



DEPARTMENT OF CHEMISTRY

KAKATIYA UNIVERSITY

M.Sc. (5 Year Integrated course)

Revised syllabi with effect from the academic year 2023-2024

[Under CBCS system]

Semester –I

Curriculum						Scheme of Examination		
S. No	Paper Code	Paper no.	Title of the paper	Instruction Hrs/ Week	No. of Credits	Marks		Total marks
						External	Internal	
1	1-T1	Paper-I	English language	4	4	80	20	100
2	1-T2	Paper-II	Second language	4	4	80	20	100
3	1-T3	Paper-III	Mathematics-I/Biology-I	4	4	80	20	100
4	1-T4	Paper- IV	Computer science	4	4	80	20	100
5	1-T5	Paper-V	Chemistry-I	4	4	80	20	100
6	1-T6	Paper-VI	Chemistry-II	4	4	80	20	100
7	1-P1	Paper-VII	Computer lab	4	2	50	----	50
8	1-P2	Paper-VIII	Chemistry lab	4	2	50	----	50
	Total	----	----	32	28	----	----	700

Semester –II

Curriculum						Scheme of Examination		
S. No	Paper Code	Paper no.	Title of the paper	Instructi on Hrs/ Week	No. of Credits	Marks		Total marks
						External	Internal	
1	2-T1	Paper-I	English language	4	4	80	20	100
2	2-T2	Paper-II	Second language	4	4	80	20	100
3	2-T3	Paper-III	Mathematics-II	4	4	80	20	100
4	2-T4	Paper- IV	Computer science	4	4	80	20	100
5	2-T5	Paper-V	Chemistry-I	4	4	80	20	100
6	2-T6	Paper-VI	Chemistry-II	4	4	80	20	100
7	2-P1	Paper-VII	Computer lab	4	2	50	----	50
8	2-P2	Paper-VIII	Chemistry lab	4	2	50	----	50
	Total	----	----	32	28	----	----	700

Semester-III

Curriculum						Scheme of Examination		
S. No	Paper Code	Paper no.	Title of the paper	Instruction Hrs/ Week	No. of Credits	Marks		Total marks
						External	Internal	
1	3-T1	Paper-I	English language	4	4	80	20	100
2	3-T2	Paper-II	Second language	4	4	80	20	100
3	3-T3	Paper-III	Community development	2	2	40	10	50
4	3-T4	Paper- IV	Environmental studies	2	2	40	10	50
5	3-T5	Paper-V	Computer science	4	4	80	20	100
6	3-T6	Pper-VI	Chemistry-I	4	4	80	20	100
7	3-T7	Paper-VII	Chemistry-II	4	4	80	20	100
8	3-P1	Paper-VIII	Computer lab	4	2	50	----	50
9	3-P2	Paper-IX	Chemistry lab	4	2	50	----	50
	Total	----	----	32	28	----	----	700

Semester-IV

Curriculum						Scheme of Examination		
S. No	Paper Code	Paper no.	Title of the paper	Instruc tion Hrs/ Week	No. of Cred its	Marks		Total marks
						External	Interna l	
1	4-T1	Paper-I	English language	4	4	80	20	100
2	4-T2	Paper-II	Second language	4	4	80	20	100
3	4-T3	Paper-III	EP	2	2	40	10	50
4	4-T4	Paper- IV	Chemical biology	2	2	40	10	50
5	4-T5	Paper-V	Computer science	4	4	80	20	100
6	4-T6	Paper-VI	Chemistry-I	4	4	80	20	100
7	4-T7	Paper-VII	Chemistry-II	4	4	100	20	100
8	4-P1	Paper-VIII	Computer lab	4	2	50	----	50
9	4-P2	Paper-IX	Chemistry lab	4	2	50	----	50
	Total	----	----	32	28	----	----	700

5-Year Integrated M.Sc. (CHEMISTRY)

SEMESTER-I (Theory)

PAPER-I : ENGLISH (1T1)

Unit-I : Poetry (Selections from Pleasures of Reading : An Anthology of Poems

Ed. C. Vijayasree & others (Orient Longman, 2001)

01. *O What is that Sound* - W.H. Auden (British)
02. *The Negro Speaks of Rivers* - Langstand Hughes (American)
03. *Telephone Conversation* - Wole Soyinka (African)
04. *A Different History* - Sujatha Bhatt (Indian English)

Unit-II : Prose (Selections from English Today : A Course in Reading & Writing)

Ed. K. Durga Bhavani & Others (Foundation Books)

01. *The Lost Child* - Mulk Raj Anand
02. *English in India Today : Some Views* - Susan Sontag et al
03. *I have a Dream* - Martin Luther King Jr.
04. *Gajar Halwa* - Gita Hariharan
05. *Health : An Issue of Social Justice* - K. Park

Unit-III: Short Stories (Selections from Vignettes of Life, Ed. T. Padma (Macmillan, 1997)

01. *The Lottery Ticket* - Anton Chekov
02. *Ha' Penny* - Alan Paton
03. *Diamond Rice* - Ranga Rao

Unit-IV: Language Study - 1

01. Tag Questions
02. Actives and Passives
03. Tenses
04. Reported Speech
05. Simple, Compound and Complex Sentences

Unit-V: Language Study - 2

01. Phrasal Verbs & Prepositional Verbs
02. Concord
03. More about Articles
04. Sentence Variations & Rewriting of Sentences
05. Idioms

Prescribed Text for Language Study:

1. Modern English : A Book of Grammar, Usage & Composition
by N. Krishnaswamy (Macmillan)

SEMESTER – I

PAPER-II : TELUGU (1T2)

UNIT-I

సంజయరాయభారము

ప్రథమాశ్వాసము 273 నుండి 333 వరకు(తిక్కన-ఆంధ్ర మహాభారతము-ఉద్యోగ పర్వము)

UNIT-II

కుచేలోపాఖ్యానము

దశమ స్కంధము (ఉత్తర-భాగము)-957ప. అనిన మునీంద్రుకనుగొని...నున్ది1029ప.

UNIT-III

సత్యభామ సాంత్యనము

ప్రథమాశ్వాసము 52 ప. అనిఇట్లు బహు ప్రకారంబుల...ను137 ప

....సఖీ మయూరికలు సెలరేగన్ వరకు(నంది తిమ్మన- పారిజాతాపహరణము)

UNIT-IV

సీతాపరిత్యాగము

షష్ఠాశ్వాసము266 ప. ఇంతకుబూని వచ్చి...నుండి 320 ప. రంగారు బంగారు

చెంగావులు....వరకు(కంకంటి పాపరాజు - ఉత్తర రామాయణము)

UNIT-V

వ్యాకరణము

(a) సంధులు

1. సవర్ణదీర్ఘసంధి 2. గుణసంధి 3. యణాదేశసంధి

4. వృద్ధిసంధి 5. ఉత్వసంధి 6. త్రికసంధి

7. రుగాగమ సంధి 8. టుగాగమ సంధి 9. సరళాదేశము 10. గసదదవాదేశము

(b) సమాసములు

1. అవ్యయిభావ సమాసము 2. కర్మధారయ సమాసము 3. తత్పరుష సమాసము

4. ద్వంద్వ సమాసము 5. బహువ్రీహి సమాసము 6. ద్వీగు సమాసము

SEMESTER – I

PAPER-III : MATHEMATICS (I) for Biology Students (1T3)

Unit-I : Functions : Definition of a function and one – one onto bijections, identify, constant functions – equality of two functions – composite functions – real-valued functions – domain – range – algebra of real valued functions.

