From the academic year 2018-2019

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

DEPARTMENT OF CHEMISTRY

SEMESTER-I

CHEMISTRY-I

(Common to all branches)

Instruction : 2+1 hours per week	Semester End Exam Marks : 60	Subject Reference Code :18BS140CH
Credits : 2	Continuous Internal Exam Marks : 40	Duration of semester End Exam : 3H

LEARNING OUTCOMES

At the end of the course, students should be able to:

1. Construct a galvanic cell and calculate its EMF and pH wherever applicable
2. Diagonize the type of corrosion in a given corrosion problem and suggest a suitable method of corrosion control.
3. Rationalise the properties of refractories and suggest a suitable refractory for a given application
4. Discuss the mechanism of lubrication, properties of lubricants and suggest a suitable lubricant for a given application
5. Rate the fuels and suggest methods for enhancement of the quality of fuels for the required output.
6. Analyse microscopic chemistry in terms of atomic and molecular orbitals and construct molecular orbital diagrams for simple diatomic molecules
7. Interpret UV-Visible and Infrared spectra of simple organic molecules in order to understand their structure

UNIT-I: ELECTROCHEMISTRY (8H)

Introduction, electrolytic and galvanic cells. IUPAC convention of cell notation, cell reaction, concept of electrode potential, electro motive force (emf), electro chemical series – applications, Nernst equation-derivation and Numericals. Types of electrodes- Calomel electrode (CE), Quinhydrone electrode and Glass electrode (GE). Determination of p^H using glass electrode. Applications of Potentiometry in Quantitative Analysis: Neutralization titration, Redox titration (Fe(II) Vs $KMnO_4$).

UNIT-II: CORROSION AND ITS CONTROL (8H)

Corrosion: Concept of corrosion, gravity of corrosion- Types of corrosion- Mechanism of Chemical & Electro chemical corrosion, Galvanic corrosion, Galvanic series, Formation of anodic and cathodic areas on a single metal-Differential aeration corrosion (Pitting, Water line corrosion), stress corrosion.

Factors affecting corrosion- i. Nature of metal: 1. Relative position of metal in galvanic series. 2. Relative areas of anode & cathode 3.Nature of corrosion product.

ii. Nature of environment: 1.Temperature 2. p^H 3. Humidity.

Corrosion control methods -Principle of cathodic protection- Sacrificial Anodic Protection (SAP), Impressed Current Cathodic Protection (ICCP)

Metallic coatings-Anodic & Cathodic coatings- Coating techniques- Electroplating (Cu coating on Fe), Electroless plating (Ni coating on Insulators)

UNIT-III: ENGINEERING MATERIALS (8H)

a) Lubricants

Definition, Mechanism of lubrication: Hydro dynamic-Boundary-Extreme pressure lubrication, Classification: solid, semi solid and liquid lubricants, Properties of lubricants: Determination of Viscosity, viscosity index, Saponification number- and its significance, iodine value and its significance. Applications of Lubricants.

b) Refractories:

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

UNIT-IV: CHEMICAL FUELS (8H)

Introduction-classification –comparision of solid, liquid and gaseous fuels.
Calorific value (CV)-HCV, LCV (Definition and relationship), Dulongs formula-Numericals.
Chemistry of combustion-Numericals by weight-weight method and weight- volume method.
Liquid fuels - Petroleum refining-composition and rating of petrol and diesel (Octane number, cetane number) and its enhancement methods-Anti knocking agents and reforming.
Cracking and significance –Types of cracking- fixed bed catalytic cracking.
Bio-Diesel: Source – trans-esterification and advantages.

UNIT-V: MOLECULAR STRUCTURE AND SPECTROSCOPY (8H)

a. Molecular orbital theory: Linear Combination of Atomic Orbitals (LCAO), Molecular orbital energy level diagrams of O_2, N_2, CO.
Crystal field theory- salient features- splitting of d orbitals of transition metal complexes in octahedral, tetrahedral and square planar complexes.
b. Spectroscopic techniques: Principle and selection rules - Vibrational and electronic transitions of molecules. Working principles - block diagrams of UV visible and IR spectrometers, Applications in structural elucidation. Interpretation of IR spectra of benzene, ethanol and ethylacetate, interpretation of UV visible spectra of benzene and propanone.

Text Books:

1. J D Lee, Concise inorganic chemistry, Blackwell science ltd, USA, Fifth edition.
2. PC Jain, M Jain Engineering Chemistry, Dhanapathi Rai &sons (16th edition), New Delhi.
3. Sashi Chawla, Text book of Engineering Chemistry, Dhanapathi Rai &sons, New Delhi.
4. O.G. PALANNA, Engineering Chemistry, TMH Edition.
5. Fundamentals of Molecular Spectroscopy, by C. N. Banwell.
6 .S S Dara, S Chand & sons, Engineering Chemistry, New Delhi.
7. Puri, Sharma and Pathania Principles of physical chemistry, Vishal Publishing Co.
8. PL Soni and op Dharmarha, S Chand &sons, Text book of PhysicalChemistry, New Delhi.
9. NPTEL Polymer Chemistry Course, D. Dhara, IIT Kharagpur

Learning Resources:

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, byM. J. Sienko andR. A. Plane
3. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
4. Physical Chemistry, by P. W. Atkins
5. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition

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DEPARTMENT OF CHEMISTRY
SEMESTER-I
CHEMISTRY LAB-I
(Common to all branches)

Instruction : 2 hours per week	Semester End Exam Marks : 25	Subject Reference Code : 18BS151CH
Credits : 0.5	Continuous Internal Exam Marks : 15	Duration of semester End Exam : 3 Hours

LEARNING OUT COMES:

At the end of the course students should be able to:

1. Estimate the amount of the given acid by p^Hmetry.
2. Construct the galvanic cell and measure the variation of EMF of the cell with the change in concentration.
3. Assess the estimation of iron by instrumental and volumetric techniques.
4. Determine the rate constant of a chemical reaction.
5. Measure molecular/system properties such as viscosity, partition coefficient.

Any six experiments

1. Estimation of acid in the test sample using p^H Metry
2. Potentiometric Analysis of the concentration of a given acid.
3. Potentiometric Analysis of the concentration of $FeSO_4$ in the given solution
4. Quantitative determination of ferrous iron in the given solution by permanganometry.
5. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.
6. Determination of viscosity of the given oil using Ostwald viscometer
7. Determination of partition coeffecient of acetic acid between butanol and water.
8. Synthesis of a drug namely Aspirin.

Text Books:

1. G H Jeffery, J Bassett, J Mendham, R C Denney, Vogel's text book of quantitative chemical analysis, Fifth Edition.
2. M S Kaurav, Engineering chemistry with laboratory experiments, PHI learning (P) ltd, New Delhi.
3. Sunita rattan, Experimenta in applied chemistry, S K Kataria & Sons (2010)

9/5/18