

**KAKATIYA UNIVERSITY**  
**B.Sc. Final Year (Under CBCS)**  
**SEMESTER – V**  
**(SEC-3) Skill Enhancement Course-III**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

---

**VERBAL REASONING FOR APTITUDE TEST**

**Credits: 2**

**Theory: 2 hours/week**

**Marks - 50**

**Unit – I NUMBERS AND DIAGRAMS**

**1.1 Series Completion:** Number series, Alphabet Series

**1.2 Series Completion:** Alpha Numeric Series, Continuous Pattern Series

**1.3 Logical Venn Diagrams**

**1.4 Mathematical Operations:** Problem solving by substitution, Interchange of signs and numbers

**Unit – II ARITHMETICAL REASONING**

**2.1 Mathematical Operations:** Deriving the appropriate conclusions

**2.2 Arithmetical Reasoning:** Calculation based problems, Data based problems

**2.3 Arithmetical Reasoning:** Problems on ages, Venn diagram based problems

**2.4 Cause and Effect Reasoning**

**Text Book:** A Modern Approach to Verbal & Non-Verbal Reasoning by Dr. R.S. Aggarwal

**KAKATIYA UNIVERSITY**  
**B.Sc. Final Year (Under CBCS)**  
**SEMESTER – V**  
**(GE-1) GENERIC ELECTIVE-I**  
**(FOR ALL SCIENCE FACULTY DEPARTMENTS)**

---

**PUBLIC HEALTH AND HYGIENE**

**Credits: 2**

**Theory :2 hours/week**

**Marks: 50**

**UNIT – I : NUTRITION AND ENVIRONMENT**

1.1 Balanced diet and Malnutrition.

1.2 Nutritional deficiencies and disorders- Carbohydrates, proteins, lipids, vitamins and minerals.

1.3 Occupational, Industrial, agricultural and urban Health-Exposure at work place, urban areas, industrial workers, farmers and agricultural labourers, Health workers and health disorders and diseases.

1.4 Environmental pollution and associated Health hazards, Water borne diseases and Air borne diseases.

**UNIT-II : DISEASES AND HEALTH CARE**

2.1 Causes, Symptoms, Diagnosis, Treatment and Prevention - Malaria, Filariasis, Measles,

Polio, Chicken pox, Rabies, Plague, Leprosy,.

2.2 Causes, Symptoms, Diagnosis, Treatment and Prevention of non communicable diseases - Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

2.3 Health care legislation in India – Termination of pregnancy act, Maternity benefit act, Biomedical waste act, ESI act.

2.4 First Aid and Health awareness, personal health care record maintenance.

**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSC-1E)**  
**SEMESTER – V**

---

**CHEMISTRY PAPER-V**

**Unit-I (Inorganic Chemistry) 11 Hrs**

**S5-I-1: Coordination Compounds-II 09 Hrs**

Tetrahedral, square planer with suitable examples. Crystal field stabilization energies and its calculations for various  $d^n$  configurations in octahedral complexes. High Spin Low Spin complexes.

Magnetic properties of transition metal complexes- para, dia, ferro, anti ferromagnetic properties, determination of magnetic susceptibility (Guoy method), spin only formula, calculations of magnetic moments.

Electronic spectra of metal complexes – color of transition metal aqua complexes– d-d transitions. Detection of complex formation - basic principles of various methods- change in chemical properties, solubility, color, pH, conductivity, magnetic susceptibility.

Thermodynamic and kinetic stability of transition of metal complexes. Stability of metal complexes –stepwise and overall stability constant and their relationship. Factors effecting the stability constants. Chelate effect, determination of composition of complex by Job's method and mole ratio method.

**Applications of coordination compounds**

Applications of coordination compounds a) in quantitative and qualitative analysis with suitable examples b) in medicine for removal of toxic metal ions and cancer therapy c) in industry as catalysts polymerization – Ziegler Natta catalyst d) water softening

**S5-I-2: Boranes and Carboranes 02 Hrs**

Definition of clusters. Structures of boranes and carboranes- Wade's rules, closo, nido arachno Boranes and Carboranes.