Matrices : Matrix of order $m \times n$ – algebra of matrices – symmetric and skew symmetric matrices – Hermitian and skew-Hermitian matrices – Determinants – adjoint of a square matrix – singular and non-singular matrix – inverse of matrix – solution of system of linear equations using matrices.

Unit-II : Logarithms - definition - theorems on logarithms (statement only) - common logarithms - natural logarithms - exponential function - simple problems on these topics. Permutations and Combinations : Definition of permutations and combinations - nPr and nCr formulae (without proof) - Simple problems on these topics. Binomial theorem for positive integral index - Binomial theorem for rational index (statement only) - simple problems on these topics - Mathematical induction : Principle of mathematical induction - Problems on this topic.

Unit-III : Trigonometry : Trigonometric ratio - relation among trigonometric ratios - trigonometric ratios of compound angles - Trigonometric ratios of multiple angles - problems on these topics. Heights and distances : Angles of elevation and depressions - Problems involving one plane - Vectors : Vectors - Scalars - Vector algebra - Law of vector algebra - Unit vectors - Rectangular unit vectors - components of a vector - The dot or a scalar product - The cross or vector product - Triple products - simple problems on these topics.

Unit-IV : Quadratic Expression - Quadratic expression, equation in one variable - extreme values - changes in sign and magnitude - quadratic inequation. Probability : Random experiment - random event - exclusive events - mutually exclusive events - dependent and independent events - Classical definition of probability - relative frequency approach - sample space - sample events - addition and multiplication theorems - Bayes theorem - Random variable - distribution function - probability distribution function - Mean and variance of a random variable.

Texts and References

1. Intermediate mathematics IA by Telugu Akademi
2. Intermediate mathematics IIA by Telugu Akademi
3. Vector analysis, Murray R. Spiegel (Schaum's outline series)

SEMESTER-I

PAPER-III. : BIOLOGY (I) for Mathematics Students (IT3)

Unit-1: General characters and brief life history of one representative each of

- a) Prokaryotes: Viruses, Cyanobacteria, Bacteria
- b) Eukaryotes: Algae, Fungi, Bryophytes, Pteridophytes, Cycadophyta (Gymnosperms) and Magnoliophyta (Angiosperms)

Unit-II: Internal Morphology:

- a) Cell (Ultra structure) and Tissue systems
- b) Cell division: Mitosis and Meiosis and their significance

Unit-III: Inheritance:

- a) Mendelism
- b) Nucleic acids: Chemical structure and significance

Unit-IV: Photosynthesis:

- a) PS-I
- b) PS-II

Unit-V: Phytohormones:

- a) Growth promoters: Auxins, Gibberellins and Cytokinins
- b) Growth regulators(Ethylene) and Growth inhibitors (Ascorbic acid)

Unit-VI: Brief account of taxonomy and economic botany of Magnoliophyta

- a) Magnoliopsida (Dicotyledons): Fabaceae, Cucurbitaceae, Apiaceae and Sblanaceae
- b) Lilliopsida(Monocotyledons): Liliaceae and Poaceae.

SEMESTER-I

PAPER-IV : COMPUTER SCIENCE (IT4)

Computer Fundamentals and Office Tools

Unit-I: Introduction to Personal Computers - Processing Information - Inside the PC - Storing Information: Disks, Discs, and Flash - Getting Information In: Input - Getting Information Out: Output - Windows and File Management - Working with Windows - Working with Files. (Chapters 1,2,3,4,5,6 of Text Book 1)

Unit-II: MS Word: Basics - Formatting Text and Documents - Headers Footers and Foot Notes - Tabs, Tables and sorting - working with graphics - Templates, wizards and sample documents - macros - mail merge.
(Chapters 4,5,6,7,8,9,1 1, 12 of Text Book 2)

Unit-III: MS Excel: Basics - Spreadsheet Features - Entering and formatting text and numbers - Copying, moving, auto fill - Entering and editing formulas - Rearranging worksheets - Excel Formatting Techniques - page setup - column width, row height - alignment - borders - colors and shading - page breaks - charts and graphics.

(Chapters 13,14,15,17,18,19 of Text Book 2)

Unit-IV: MS Power Point: Basics - Creating presentations - Working with Text - Graphics and Multi media - setting up the slide show.

(Chapters 24,25,26,27 of Text Book 2)

Unit-V: MS Access: Introduction - Creating a Database and Tables – adding, renaming deleting fields in tables - Primary Key - Forms - Entering and Editing Data in Tables - Finding, Sorting and Displaying Data - Printing Reports, Forms, Letters and labels.

(Chapters 29,30,31,32,33,34 of Text Book 2)

Text Books

1. Computer Fundamentals, Lary Long, Wiley India
2. Working in Micro Soft Office, Ron Mansfield, TMH

SEMESTER-I

PAPER-V:CHEMISTRY-I(1T5)

UNIT-I

1. Periodic properties of elements and chemistry of s-block elements 8 h

a) Periodic properties of elements:

Ionization energy, electron affinity and electronegativity of elements, methods of determination of electronegativity – Pauling's approach and Mulliken's approach, Applications of electronegativity with respect to chemical behavior nature of bond, bond length, bond angle and diagonal relationship.

b) Chemistry of s-block elements :

Electropositive character, Reducing properties, Oxidation potentials, Flame colouration of alkali and alkaline earth metals, Solutions of s-block metals in liquid NH₃, Uses of alkali and alkaline earth metals.

2. Theory of quantitative analysis 7 h

a) **Volumetric analysis** - Principles, Types of titrations - i) Acid - base titrations - Strong acid - strong base, Strong acid - weak base, Weak acid - strong base, weak acid - weak base - Principles, titration curves and theory of acid base indicators ii) Redox titrations - Principles and theory of redox indicators iii) Complexation titrations - Principles and theory of metal ion indicators.

b) **Gravimetric analysis** - Principles and applications; co-precipitation and post-precipitation.

UNIT-II

1. Structural theory in organic chemistry

7h

Bond polarisation: Factors influencing the polarization of covalent bonds, electro negativity-inductiv effect. Application of inductive effect(a) Basicity of amines (b) Acidity of carboxylic acids (c) Stability of carbonium ions. Resonance-Mesomeric effect, application to (a) acidity of phenol, (b) acidity of carboxylic acids and basicity of anilines. Stability of carbo cations, Carbanions and free radicals. Hyper conjugation and its application to stability of carbanium ions, free radicals and alkenes.

2. Acyclic hydrocarbons

8h

Alkanes- methods of preparation: From Grignard reagent, Kolbe synthesis. Chemical reactivity- inert nature, free radical substitution, Halogenation example- reactivity, selectivity and orientation.

Alkenes - preparation of alkenes (with mechanism) (a) by dehydration of alcohols (b) dehydrohalogenation of alkyl halides (c) by dehalogenation of 1,2 dihalides, Zaitsev's rule. Properties: Anti-addition of halogen and its mechanism. Addition of HX, Markonikov's rule, addition of H₂O, HOX, H₂SO₄ with mechanism and addition of HBr in the presence of peroxide(anti-Markonikov's rule). Oxidation(cis- addition) – hydroxylation by KMnO₄, OsO₄, anti addition (via epoxidation), hydroboration, ozonolysis, location of double bond Dienes- Types of dienes, reactions of conjugated dienes- 1,2 and 1,4 addition and HBr to 1,3 butadiene and Diels – Alder reaction.

Alkynes– Preparation by dehydrohalogenation of vicinal dihalides, dehalogenation of tetrahalides. Physical Properties: Acidity of terminal alkynes (formation of metal acetylides) preparation of higher alkynes, Chemical reactivity – electrophilic addition of X₂, HX, H₂O (tautomerism), Oxidation (formation of enediol, 1,2diones and carboxylic acids) and reduction (Metal-ammonia reduction, catalytic hydrogenation).

