishing Co.

7. PL Soni and op Dharmarha, S Chand &sons, Text book of PhysicalChemistry, New Delhi.

8. S. Glasstone and D Lewis, Elements of Physical Chemistry.

9. Fred W. Billmeyer Jr., Textbook of Polymer Science.

10. Shikha Agarwal, Engineering Chemistry, Cambridge University Press, 2015.

11. Wikipedia.



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From the Academic Year 2016-2017

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

9-5-81, Ibrahimbagh, Hyderabad, Telangana -500031 DEPARTMENT OF CHEMISTRY SYLLABUS FOR THE SEMESTER-II

CHEMISTRY LABORATORY -II

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

Instruction : 2 hours per week	Semester End Exam Marks	: 30	Subject Reference Codo	DC
Credits · 2	Consignal Marl	100	Subject Reference Coue	: 82
Sigures 12	Sessional Marks	:20	Duration of semester End Exam	: 2 Hours

OBJECTIVES	OUTCOMES		
The course will enable the students to:	At the end of the course students should be able to:		
 Describe the quantitative analytical techniques Learn the working principle of the instruments Apply the theoretical principles in experiments Determine the Saponification value of a lubricant Examine the accuracy 	 Analyze the given substance using conventional and instrumental techniques Estimate the amount of substances by Potentiometry , and P^Hmetry Evaluate the data from the practical observations asses the quality of a lubricant Calculate the percentage of error of the results obtained. 		

Dichrometry

1. Estimation of Ferrous iron.

2. Estimation of chromium.

Iodometry

- 3. Estimation of Copper in brass / in the given solution
- 4. Estimation of Chloride in water sample
- 5. Determination of saponification number / lodine number of a lubricant
- 6. Preparation of a Conducting polymer

Potentiometry

- 7. Construction of a galvanic cell / battery and study of variation of EMF / cell voltage with concentration of electrolyte solution
- 8. Estimation of Ferrous iron by redox titration method
- 9. Determination of fluoride in a given water sample by ion selective Electrode

P^H Metry

- 10. Estimation of concentration of strong acid and measurement of pH of an effluent
- 11. Estimation of concentration of weak acid and measurement of pH of an effluent

Electroplating

12. Electroplating of copper on iron.

Learning Resource:

1. B.Vishwanathan, P.S Raghavan Practical Physical Chemistry, Viva Books Private Limited.

2. J. Mendham and Thomas, "Vogel's Text book of quantitative chemical analysis", Person education Pvt. Ltd, 6th Edition (2002).