**Unit-II (Organic Chemistry)****11 Hrs****S5-O-1: Amines, Cyanides and Isocyanides****07 Hrs****Amines:**

Nomenclature, classification into 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> Amines and Quaternary ammonium compounds. Preparative methods – 1. Ammonolysis of alkyl halides 2. Gabriel synthesis 3. Hoffman's bromide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties and basic character – Comparative basic strength of Ammonia, methyl amine, dimethyl amine, tri methyl amine and aniline- comparative basic strength of aniline, N- methyl aniline and N,N-dimethyl aniline (in aqueous and non- aqueous medium), steric effects and substituent effects. Use of amine salts as phase transfer catalysts. 4. Chemical Properties: a) Alkylation b) Acylation c) Carbylamine reaction d) Hinsberg's separation. 5. Reaction with Nitrous acid of 1<sup>o</sup>, 2<sup>o</sup>, 3<sup>o</sup> (Aliphatic and aromatic amines). Electrophilic substitutions of Aromatic amines – Bromination and Nitration, oxidation of aryl and 3<sup>o</sup> Amines, diazotisation. 6. Diazonium salts: Preparation with mechanism. Synthetic importance – a) Replacement of diazonium group by – OH, X (Cl)- Sandmeyer and Gatterman reaction, by fluorine (Schiemann's reaction), by iodine, CN, NO<sub>2</sub>, H and aryl groups. Coupling Reaction of diazonium salts. i) with phenols ii) with anilines. Reduction to phenyl hydrazines

**Cyanides and isocyanides:**

Nomenclature (aliphatic and aromatic) structure. Preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from Alkyl halides and Amines. 2. Properties of cyanides and isocyanides, a)hydrolysis b) addition of Grignard reagent iii) reduction iv) oxidation.

**S5-O-2: Heterocyclic Compounds****04 Hrs**

Introduction and definition: Simple 5 membered ring compounds with one hetero atom Ex. Furan. Thiophene and pyrrole. Importance of ring systems – presence in important natural products like hemoglobin and chlorophyll. Numbering the ring systems as per Greek letter and Numbers. Aromatic character – 6- electron system (four-electrons from two double bonds and a pair of non-bonded electrons from the hetero atom). Tendency to undergo substitution reactions. Resonance structures: Indicating electron surplus carbons and electron deficient hetero atom. Explanation of feebly acidic character of pyrrole, electrophilic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions. Reactivity of furan as 1,3-diene, Diels Alder reactions (one example). Sulphonation of thiophene purification of Benzene

obtained from coal tar). Preparation of furan, Pyrrole and thiophene from 1,4,- dicarbonyl compounds only, Paul-Knorr synthesis, structure of pyridine, Basicity – Aromaticity – Comparison with pyrrole – one method of preparation and properties – Reactivity towards Nucleophilic substitution reaction – Pchichibabin reaction.

### Unit-III (Physical Chemistry)

#### S5-P-1: Chemical Kinetics

11 Hrs

Introduction to chemical kinetics, rate of reaction, variation of concentration with time, rate laws and rate constant. Specific reaction rate. Factors influencing reaction rates: effect of concentration of reactants, effect of temperature, effect of pressure, effect of reaction medium, effect of radiation, effect of catalyst with simple examples, order of reaction.

First order reaction, derivation of equation for rate constant. Characteristics of first order reaction. Units for rate constant. Half- life period, graph of 1st order reaction, examples. Decomposition of  $\text{H}_2\text{O}_2$  and decomposition of oxalic acid.

Pseudo first order reaction, Hydrolysis of methyl acetate, inversion of cane sugar, problems

Second order reaction, derivation of expression for 2nd order rate constant, examples- Saponification of ester,  $2\text{O}_3 \rightarrow 3\text{O}_2$ ,  $\text{C}_2\text{H}_4 + \text{H}_2 \rightarrow \text{C}_2\text{H}_6$ . Characteristics of second order reaction, units for rate constants, half- life period and second order plots.