UNIT-III

1. Gaseous State

10 h

Deviation of real gases from ideal behavior. van der Waals equation of state. Critical phenomenon. PV isotherms of real gases, continuity of state. Andrew's isotherms of CO₂. The van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's constants. The law of corresponding states, reduced equation of states. Joule Thomson effect and inversion temperature of a gas. Liquifaction of gases: i) Linde's method based on Joule Thomson effect ii) Claude's method based on adiabatic expansion of a gas.

Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η ; variation of viscosity with temperature and pressure. Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities.

2. Liquid State

6 h

Intermolecular forces, structure of liquids (qualitative description). Structural differences between solids, liquids and gases. Surface tension and its determination using stalagmometer. Viscosity of a liquid and determination of coefficient of viscosity using Ostwald viscometer. Effect of temperature on surface tension and coefficient of viscosity of a liquid (qualitative treatment only). Liquid crystals, the mesomorphic state: Classification of liquid crystals into Smectic and Nematic, differences between liquid crystal and solid / liquid. Application of liquid crystals as LCD devices.

UNIT-IV

1. Atomic structure and elementary quantum mechanics 6 h

Black body radiation, heat capacities of solids, Rayleigh Jeans law, Planck's radiation law, photoelectric effect, Limitations of classical mechanics, Compton effect, De Broglie's hypothesis. Heisenberg's uncertainty principle, Schrodinger's wave equation and its importance. Physical interpretation of the wave function, significance of ψ and ψ^2 , a particle in a box, energy levels, wave functions and probability densities. Schrodinger wave equation for H-atom. Separation of variables, radial and angular functions (only equation), hydrogen like wave functions, quantum numbers and their importance.

2. Chemical Bonding

10h

Ionic solids- lattice and solvation energy, solubility of ionic solids, Fajan's rule, polarity and polarizability of ions, covalent nature of ionic bond, covalent bond – VSEPR Theory-Common hybridization - sp , sp^2 , sp^3 , sp^3d , sp^3d^2 and sp^3d^3 , shapes of molecules.

Molecular orbital theory: Shapes and sign convention of atomic orbitals. Modes of overlapping. Concept of σ and π bonds. Criteria for orbital overlap. LCAO concept. Types of molecular orbitals- bonding, antibonding and non bonding.

MO diagrams of homonuclear diatomic molecules, e.g., N_2 , O_2 , C_2 , B_2 , F_2 , and heteronuclear diatomic molecules CO , NO , CN^- , NO^+ and HF . Bond order, stability and magnetic properties

SEMESTER-I

PAPER-VI: CHEMISTRY –II(1T6)

UNIT-I

1. Chemistry of p- block elements- I

10h

Group-13: Synthesis and structure of diborane and higher Boranes (B_4H_{10} and B_5H_9),

Boron nitrogen compounds ($B_3N_3H_6$ and BN), Lewis acid nature of BX_3

Group – 14: Carbides-Classification – ionic, covalent, interstitial – synthesis. Structures and reactivity. Industrial application. Silicones – Preparation – a) direct silicon process b) use of Grignard reagent c) aromatic silylation. Classification – straight chain, cyclic and cross-linked.

Group – 15: Nitrides – Classification – ionic, covalent and interstitial. Reactivity – hydrolysis. Preparation and reactions of hydrazine, hydroxyl amine, phosphazenes.

2. General Principles of Inorganic qualitative analysis

6 h

Anion analysis: Theory of sodium carbonate extract, classification and reactions of anions- CO_3^{2-} , Cl^- , Br^- , SO_4^{2-} , PO_4^{3-} , BO_3^{3-} , CH_3COO^- , NO_3^- .

Cation Analysis: Principles involved - Solubility product, common ion effect, general discussion for the separation and identification of group I individual cations (Hg_2^{2+} , Ag^+ , Pb^+) with flow chart and chemical equations. Principle involved in separation of group II & IV cations.

General discussion for the separation and identification of group II (Hg^{2+} , Pb^{2+} , Bi^{3+} , Cd^{2+} , Sb^{2+}), III (Al^{3+} , Fe^{3+}), IV (Mn^{2+} , Zn^{2+}) individual cations with flow chart and chemical equations. Application of concept of hydrolysis in group V cation analysis. General discussion for the separation and identification of group V individual cations (Ba^{2+} , Sr^{2+} , Ca^{2+}) with flow chart and chemical equations. Theory of flame test. Identification of Group VI cations (Mg^{2+} , NH_4^+).

UNIT-II

1. Aromatic Hydrocarbons

10h

Concept of aromaticity – definition, Huckel's rule – application to Benzenoids and Non – Benzenoids (cyclopropenyl cation, cyclopentadienyl anion and tropylium cation).

Preparations: From acetylene, phenols, benzene carboxylic acids and sulphonic acids.

Reactions - General mechanism of electrophilic substitution, mechanism of nitration, sulphonation, and halogenation, Friedel Craft's alkylation (polyalkylation) and acylation. Orientation of aromatic substitution - Definition of ortho, para, and meta directing groups. Ring activating and deactivating groups with examples. Orientation – (i) activating groups: Amino, methoxy and alkyl groups. (ii) Deactivating groups - carboxy, nitro, nitrile, carbonyl and sulphonic acid & halo groups.

2. Arenes and Polynuclear Aromatic Hydrocarbons

6 h

Preparation of alkyl benzenes by Friedel Craft's alkylation, Friedel Craft's acylation followed by reduction, Wurtz-Fittig reaction. Chemical reactivity: Ring substitution reactions, side chain substitution reactions and oxidation.

Polynuclear hydrocarbons – Structure of naphthalene and anthracene (Molecular Orbital diagram and resonance energy) Reactivity towards electrophilic substitution. Nitration and sulphonation as examples.

UNIT-III

1.Solutions

8h

Liquid mixtures-Classification of binary mixtures as completely miscible, partially miscible and completely immiscible liquid pairs. Raoult's law, ideal and non ideal solutions of completely miscible liquid pairs, vapour pressure - Composition and vapour pressure - temperature diagrams, Principle of fractional distillation- Fractional distillation of ideal and non ideal (positive and negative deviation from Raoult's law) solutions, Azeotropic mixtures. Partially miscible liquid pairs - Phenol-Water, trimethylamine-water, nicotine-water systems - Lower and upper CST - Effect of impurities on CST - Binary mixtures of completely immiscible liquid pairs, Principle of steam distillation and applications, Problems.

S2-P-2: Dilute Solutions & Colligative Properties

7 h

Dilute Solutions, Colligative Properties, Raoult's law, relative lowering of vapour pressure, molecular weight determination. Osmosis - laws of osmotic pressure, its measurement, determination of molecular weight from osmotic pressure. Elevation of boiling point and depression of freezing point. Derivation of relation between molecular weight and elevation in boiling point and depression in freezing point. Experimental methods for determining various colligative properties. Abnormal behaviour of electrolytes, Van't Hoff factor, degree of dissociation and association of solutes- problems.

UNIT-IV

1. Theories of bonding in metals:

7 h

Valence bond theory, Explanation of metallic properties and its limitations, Free electron theory, thermal and electrical conductivity of metals, limitations, Band theory, formation of bands, explanation of conductors, semiconductors n-type and p-type, extrinsic & intrinsic semiconductors, and insulators.