Zero order reaction: derivation of rate expression, examples i) combination of  $\text{H}_2$  and  $\text{Cl}_2$  to form  $\text{HCl}$ , ii) thermal decomposition of  $\text{HI}$  on gold surface characteristics of Zero order reaction units of  $k$ , half-life period and graph, problems.

Determination of order of reaction: i) method of integration, ii) half life method, iii) vant-Hoff differential method iv) Ostwald's isolation method. Problems.

Kinetics of complex reactions (first order only): Opposing reactions, Parallel reactions, Consecutive reactions and Chain reactions. Problems.

Effect of temperature on reaction rate, Arrhenius equation. Temperature coefficient. Concept of energy of activation, determination of energy of activation from Arrhenius equation and by graphical method, problems. Simple collision theory based on hard sphere model explanation of frequency factor, orientation or steric factor. The transition state theory (elementary treatment).

**Unit-IV (General Chemistry)****12 Hrs****S5-G-1: Molecular spectroscopy****08 Hrs**

Introduction to electromagnetic radiation, interaction of electromagnetic radiations with molecules, various types of molecular spectra.

**Rotational spectroscopy (Microwave spectroscopy)**

Rotational axis, moment of inertia, classification of molecules (based on moment of inertia), rotational energies, selection rules, determination of bond length of rigid diatomic molecules eg. HCl.

**Infra red spectroscopy**

Energy levels of simple harmonic oscillator, molecular vibration spectrum, selection rules. Determination of force constant. Qualitative relation of force constant to bond energies. Anharmonic motion of real molecules and energy levels. Modes of vibrations in polyatomic molecules. Characteristic absorption bands of various functional groups. Finger print nature of infrared spectrum

**Electronic spectroscopy:**

Bonding and antibonding molecular orbitals, electronic energy levels of molecules ( $\sigma$ ,  $\pi$ ,  $n$ ), types of electronic transitions:  $\sigma \rightarrow \sigma^*$ ,  $n \rightarrow \sigma^*$ ,  $n \rightarrow \pi^*$ ,  $\pi \rightarrow \pi^*$  with suitable examples. Selection rules, Terminology of chromophore, auxochrome, bathochromic and hypsochromic shifts. Absorption of characteristics of chromophones: diene, enone and aromatic chromophores. Representation of UV-Visible spectra.

**S5-G-2: Photochemistry****04 Hrs**

Introduction to photochemical reactions, Difference between thermal and photochemical reactions, Laws of photo chemistry- Grotthus - Drapper law, Stark – Einsteins Law of photo chemical equivalence. Quantum yield. Examples of photo chemical reactions with different quantum yields. Photo chemical combinations of  $H_2 - Cl_2$  and  $H_2 - Br_2$  reactions, reasons for the high and low quantum yield. Problems based on quantum efficiency, Consequences of light absorptions. Singlet and triplet states. Jablonski diagram Explanation of internal conversion, inter- system crossing, Phosphorescence, fluorescence.

## References :

### Unit- I

1. Principles of Inorganic Chemistry by Puri, Sharma and Kalia Vishal Publications 1996.
2. Concise Inorganic Chemistry by J.D. Lee 3<sup>rd</sup> edn.
3. Basic Inorganic Chemistry by F.A.Cotton, G.Wilkinson and Paul.L. Gaus 3<sup>rd</sup> edn Wiley Publishers 2001. Chem.
4. Inorganic Chemistry Principles of structure and reactivity by James E.Huhey, E.A. Keiter and R.L. Keiter 4<sup>th</sup> edn.
5. Chemistry of the elements by N.N.Greenwood and A. Earnshaw Pergamon Press 1989.
6. Inorganic Chemistry by Shriver and Atkins 3<sup>rd</sup> edn Oxford Press 1999.

### Unit- II

1. Text book of organic chemistry by Soni.
2. General Organic chemistry by Sachin Kumar Ghosh.
3. Text book of organic chemistry by Morrison and Boyd.
4. Text book of organic chemistry by Graham Solomons.
5. Text book of organic chemistry by Bruce Yuranis Powla.

### Unit III

1. Principles of physical chemistry by Prutton and Marron.
2. Text Book of Physical Chemistry by Soni and Dharmahara..
3. Text Book of Physical Chemistry by Puri, Sharma and Pattania.
4. Physical Chemistry by Atkins & De Paula, 8<sup>th</sup> Edition
5. Text Book of Physical Chemistry by K. L. Kapoor.
6. Physical Chemistry through problems by S.K. Dogra.
7. Text Book of Physical Chemistry by R.P. Verma.
8. Elements of Physical Chemistry by Lewis Glasstone.
9. Basics of Chemical Kinetics by G.L. Agarwal
10. Kinetics and mechanism of chemical transformations by Rajaram & Kuriacose

### Unit IV

1. Bioinorganic Chemistry, M.N.Huges
2. Organic spectroscopy, William Kemp
3. Text Book of Physical Chemistry by Puri, Sharma and Pattania.
4. Photochemistry by Gurdeep Raj, Goel publishing house, 5<sup>th</sup> edition

**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSC-1E)**  
**SEMESTER – V**

---

**LABORATORY COURSE**  
**CHEMISTRY-V (Organic Synthesis and TLC)**  
**(03 Hrs per week, 01 Credit)      45 Hrs**

**I. Synthesis of Organic compounds:**

Acetylation: Acetylation of salicylic acid, Benzoylation of Aniline.

Aromatic electrophilic substitution: Nitration: Preparation of nitro benzene and m-dinitro benzene.

Halogenation: Preparation of p-bromo acetanilide, Preparation of 2, 4, 6-tribromo phenol

Oxidation: Preparation of benzoic acid from benzyl chloride.

Esterification: Preparation of n-butyl acetate from acetic acid.

Methylation: Preparation of 1-naphthyl methyl ether.

Condensation: Preparation of benzilidene aniline and Benzaldehyde and aniline.

Diazotisation: Azocoupling of 1-Naphthol.

**II. Thin layer Chromatography (TLC)**

Determination of  $R_f$  values and identification of organic compounds: preparation and separation of 2,4-dinitrophenyl hydrazones of acetone and 2-butanone using toluene and light petroleum(40:60)

Separation of ortho & para nitro aniline mixtures



**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSE-1E)**  
**SEMESTER – V**

**ELECTIVE-I**

---

**A (T) - INSTRUMENTAL METHODS OF ANALYSIS**

**Unit I: Chromatography-I**

**11Hrs**

**S5-E-A-I: Solvent Extraction-** Principle, Methods of extraction: Batch extraction, continuous extraction and counter current extraction. Application – Determination of Iron (III).  
**Chromatography:** Classification of chromatographic methods, principles of differential migration, adsorption phenomenon, nature of adsorbents, solvent systems.

**Thin layer Chromatography (TLC):** Advantages, preparation of plates, development of the chromatogram, Detection of the spots, factors effecting R<sub>f</sub> values and applications.

**Paper Chromatography:** Principle, choice of paper and solvent systems, development of chromatogram – ascending, descending, radial and two dimensional chromatography and applications

**Unit II: Chromatography-II**

**11Hrs**

**S5-E-A-II: Column Chromatography-** Principle, Types of stationary phases, Column packing – Wet packing technique, Dry packing technique. Selection criteria of mobile phase solvents for eluting polar, non-polar compounds and its applications.

**Ion exchange chromatography:** Principle, cation and anion exchange resins, its application in separation of ions.

**Gas Chromatography:** Theory and instrumentation (Block Diagram), Types of stationary phases and carrier gases (mobile phase).

**High performance liquid chromatography:** Theory and instrumentation, stationary phases and mobile phases. Analysis of paracetamol.