2. Material Science

8 h

Classification of materials- classification as metals, ceramics, organic polymers, composites, biological materials etc. The property of super conductivity of materials. Super conducting materials- elements, alloys and compounds. Properties of super conductors-zero resistivity, Meissner effect and thermal properties. Composites- meaning of composites, advanced composites, classification - particle reinforced fiber reinforced and structural composites general characters of characters of composite materials-Particle- reinforced composites - large particle and dispersion- strengthened composite. Fiber reinforced composites (continuous and discontinuous fiber composites).

SEMESTER-I (Practicals)

PAPER-VII: COMPUTER SCIENCE(1-P1)

MS Office

Paper-VIII: CHEMISTRY(IP-2)

Volumetric analysis

1. Preparation of standard sodium carbonate solution and standardization of HCl.
2. Estimation of carbonate in baking soda.
3. Estimation of carbonate and bicarbonate in washing soda.
4. Estimation of alkali content in antacid
5. Estimation of Ferrous by dichrometry
6. Estimation of Ferrous and Ferric in the given mixture using standard dichromate.
7. Standardisation of $\text{Na}_2\text{S}_2\text{O}_3$ using $\text{K}_2\text{Cr}_2\text{O}_7$.
8. Estimation of copper using iodometry.
9. Preparation of standard Mg^{2+} solution and standardization of EDTA.
10. Estimation of Mg^{2+} / Ca^{2+}
11. Hardness of Water.
12. Estimation of Ni^{2+} / Cu^{2+} .

SEMESTER-II (Theory)

PAPER-I : ENGLISH (2T1)

Unit-I : Drama

Look Back in Anger - John Osborne

Unit-II : Novel

The Guide - R.K. Narayan

Unit-III : Literary Terms and other Terms

- | | |
|-----------------|---------------------------------------|
| 01. Language | 09 Symbol |
| 02. Literature | 10. Diction |
| 03. Novel | 11. Multiculturalism |
| 04. Short Story | 12. Racial Discrimination (Apartheid) |
| 05. Poem | 13. Post-colonialism |
| 06. Drama | 14. Angry Youngman |
| 07. Metaphor | 15. Gender Discrimination |
| 08. Simile | 16. Folk Literature. |

Recommended books.

01. A Glossary of Literary Terms — M H.Abrams
02. A Glossary for the Skidy of English - Lee. T.Lemon / Shiv. K.Kumar (OUP)
03. Background to the Study of English Literature - B Prasad (Macmillan)

Unit-IV : Compostion-1

01. Letter - Writing
02. Precis and Comprehension

Unit-V : Composition - 2

- 01 Paraphrasing and Expansion

Prescribed text for Composition

1. Modern English : A Book of Grammar, Usage and Composition by N. Krishnaswamy (Macmillan)

Refernces Book :

1. Examine Your English by Margaret Mason (Orient Longman).

SEMESTER-II

PAPER-II : TELUGU (2T2)

ఆధునిక కవిత్వము - గద్య భాగము

UNIT-I

స్నేహలత -రాయప్రోలు సుబ్బారావు

UNIT-II

అగ్నిధార('ఓ'నుండి 'మహాలేఖిని'
వరకు మొత్తం 20 ఖండికలు) -1963 ముద్రణ

-డా. దాశరథి కృష్ణమాచార్యులు

UNIT-III

వసంతోత్సవము-కర్పూర వసంతరాయలు - ప్రథమాశ్వాసము

-డా. సి. నారయణ రెడ్డి

గద్యభాగము

UNIT-IV

వ్యాసములు

1. స్వభాష ('సాక్షి' వ్యాసముల నుండి)
- పానుగంటి లక్ష్మి నరసింహారావు
2. తెలుగు వైతాళికులు సురవరం ప్రతాపరెడ్డి(ఉపన్యాసతోరణము నుండి)
- దేవులపల్లి రామనుజరావు
3. భారతీయ పునరుజ్జీవ ఉద్యమం ('భావుక సీమ' నుండి)
- సుప్రసన్న

1. కథలు

1. దిద్దుబాటు-గురజాడ
2. బ్రతకనేర్చిన మనిషి - మధురాంతకం రాజరాం
3. అలరాసపుట్టిల్లు - కల్యాణ సుందరీ జగన్నాథం

2. సాధారణ వ్యాసం

ప్రస్తుత చర్చనీయాంశములలో ఎవైనా మూడింటిని ఎన్నిక చేసి ఒక దానిని గూర్చి వ్యాసము
వ్రాయమని అడుగవలయును.

SEMESTER-II

PAPER-III : MATHEMATICS (2T3)

Unit-I: Matrices: Eigen values – Eigen vectors of a square matrix – characteristic equation of a square Matrix – diagonalization of real symmetric matrix – Caley-Hailton theorem – Application to determine the powers of square matrices and inverses of non-singular matrices.

Beta and Gamma functions: Beta and Gamma functions – Evaluation of beta function – Evaluation of gamma function – Transformation of beta function – Transformation of gamma function – Properties of beta and gamma functions

Unit-III: Coordinate planes – Coordinates – Distance between two points in spaces – Section formulae – direction cosines of a line – relation between direction cosines – direction ratios – equation of a plane – Equation of a straight line – Angle between two lines – shortest distance between tow skew lines – sphere – cone – right circular cone – cylinder – right circular cylinder.

Unit-IV: Increasing function and decreasing function – maxima and minima – Rolle’s theorem – Langrange’s mean value theorem – Cauchy mean value theorem – Taylor series – Maclauin series – concavity and convexity of a curve – points of inflection – Asymptotes – Curvature – Limits – Continuity and differentiability of function of several variables – partial derivatives – Eluer’s theorem on homogenous functions

Text books / Reference books

1. Higher Engineering Mathematics by B.S Grewal
2. Advanced Engineering Mathematics by E. Kreyszig
3. Topics in Algebra by Hersein
4. Abstract Algebra by Bhattacharya
5. Calculus and Analytical Geometry by G. B. Thomas
6. Calculus by T. M. Apostal
7. Textbook of Mathematical Analysis by A. K. Snarma

SEMESTER-II

PAPER-IV : COMPUTER SCIENCE (2T4)

Unit-1: Introductory Concepts: Computer Characteristics - Modes of Operators - Types of programming languages - Introduction to C - Desirable program characteristics

C Fundamentals: The C character set - Identifiers and keywords - Data types - Constants - Variables and arrays - Declarations - Expressions - Statements - Symbolic constants

Operators and Expressions: Arithmetic operators - Unary operators - Relational and Logical operators - Assignment operators-The conditional operator - Library functions (Chapters 1,2 and 3)

Unit-II: Data Input and Output: Single character input output - Entering input data - Getchar, putchar, scanf, printf, gets, puts functions — Interactive programming

Running Complete Programs: Planning, writing, entering, compiling and executing programs - Error diagnostics - Debugging techniques

Unit-III : Functions: Overview, Definition, Accessing a function - Function prototypes – Passing arguments - Recursion.

Program Structure: Storage classes - Automatic variables - External/Global variables - Static variables - Multi file programs - Library functions.

Arrays: Definition - Processing pointers to functions - pointers and arrays - Dynamic memory allocation - Arrays and strings (Chapters 7, 8 and 9).

Unit-IV: Pointers: Pointer declarations - Passing pointers to functions - Pointers and arrays - Dynamic memory allocation - Arrays of pointers.

Structure and Unions : Defining and processing a structure – User defined data types (typedef) – Structure and pointers – Passing structures to functions – Unions.

Data files: Opening and closing a Data file – creating a data file – Processing a data file – Unformatted data files (Chapters 10, 11 and 12).

Textbook.

Programming with C, Byron Gottfried, TMS

Reference books.