**Unit III: Colorimetry and Spectrophotometry**

**12Hrs**

**S5-E-A-III:** General features of absorption – spectroscopy, transmittance, absorbance, and molar absorptivity. Beer Lambert's law and its limitations, difference between Colorimetry and Spectrophotometry.

Instruments – Single beam UV- Visible Spectrophotometer, Double beam UV- Visible Spectrophotometer. Lamps used as energy sources. Verification of Beer's law. Estimation of iron in water samples by thiocyanate method. Estimation of (i) Chromium and (ii) Manganese in steel.

**IR Spectrophotometer:** Principle, Sources of Radiations, Sampling, Block diagram of FT-IR Spectrophotometer.

**Unit IV: Electro analytical methods**

**11Hrs**

**S5-E-A-IV:** Types of Electro analytical Methods.

**I) Interfacial methods** – a) Potentiometry: Principle, Electrochemical cell, Electrodes- (i) Indicator and (ii) Reference electrodes – Normal Hydrogen Electrode, Quinhydrone Electrode, Saturated Calomel Electrode. Numerical Problems. Application of Potentiometry – Assay of Sulphanilamide

b) Voltametry – three electrode assembly; Introduction to types of voltametric techniques, micro electrodes, Over potential and Polarization

**II) Bulk methods** – Conductometry, Conductivity Cell, Specific Conductivity, Equivalent Conductivity. Numerical Problems. Applications of conductometry. Estimation of  $\text{Cl}^-$  using  $\text{AgNO}_3$ . Determination of Aspirin with KOH.

**Recommended Text Books and Reference Books**

1. Analytical Chemistry by David Krupadanam, Universities Press (India) Limited.
2. D.A. Skoog, F.J. Holler, T.A. Nieman, Principles of Instrumental Analysis, Engage earning India Ed.
3. D. A. Skoog, D.M. West, F.J. Holler, Fundamentals of Analytical Chemistry 6<sup>th</sup> Ed., Saunders College Publishing, Fort worth (1992).
4. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. Instrumental Methods of Analysis. 7th Ed. Wadsworth Publishing Co. Ltd., Belmont, California, USA, 1988.
5. Harris, D. C. Quantitative Chemical Analysis, W. H. Freeman.2007.
6. Dean, J. A. Analytical Chemistry Notebook, McGraw Hill.
7. Day, R. A. & Underwood, A. L. Quantitative Analysis, Prentice Hall of India.
8. Freifelder, D. Physical Biochemistry 2nd Ed., W.H. Freeman and Co., N.Y. USA, 1982.
9. Cooper, T.G. The Tools of Biochemistry, John Wiley and Sons, N.Y. USA. 16, 1977.
10. Vogel, A. I. Vogel's Qualitative Inorganic Analysis 7th Ed., Prentice Hall.
11. Vogel, A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Prentice Hall.
12. Robinson, J.W. Undergraduate Instrumental Analysis 5th Ed., Marcel Dekker, Inc, New York (1995).
13. Analytical Chemistry 7<sup>th</sup> edition by Gary D. Christian (2004).
14. B. K. Sharma, Industrial Chemistry (including Chemical Engineering). Edn. (1997).
15. M.N Sastry, Separation Methods, Paperback (2004), Himalaya Publications.
16. Usharani Analytical Chemistry Paperback (2000) Narosa Publications

**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSE-1E)**  
**SEMESTER – V**

**ELECTIVE-I**

---

**A (T) - INSTRUMENTAL METHODS OF ANALYSIS**

**LABORATORY COURSE**

**(Chemical Kinetics & Electrochemistry)**

**(02 Hrs per week, 01 Credit)      30 Hrs**

**I. Chemical Kinetics**

1. Kinetic study of Acid Catalyzed hydrolysis of methyl acetate and determination of rate constant - Graphical method.
2. Kinetic study of Acid catalyzed Acetone - Iodine reaction and determination of rate constant – Graphical method.
3. Kinetic study of persulphate iodide reaction and determination rate constant  
Graphical method

**II. Electrochemistry (Potentiometry & pH metry)**

1. Determination of Redox potentials of  $\text{Fe}^{2+}$  by Potentiometry titration of ferrous ammonium sulphate Vs.  $\text{KMnO}_4$ .
2. pH metric titration of strong acid (HCl) with strong base (NaOH)
3. pH metric titration of weak acid ( Acetic acid) with strong base (NaOH) and determination of dissociation constant

**Reference Books:**

1. Garland, C. W.; Nibler, J. W. & Shoemaker, D. P. *Experiments in Physical Chemistry 8<sup>th</sup> Ed.*; McGraw-Hill: New York (2003).
2. Halpern, A. M. & McBane, G. C. *Experimental Physical Chemistry 3rd Ed.*; W.H. Freeman & Co.: New York (2003).
3. Khosla, B. D.; Garg, V. C. & Gulati, A., *Senior Practical Physical Chemistry*, R. Chand & Co.: New Delhi (2011).
4. Practical Physical Chemistry by B. Vishwanathan and P.S. Raghavan.

**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSE-1E)**  
**SEMESTER – V**

**ELECTIVE-I**

---

**B) INDUSTRIAL CHEMISTRY AND CATALYSIS**  
**(03 Hrs per week, 03 Credits) 45 Hrs**

**Unit I: General Principles of Metallurgy and Production of Non Ferrous Metals 11 Hrs**

**S5-E-B-I: Pyrometallurgy:** Drying and calcination, roasting, smelting, products of smelting,

**Hydrometallurgy:** Leaching methods, leaching agents, leaching of metals, oxides and sulphides.

**Separation of liquid and solid phases and processing of aqueous solutions**

**Electrometallurgy:** Electrolysis, Refining electrolysis, electrolysis from aqueous solutions, fused-salt electrolysis

**Refining processes:** Chemical and physical refining processes

**Production of selected non-ferrous metals (Copper, Nickel, Zinc):** Properties, raw materials, production (flow charts presentations and chemical reactions involved) and uses.

**Unit II: Natural and Synthetic Dyes 12 Hrs**

**S5-E-B-II:** Classification of dyes. Sources of natural dyes: Indigoid, Anthraquinone, Naphthoquinone, Benzoquinone, Flavonoid, Carotenoid and Tannin-based dyes.

**Synthetic Dyes:** Acidic, basic, dispersive, direct, reactive and vat dyes with examples.

Extraction of natural dyes and their sustainability: The different methods for extraction of coloring materials from natural dyes. Aqueous extraction, alkali or acid extraction, microwave and ultrasonic assisted extraction, fermentation, solvent extraction, super critical fluid extraction.

Drying methods. Application of natural dyes on textiles, Mordanting- types of mordanting - metallic mordants, oil mordants, Tannins and Tannic acid. Present scenario and sustainability

Issues in usage of natural dyes and cost considerations.

**Unit III: Catalysis-I 11 Hrs**

**S5-E-B-III: Homogeneous and heterogeneous catalysis** - Definition of a catalyst and catalysis.

Comparison of homogeneous and heterogeneous catalysis with specific examples. General characteristics of catalytic reactions.

**Acid-base catalysis-** Examples of acid and base catalysed reactions, hydrolysis of esters. Kinetics of acid catalysed reactions. Specific acid and general acid catalysis, Kinetics of base catalysed reactions. Specific base and general base catalysis. Examples-Aldol condensation and decomposition of nitramide, base catalysed conversion of acetone to di acetone alcohol. Effect of PH on reaction rate of acid and base catalysed reactions.

**Phase transfer catalysis:** Principle of phase transfer catalysis, classification of phase transfer catalysts. Factors influencing the rate of PTC reactions.