1. Programming and Problem Solving through C Language, ITL Education, McMillan India
2. Computer Fundamentals and Programming in C, Dey and Ghosh, Oxford

SEMESTER-II(2T5)

PAPER-V: CHEMISTRY-I

UNIT-I

1. p-block Elements -II

9 h

Oxides: Types of oxides (a) Normal- acidic, basic amphoteric and neutral (b) Mixed(c) sub oxide

d) peroxide e) superoxide. Structure of oxides of C, N, P, S and Cl - reactivity, thermal stability, hydrolysis.

Oxy acids: Structure and acidic nature of oxyacids of B, C, N, P, S and Cl. Redox properties of oxyacids of Nitrogen: HNO_2 (reaction with FeSO_4 , KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), HNO_3 (reaction with H_2S , Cu), HNO_4 (reaction with KBr, Aniline), $\text{H}_2\text{N}_2\text{O}_2$ (reaction with KMnO_4). Redox properties of oxyacids of Potassium: H_3PO_2 (reaction with HgCl_2), H_3PO_3 (reaction with AgNO_3 , CuSO_4). Redox properties of oxyacids of Sulphur: H_2SO_3 (reaction with KMnO_4 , $\text{K}_2\text{Cr}_2\text{O}_7$), H_2SO_4 (reaction with Zn, Fe, Cu), $\text{H}_2\text{S}_2\text{O}_3$ (reaction with Cu, Au), H_2SO_5 (reaction with KI, FeSO_4), $\text{H}_2\text{S}_2\text{O}_8$ (reaction with FeSO_4 , KI)

Interhalogens- classification- general preparation- structures of AB , AB_3 , AB_5 and AB_7 type and reactivity. Poly halides- definition and structure of ICl_2^- , ICl_4^- and I_3^- . Comparison of Pseudohalogens with halogens.

2. Chemistry of Zero group elements

6 h

General preparation, properties, structure, bonding and reactivity of Xenon compounds – Oxides, Halides and Oxy-halides. Clathrate compounds and Anomalous behavior of He (II).

UNIT-II

1. Halogen compounds

7 h

Classification of alkyl (into primary, secondary, tertiary), aryl, aryl allyl, vinyl, benzyl).
Chemical

reactivity-reduction, formation of RMgX , Nucleophilic substitution reaction-classification into

SN^1 and SN^2 . Mechanism of, SN^1 and SN^2 reactions. Stereochemistry of SN^2 (Walden Inversion),

(Racemisation) explanation of both by taking the example of optically active halide - 2-bromobutane, structure and reactivity - Ease of hydrolysis - Comparison of allyl, benzyl, alkyl,

vinyl and aryl halides.

2. Hydroxy compounds, ethers and epoxides

8h

Alcohols: Preparation: 1°, 2° and 3° alcohols using Grignard reagent, Ester hydrolysis, Reduction of Carbonyl compounds, carboxylic acids and esters. Physical properties: H-bonding, Boiling point and Solubility. Reactions with Sodium, HX/ZnCl₂ (Lucas reagent), esterification, oxidation with PCC, alk.KMnO₄, acidic dichromates, conc. HNO₃ and Oppenauer oxidation.

Diols: Pinacol - pinacolone rearrangement

Phenols: Preparation: (i) from diazonium salts of anilines, (ii) from benzene sulphonic acids and

(iii) Cumenehydroperoxide method.

Properties: Acidic nature, formation of phenoxide and reaction with R-X, electrophilic

substitution nitration, halogenation and sulphonation. Reimer-Tiemann reaction, Gattermann-Koch reaction, Azo-coupling reaction, Schotten-Bouman reaction, Houben-Hoesch condensation.

Ethers and epoxides

Nomenclature, preparation by (a) Williamson's synthesis (b) from alkenes by the action of conc. H₂SO₄. Physical properties – Absence of Hydrogen bonding, insoluble in water, low boiling point. Chemical properties – inert nature, action of conc. H₂SO₄ and HI.

UNIT-III

1. Colloids

7 h

Colloidal state of matter — Classification of colloids — Lyophilic and lyophobic colloidal solutions. Preparation and properties (kinetic, optical and electrical), Stability of colloids, protective action. Hardy — Schulz law, gold number Emulsions types of emulsions and their preparation. Gels — Classification, preparation and properties Imbibition — Applications of colloids.

2. Stoichiometry

8h

some basic concepts- laws of chemical combinations, Gay Lussac's law of gaseous volumes, Dalton's atomic theory, Avogadro's law- atomic and molecular masses-mole concept and molar mass concept of equivalent weight-percentage composition of compounds and calculation of empirical and molecular formulae of compounds-stoichiometry and stoichiometric calculations-methods of expressing concentration of solutions-redox reactions-oxidation number concept-types of redox reactions-balancing redox reactions – oxidation number method-ion-electron method

UNIT-IV

1. Solid state

8h

Laws of Crystallography – (i) Law of Constancy of interfacial angles (ii) Law of Symmetry, Symmetry elements in crystals (iii) Law of rationality of indices. Definition of space lattice, unit cell. Bravais Lattices and Seven Crystal systems (a brief review). X-ray diffraction by crystals; Derivation of Bragg's equation, Determination of structure of NaCl, KCl & CsCl (Bragg's method Solid state and powder method).

2. Isomerism

7h

Isomerism: Definition of isomer. Classification of isomers. Constitutional and stereoisomers- definition and examples. Constitutional isomers- chain, functional and positional isomers. Stereoisomers- enantiomers and diastereoisomers- definition and examples. Representation of stereoisomers- wedge, Fischer projection, sawhorse, Newmann formulae.

Conformational analysis: classification of stereoisomers based on energy. Definition and examples conformational and constitutional isomers. Conformational analysis of ethane, n-butane, 1,2-dichloro ethane and 2-chloroethanol. Cyclic compounds- Bayer's strain theory, conformational analysis of cyclohexane

Cis-trans isomerism- E-Z nomenclature.

SEMESTER-II

PAPER-VI: CHEMISTRY(2T6)

UNIT-I

1. Chemistry of d-block elements

10 h

Characteristics of d-block elements with special reference to electronic configuration, General characteristics, Atomic and ionic radii, ionization energy, variable valence, ability to form complexes, colour and magnetic properties, catalytic properties, redox potentials. Stability of various oxidation states and SRP Comparative treatment of second and third transition series with their 3d analogues. Study of Ti, Cr and Cu triads. Titanium triad – electronic configuration and reactivity of +3 and +4 states – oxides and halides. Chromium triad – reactivity of +3 and +6 states. Copper triad – reactivity of +1, +2 and +3 states.

2. Theories of metallic bond

5 h

Valence bond theory – Salient features, Explanation of metallic properties and its limitations.

Free electron theory – Principles, Explanation of electrical conductivity in metals and its limitations. Band theory – Formation of bands, Brillouin zones, Conductors, Semiconductors and Insulators.

UNIT-II

1. Carbonyl compounds

7h

Synthesis of aldehydes & ketones from acid chloride by using 1,3-dithianes, nitriles. Oppenauer Oxidation special methods of preparing aromatic aldehydes and ketones by (a) Oxidation of arenes (b) Hydrolysis of benzal halides. Keto-enol tautomerism, polarisability of carbonyl groups, reactivity of the carbonyl groups in aldehydes and ketones. Chemical reactivity – Addition of (a) NaHSO_3 (b) HCN (c) RMgX (d) NH_3 (e) RNH_2 (f) NH_2OH (g) PhNHNH_2 (h) 2,4-DNP Schiff bases, addition of alcohols-hemi acetal and acetal formation, Halogenation using PCl_5 with mechanism. Base catalysed reactions —with particular emphasis on Aldol, Cannizzaro reaction, Perkin reaction, Benzoin condensation, haloform reaction,. Oxidation reactions — KMnO_4 oxidation and autooxidation, reduction-catalytic hydrogenation, Clemmensen's reduction, Wolf-kishner reduction, MPV reduction, reduction with LAH, NaBH_4 . Analysis 2,4 DNP test, Tollen's test. Fehling's test, Schiff's test, haloform test

2. Carboxylic acids and ester

8 h

Methods of preparation a) Hydrolysis of Nitrites, amides and esters. b) carbonation of Grignard reagents. Hydrolysis of benzotrichlorides. Kolbe reaction. Physical properties-hydrogen bonding, dimeric association, acidity-strength of acids with the examples of trimethyl acetic acid and trichloro acetic acid, Relative differences in the acidity of Aromatic and aliphatic acids. Chemical properties- Reactions involving H, OH and COOH groups-salt formation, arihydride formation, Acid halide formation, esterification and amide formation. Reduction of acid to the corresponding primary alcohol — via ester or acid chloride. Degradation of carboxylic acids by Huns Diecker reaction, Schmidt reaction (Decarboxylation). Amdt-Eistert synthesis, Halogenation by Hell-Volhard-Zelensky reaction. Acidity of α -Hydrogens of acetoacetic and malonic esters structure of carbanion Reproduction of Aceto acetic ester by Claisen condensation and synthetic applications of Aceto acetic ester. (a) Acid hydrolysis and ketonic hydrolysis Preparation of i) monocarboxylic acids ii) dicarboxylic acids (b) malonic ester — synthetic application. Preparation of i) substituted mono carboxylic acids ii) substituted dicarboxylic acids iii) trialkyl acetic acid.

UNIT-III

1. Thermodynamics-I

8 h

Terms involved – Types of systems – Extensive and intensive properties – State and path dependent functions Reversible and irreversible processes, heat, work, internal energy and enthalpy. First law of Thermodynamics – mathematical representation, Heat capacities of gases at constant volume and at constant pressure – their relationship – Workdone in reversible isothermal and adiabatic processes, adiabatic equation of state – Problems – Heat changes during chemical reactions – Hess's law, Thermochemical equations – Heat of reaction, Heat of formation, Heat of combustion, Heat of neutralization – Temperature dependence of heat of reaction – Kirchoff's equation – Derivation. Problems.

2. Phase Rule

7 h

Gibbs phase rule, explanation of terms involved, derivation – Phase equilibria of one component systems. Water system, Sulphur system, Phase equilibria of two component systems – Salt-water system (NaCl-H₂O), Freezing mixtures, Pb-Ag system simple eutectic mixture – Desilverisation of lead.

UNIT-IV

1. Chemical Equilibrium

5h

Equilibrium in physical process-equilibrium in chemical process-dynamic equilibrium-Laws of chemical equilibrium – Law of mass action and equilibrium constant-Homogeneous Equilibria, equilibrium constant in gaseous systems, relation between K_p and K_c -Heterogeneous Equilibria-applications of equilibrium constant- relation between equilibrium constant 'K' reaction Quotient 'Q' and Gibb's free energy 'G'- Factors affecting Equilibria, Le-chaatelier's principle-application to industrial synthesis of ammonia and sulphur trioxide

2. Basic concepts and Specialty of Polymers

10h

Basic concepts : Introduction to polymers, monomers, functionality, oligomers, resins and high polymers. Classification of monomers and polymers : thermoplastics and thermosets, plastics, elastomers and fibers, homo and copolymers. Polymerization techniques : bulk, solution, suspension and emulsion polymerization. Speciality Polymers : Heat resistant silicone polymers, carbon fibers, conducting polymers - examples - applications. Liquid crystal polymers : smectic, nematic and cholesteric - examples - applications. Ionic polymers : Ion-exchangers (anionic & cationic) and their applications.

SEMESTER-II

PAPER-VII: COMPUTER SCIENCE(2P1)

MS-WORD

1. Create a leave letter in word in a neat format
2. Create a word document using various bullet options
3. Create a word document implementing usage of clip art in word documents.
4. Create a word document implementing various font styles, size subscript and superscript options.
5. Create word document implementing Header and Footer
6. Create word document implementing Mail merge.

MS-EXCEL

1. Create Excel sheet by entering sample data with fields
2. For the above excel sheet add columns Total, Average and fill them using formulas.
3. Create a excel sheet by entering sample data with fields and adjust all data to center.
4. Create a excel sheet by entering sample data with fields

AND DRAW

- A) Line graph with year on X-axis literacy, population on Y-axis.
- B) Bar graph with year on X-axis and population on Y-axis
5. Create a pie-chart by using fields.

POWERPOINT

1. Create a simple power point presentation for Tollen's test using design templates.
2. Create a power point presentation for Benedict's test using Bullets, header and footer.
3. Create a power point presentation using animation to text and graphics.
4. Create a power point presentation using clipart in the presentation
5. Create a power point presentation importing images into the presentation.

ACCESS

1. Create an access data base on students with fields.

- A) To the above database append total and average field.
 - B) Find a record with name Ravi.
 - C) Sort the field in ascending order on name field.
 - D) Build a query to select the records of students whose total is above 300.
2. Design a form in Access using Form wizard.
3. Generate a report in Access from some sample database.

PAPER-VIII : CHEMISTRY (2P-2)

Semi-micro qualitative analysis of inorganic salt mixture containing two anions and two cations (with interfering anion radical).

SEMESTER-III (Theory)

PAPER-I : COMMUNICATION SKILLS (3T1)

Unit-I : Vowel Sounds-1

Monophthongs / Pure Vowels

Unit-II : Vowel Sounds-2

Diphthongs

Unit-III :

- 01 Consonant Sounds
- 02 Phonetic transcriptions

Unit-IV : Communication Skills

- 01 Understanding Communication
- 02 Greeting & Introducing
- 03 Making Requests
- 04 Asking for & Giving Permission
- 05 Offering help
- 06 Giving instructions, or directions

Unit-V: Telephone Skills

Prescribed Text :

1. A Course in Listening and Speaking-I by V. Sasikumar and others (Foundation Books, 2005).

Reference Books :

01 A Textbook of English Phonetics for Indian Students by T. Balasubramanian
(Mac Millan)

02 English Phonetics for Indian Students by T. Balasubramanian (Macmillan)

SEMESTER –III

PAPER-II: TELUGU(3T2)

Unit-I: ప్రాచీన కవిత్వం

1. గజేంద్ర మోక్షం - పోతన
2. హనుమత్ సందేశం - మొల్ల
3. సుభాషితాలు - ఏనుగు లక్ష్మణ కవి

Unit-II: ఆధునిక కవిత్వం

1. అంతర్నాదం- దాశరథి కృష్ణమాచార్యులు
2. ప్రపంచ పదులు - డా.సి.నారాయణ రెడ్డి
3. అల్వీదా - కౌముది

Unit-III: వచన విభాగం

1. యుగాంతం- నెల్లూరి కేశవ స్వామి
2. ఎంకన్న- ఆచర్య పాకల యశోదా రెడ్డి
3. మామిడి పండు- సురవరం ప్రతాప రెడ్డి
4. మా వూరు పోయింది - దెవులపల్లి వెంకట కృష్ణ శాస్త్రి

Unit-IV: ఛందస్సు

ఉత్పలమాల, చంపకమాల, శార్దూలం, మత్తేభం, ఆటవెలది, తేటగీతి, ద్విపద, సీసం, కందం,

ఉత్సాహం, తరళం, స్రగ్ధర, మహా స్రగ్ధర, ముత్యాల సరం

SEMESTER-III

PAPER-III COMMUNITY DEVELOPMENT (3T3)

Unit-I : Science of Society - Definition - Human experience and behavior; Personality - Definition – approaches and theories; Human Learning Motivation, Attitude and work behavior; Group dynamism, Inter-group relations - Conflict Leadership and Management

Unit-II : Socio-cultural bases of knowledge and Science, Conceptions of Science - Positive, realistic Weberian and forms of conventionalism, Theory of Scientific creativity, Mertonian normative structure of Science.