#### **Unit IV: Catalysis-II**

**11 Hrs**

**S5-E-B-IV: Enzyme catalysis-** Characteristics of enzyme catalysis, Examples: (i) Invertase in inversion of cane sugar (ii) Maltase in conversion of maltose to glucose (iii) Urease in decomposition of urea and (iv) Zymase in conversion of glucose to ethanol. Factors affecting enzyme catalysis. Effect of temperature, pH, concentration and inhibitor on enzyme catalysed reactions.

Kinetics of enzyme catalysed reactions: Michaelis-Menton Equation. Mechanism of enzyme catalysed reactions. Significance of Michaelis constant ( $K_m$ ) and maximum velocity ( $V_{max}$ ), Lineweaver-Burk plot.

#### **References**

1. E. Stocchi: Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
3. J. A. Kent: Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
4. Kate ina Skotnicová, Monika Losertová, Miroslav Kursá, Theory of production of non-ferrous metals and alloys Study.
5. K.Venkataraman, the Chemistry of Synthetic Dyes, Volume 4, Elsevier, Technology & Engineering.
6. Sujata Saxena and A. S. M. Raja by Natural Dyes: Sources, Chemistry, Application and Sustainability Issues.
7. Physical Chemistry by Atkins and De Paula, 8<sup>th</sup> Edn.
8. Physical Chemistry by Puri, Sharma and Pattania, 2017.
9. Kinetics and mechanism of chemical transformations by Rajarajm and Kuraiacose, Published by Macmillan India Ltd.
10. Text book of Physical Chemistry by K.L. Kapoor Macmillan, 1999.
11. Catalysis by J.C. Kuriacose, Macmillan Macmillan Publishers India Limited, 1980.

**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSE-1E)**  
**SEMESTER – V**

---

**LABORATORY COURSE**

**DSE: CHEMISTRY LAB PAPER -VI (Elective-B)**  
**(Spectral Analysis & Separation of Organic Compounds)**  
**(02 Hrs per week, 01 Credit)    30 Hrs**

**I. Spectral analysis of Organic compounds**

Analysis of any five organic compounds with different functional group using UV, IR, <sup>1</sup>HNMR and Mass Spectroscopy.

**II. Separation of two component mixture**

1. Aniline + Naphthalene
2. Benzoic acid + Benzophenone

**Reference Books:**

1. Skoog, D.A. Holler F.J. & Nieman, T.A. *Principles of Instrumental Analysis*, Cengage Learning India Ed.
2. Willard, H.H., Merritt, L.L., Dean, J. & Settoe, F.A. *Instrumental Methods of Analysis*, 7th Ed. Wadsworth Publishing Company Ltd., Belmont, California, USA, 1988.
3. Spectroscopic identification of organic compounds by R M Silverstein and F X Webster.

**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSE-1E)**  
**SEMESTER – V**

**ELECTIVE-I**

---

**CHEMISTRY PAPER-VI (Elective-C)**  
**DSE: Analysis of Drugs, Foods & Dairy Products**  
**(03 Hrs per week, 03 Credits) 45 Hrs**

**UNIT- I** **11 Hrs**

**S5-E-C-1: Analysis of the drugs and pharmaceuticals preparations-I**

(Knowledge of molecular formula, structure and analysis)

1. Analysis of analgesics and antipyretics like aspirin and paracetamol
2. Analysis of antimalerials like chloroquine.
3. Analysis of drugs in the treatment of infections and infestations: Amoxicillin, chloramphenicol, metronidazole, penicillin, tetracycline, cephalexin (cephalexin). Anti-tuberculosis drug-isoniazid.

**UNIT - II** **11 Hrs**

**S5-E-C-2: Analysis of the drugs and pharmaceuticals preparations-II**

(Knowledge of molecular formula, structure and analysis)

1. Analysis of antihistamine drugs and sedatives like: Allegra, zyrtec (citrizine), alprazolam, trazodone, lorazepam, ambient (zolpidem), diazepam.
2. Analysis of prevacid (lansoprazole) a drug used for the prevention of production of acids in stomach.