Unit-III : Socio-economic and cultural aspects of Scientific technological revolution. Science and Technology, Conceptual distraction reconsidered and relations between Science and Technology

Unit-IV: Sociology of rural development - Key sociological issues - Modernization theories and theories of under development. Rural development in India: Cooperative movements and Rural development - Leadership and Rural development - Politics, Power and Rural development - Bureaucracy and Rural development.

Unit-V: Types of productive system - The rise of factory system. Importance of Human relations at work - Industrial bureaucracy - Society of unequal - Executives - Roles, Functions and strains (White and Blue collared) - Workers in modern society - roles, alienation - Workers participation

SEMESTER-III

PAPER-IV: ENVIRONMENTAL STUDIES (3T4)

Unit-I (8 Hours)

1. Importance of environmental studies, Need for public awareness
2. Forest resources – use and over exploitation - deforestation - social forestry
3. Water Resources – use and over utilization of surface and ground water, floods and drought
4. Mineral resources - use and exploitation, environmental effects

Unit-II: (8 Hours)

1. Food resources - world food problems, changes caused by agriculture, organic agriculture
2. Energy resources - solar energy, wind energy, geothermal energy, bio-energy
3. Land resources - Land degradation, soil erosion, desertification
4. Conservation of natural resources - equitable use of resources and sustainability

Unit-III:

(8 Hours)

1. Ecosystem - structure and functions, ecological pyramids, food chain and food webs
2. Organic matter decomposition - composition of organic matter, immobilization of carbon, dynamics of organic matter
3. Biodiversity - definition, genetic, species and ecosystem diversity, measurement of diversity
4. Biodiversity - values, threats and conservation (*in situ* and *ex situ*)

Unit-IV :

(7 Hours)

1. Air pollution - green house effect, acid rain, ozone depletion
2. Water pollution - BOD and COD, eutrophication
3. Soil pollution - composting, bioremediation, activated sludge

Unit-V:

(7 Hours)

1. Noise pollution - sources, effects and control measures
2. Radioactive pollution - sources, effects and control measures
3. Solid waste management - Causes, affects and control measures of urban and industrial wastes

Unit-VI:

(7 Hours)

1. Environment protection act - Air pollution control act, Water pollution control act, Wildlife protection act
2. Issues involved in enforcement of environmental legislation
3. Environment and human health
4. HIV/AIDS
5. Role of information technology in environment and human health

Reference Books

1. Text book of Environmental Studies, E Bharucha, University Press, 2005
2. Environmental Studies, M. v. Ramana et al.
3. Elements of Environmental Chemistry, Somu SriHari, Sri Laksmi Publications 2001.

SEMESTER-III**PAPER-V : COMPUTER SCIENCE (3T5)**

Unit-I: DATABASE ENVIRONMENT: Basic concepts, File processing systems, Range of Database Applications; Advantages, Components of Database Environment. DATA DEVELOPMENT PROCESS: Database development with Information System Development Process; Three Scheme Architecture for Database Development: Three-tiered Database Location Architecture (CHAPTERS 1 & 2)

Unit-II: MODELING DATA IN THE ORGANIZATION: Modeling the rules of the organization; The E. R. Model; Entity-Relationship Model Constructs; Relationships. ENHANCED E-R MODEL AND BUSINESS RULES: Representing super types and subtypes; Specify; Constraints in super type/sub type relationships; EER modeling examples (CHAPTERS 3 & 4)

Unit-III: LOG IC DATABASE DESIGN AND THE ‘RELATIONALMODEL: The Relational Data Model; Integrity constraints Transforming EER-Diagrams into Relations; Introduction to Normalization, The Basic Normal forms; Merging Relations ADVANCED NORMAL FORMS: Boyer Codd Normal Form; Fourth Normal Form; Higher Normal Form - PHYSICAL DATABASE DESIGN AND PERFORMANCE: Physical Database Design process; Designing Fields, Designing physical data records and De-normalization, Designing Physical Files; Using and selecting indexes; Designing Databases; Optimising for Quex performance (CHAPTER 5, APPENDIX B60)

Unit-IV: SQL: The SQL Environment, Defining a Database in SQL; Inserting, Updating and Deleting data; Internal Scheme Definitions in RDBMS, Processing Single Table, ADVANCED - SQL: Processing multiple tables; Ensuring Transaction Integrity, Data Dictionary Facilities; SQL- 99 enhancements and Extensions to SQL; Triggers and Routines Embedded SQL and Dynamic SQL. (CHAPTERS 7 & 8)

Reference Book:

Modem Database Management; F. R Macfaéden et al, (PearsU Education, VI Ed)

SEMESTER-III

PAPER-VI:CHEMISTRY-I(3T6)

UNIT-I

1. Chemistry of f-block elements:

6 h

Chemistry of Lanthanides: Position in periodic table, Electronic structure, oxidation state, ionic and atomic radii- lanthanide contraction- cause and consequences, anomalous behavior of post lanthanides-complexation- type of donor ligands preferred. Magnetic properties- paramagnetism. Colour and spectra, f-f transitions – occurrence and separation – ion exchange method, solvent extraction.

Chemistry of actinides- general features – electronic configuration, oxidation state, actinide contraction, colour and complex formation. Comparison with lanthanides.

2. Coordination Compounds-I

7 h

Simple inorganic molecules and coordination complexes. Nomenclature – IUPAC rules, 1. Brief

review of Werner's theory, Sidwick's electronic interpretation and EAN rule and their limitations. (Valence bond theory (VBT) – postulates and application to (a) tetrahedral complexes $[\text{Ni}(\text{NH}_3)_4]^{2+}$, $[\text{NiCl}_4]^{2-}$ and $[\text{Ni}(\text{CO})_4]$ (b) square planar complexes $[\text{Ni}(\text{CN})_4]^{2-}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, $[\text{PtCl}_4]^{2-}$ (c) octahedral complexes $[\text{Fe}(\text{CN})_6]^{4-}$, $[\text{Fe}(\text{CN})_6]^{-3}$, $[\text{FeF}_6]^{4-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$, $[\text{CoF}_6]^{3-}$. Limitations of VBT). 2. Coordination number, coordination geometries of metal ions, types of ligands. 3. Isomerism in coordination compounds, stereo isomerism – (a) geometrical isomerism in (i) square planar metal complexes of the type $[\text{MA}_2\text{B}_2]$, $[\text{MA}_2\text{BC}]$, $[\text{M}(\text{AB})_2]$, $[\text{MABCD}]$. (ii) Octahedral metal complexes of the type $[\text{MA}_4\text{B}_2]$, $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{MA}_3\text{B}_3]$ using suitable examples, (b) Optical isomerism in (i). tetrahedral complexes $[\text{MABCD}]$, (ii). Octahedral complexes $[\text{M}(\text{AA})_2\text{B}_2]$, $[\text{M}(\text{AA})_3]$ using suitable examples. Structural isomerism: ionization, linkage, coordination ligand isomerism using suitable examples- stereo isomerism- geometrical and optical isomers.