**UNIT - III** **11 Hrs**

**S5-E-C-3: Analysis of the drugs and pharmaceuticals preparations-III**

1. Analysis of anti epileptic and anti convulsant drugs like Phenobarbital and phenacemide.
2. Analysis of drugs used in case of cardiovascular drugs: atenolol, norvasc (amlodipine).
3. Analysis of Lipitor (atorvastatin) a drug for the prevention of production of cholesterol.
4. Analysis of diuretics like: furosemide (Lasix), triamterene

**UNIT - IV**

**S6-E-C-4: Analysis of Milk, Milk products & Food materials** **12 Hrs**

Acidity, total solids, fat, total nitrogen, protenines, lactose, phosphate activity, casein, chloride. Analysis of food materials- Preservatives: Sodium carbonate, sodium benzoate sorbic acid Coloring matters, - Brilliant blue FCF, fast green FCF, tertrazine, erythrosine, sunset yellow FCF. Flavoring agents - Vanilla, diacetyl, isoamyl acetate, limonene, ethyl propionate, allyl hexanoate and Adulterants in rice and wheat, wheat flour, sago, coconut oil, coffee powder, tea powder, milk.

**Reference Books:**

- 1.F.J.Welcher-Standard methods of analysis
- 2.A.I.Vogel-A text book of quantitative Inorganic analysis-ELBS
- 3.F.D.Snell & F.M.Biffen-Commercial methods of analysis-D.B.Taraporavala & sons
- 4.J.J.Elving and I.M.Kolthoff- Chemical analysis - A series of monographs on analytical chemistry and its applications -- Inter Science- Vol I to VII.
- 5.Analytical Agricultural Chemistry by S.L.Chopra & J.S.Kanwar -- Kalyani Publishers
6. Quantitative analysis of drugs in pharmaceutical formulations by P.D.Sethi, CBS Publishers and Distributors, New Delhi .
7. G.Ingram- Methods of organic elemental micro analysis- Chapman and Hall.
8. H.Wincciam and Bobbles (Henry J)- Instrumental methods of analysis of food additives.
9. H.Edward-The Chemical analysis of foods;practical treatise on the examination of food stuffs and the detection of adulterants
10. The quantitative analysis of drugs- D.C.Garratt-Chapman & Hall.
11. A text book of pharmaceutical analysis by K.A.Connors-Wiley-International.
12. Comprehensive medicinal chemistry-Ed Corwin Hansch Vol 5,Pergamon Pres.



**KAKATIYA UNIVERSITY**  
**U.G. CHEMISTRY (Under CBCS)**  
**B.Sc. Final Year (DSE-1E)**  
**SEMESTER – V**

**ELECTIVE-I**

---

**LABORATORY COURSE**

**DSE: CHEMISTRY LAB PAPER -VI (Elective-C)**

**((Industrial Chemicals & Environment))**

**(02 Hrs per week, 01 Credit)    30 Hrs**

1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD)
3. Percentage of available chlorine in bleaching powder.
5. Measurement of chloride of water samples by simple titration method by AgNO<sub>3</sub>
6. Estimation of total alkalinity of water samples (CO<sub>3</sub><sup>2-</sup> & HCO<sub>3</sub><sup>-</sup> using double titration Method.
7. Estimation of Copper in Brass

**Reference Books:**

1. E. Stocchi., Industrial Chemistry, Vol-I, Ellis Horwood Ltd. UK.
2. R.M. Felder, R.W. Rousseau: Elementary Principles of Chemical Processes, Wiley Publishers, New Delhi.
3. J. A. Kent., Riegel's Handbook of Industrial Chemistry, CBS Publishers, New Delhi.
4. S. S. Dara., A Textbook of Engineering Chemistry, S. Chand & Company Ltd. New Delhi.
5. K. De., Environmental Chemistry: New Age International Pvt. Ltd, New Delhi.
6. S. M. Khopkar., Environmental Pollution Analysis: Wiley Eastern Ltd, New Delhi.