UNIT-II

1.

Nitro

hydrocarbons:

6h

Nomenclature and classification of nitro hydrocarbons. Structure. Tautomerism of nitroalkanes leading to aci and keto form. Preparation of Nitroalkanes. Reactivity - halogenation, reaction with HNO_2 (Nitrous acid), Nef reaction, Mannich reaction, Michael addition and reduction. Aromatic Nitro hydrocarbons: Nomenclature, Preparation of Nitrobenzene by Nitration. Physical properties, chemical reactivity – orientation of electrophilic substitution on nitrobenzene. Reduction reaction of Nitrobenzenes in different media.

2. Amines, Cyanides and Isocyanides

9h

Amines (Aliphatic and Aromatic): preparative methods – 1. Amination of alkyl halides 2. Gabriel synthesis 3 Hoffman's bromamide reaction (mechanism). Reduction of Amides and Schmidt reaction. Physical properties and basic character-Comparative basic strength of Ammonia, methyl amine, dimethyl amine, trimethyl amine and aniline-comparative basic strength of aniline, N-methylaniline 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 separation 5. Reaction with Nitrous acid of 1°, 2°, 3° (Aliphatic and aromatic amines) Electrophilic substitutions of Aromatic amines- Bromination and Nitration, oxidation of aryl and 3o 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, H and aryl groups. Coupling Reaction of diazonium salts. i) with phenols ii) with aniline. Reduction to phenyl hydrazines.

Cyanides and Isocyanides: structure, preparation of cyanides from a) Alkyl halides b) from amides c) from aldoximes. Preparation of isocyanides from alkyl halides and amines. Properties of cyanides and isocyanides, a) hydrolysis b) addition of Grignard reagent c) reduction d) oxidation.

UNIT-III

1. Electrochemistry — 1

8h

Electrolytic conduction, Specific and equivalent conductance – Measurement – Their variation with dilution – Kohlrausch's law of ionic conductances migration of ions – Transport numbers – Determination by Hittorf's method for non attackable electrodes Conductance variation of strong and weak electrolytes with dilution (only qualitative treatment) – Onsager equation (no derivation) – Degree of dissociation Ostwald's dilution law. Applications of conductance measurements – K_a of acids. K_{sp} of sparingly soluble salts, conductometric titrations – Problems

2. Ionic Equilibria

7h

Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di- and tri-protic acids. Salt hydrolysis, hydrolysis constants, degree of hydrolysis and pH for different salts. Buffer solutions; Henderson equation, buffer capacity, buffer range, buffer action, applications of buffers in analytical chemistry, Solubility and solubility product.

UNIT-IV

1. Solid state chemistry-II

10h

Bonding in metals: valence bond theory of metallic bond, free electron theory-molecular orbital approach to the Band theory of solids-classification of solids- Insulators, conductors and semiconductors-types of semiconductors, temperature effect on conductivity, photoconductivity and photovoltaic effect-p and n junctions

Defects in crystals: point defects and colour centres, line defects and plane defects.

2. Evaluation of analytical data

5h

Significant figures, accuracy and precision. Errors-classification of errors- determinate and

indeterminate errors, absolute and relative errors, propagation of errors in mathematical operations-addition, subtraction, division and multiplication (with respect to determinant error

SEMESTER-III

PAPER-VII: CHEMISTRY-II(3T7)

UNIT-I

1. Bioinorganic chemistry

7h

Essential elements, biological significance of Na, K, Mg, Ca, Fe, Co, Ni, Cu, Zn and chloride. toxic metal ions As, Hg and Pb. Oxygen transport and storage-structure of hemoglobin, binding and transport of oxygen. Fixation of CO₂ in photosynthesis- overview of light and dark reactions in photosynthesis. Structure of chlorophyll and co-ordination of magnesium. Electron transport in light reactions from to NADP⁺ (Z-scheme).

2. Hard and soft acids and bases rule and non-aqueous solvents

8 h

- Hard and soft acids and bases (HSAB) rule – Classification of metals and ligands as class ‘a’ and class ‘b’. Pearson’s concept of hard and soft acids and bases, Applications of HSAB rule – Predicting feasibility of a reaction and stability of compounds.
- Non-aqueous solvents – Classification and characteristics of solvents, liquid NH₃ and liquid SO₂ as solvents, autoionization, Reactions in liquid NH₃ and liquid SO₂ – Neutralization, Precipitation, redox, complex formation and solvation reactions.

UNIT-II

1. Heterocyclic Compounds

8 h

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 letters 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 reaction (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, properties – Reactivity towards Nucleophilic substitution reactions – Chichibabin reaction. Preparation and chemistry of indole, Quinoline, isoquinoline coumarins.

2. Amino acids and proteins

7 h

Definition of Amino Acids, classification of Amino acids into alpha, beta and gamma amino acids. Natural and essential amino acids-definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acid (specific examples – Glycine, Alanine, valine and Leucine) by following methods : a) From halogenated Carboxylic acid b) Malonic ester synthesis c) Strecker's synthesis. Physical properties : L-configuration, of natural amino acids. Zwitter ion structure-salt like character, solubility, melting points, amphoteric character, definition of isoelectric point. Chemical properties; General reactions due to amino and carboxyl groups - Lactams from gamma and delta amino acids by heating peptide bond (amide linkage) Structure and nomenclature of peptides and proteins.

UNIT-III

1. Photochemistry

8h

Introduction to photochemical reactions, difference between thermal and photochemical reactions. Laws of photochemistry- Grothus-Draper's law, Stark-Einstein's law of photochemical equivalence. Quantum yield. Examples of photo chemical reactions with different quantum yields. Photochemical combination of H₂-Cl₂ and H₂-Br₂ reactions, reasons for the high and low quantum yield. Problems based on quantum efficiency. Consequences of light absorption.

Singlet and triplet state. Jablonski diagram. Explanation of internal conversion and inter-system crossing, phosphorescence and fluorescence.

2.Polymer chemistry-III

7h

Radical chain polymerization-mechanism-kinetics and rate expression-initiator efficiency, types of initiators-mechanisms. Ionic polymerization-cationic and anionic polymerization, 4 types of monomers and initiators - mechanism - examples - kinetics and rate expression - living polymer - mechanism - examples - applications.

UNIT-IV

1.Solid state chemistry-III

Super conductivity: superconductivity and types of superconductors- theories of superconductivity- BCS theory- applications of superconductors. High temperature superconductors structure of defect perovskites. High superconductivity in cuprates

Specific heats of solids: Dulong and Pettit's law, Einstein theory and Debye theory of specific heats.

Solid state reactions: Classification and theory of solid state reactions-Wagner's theory and examples.

2.Carbanions-I

Introduction, acidic nature of α -hydrogen and tautomerism in carbonyl compounds, nitro hydrocarbons, ethyl acetoacetate, diethyl malonate. Terminal alkynes. Stability of carbanion reactions: Aldol reaction, Perkin reaction, Benzoin condensation, halofarm reaction, conversion of smaller alkynes to higher alkynes.

SEMESTER-III

PAPER-VIII : COMPUTER SCIENCE (3P1)

A) SQL

1. Creation and Modification of tables
2. Retrieving data from a table
3. Sorting, Grouping, Using aggregate functions on a table
4. Join, set operations, sub-queries of tables
5. Updating, Deleting, Dropping of table.

B) PWSQL

1. Programming Language Basics

2. SQL and control structures in PL/SQL
3. Procedures, Functions, Packages and Triggers
4. Controls and Exceptions
5. Records and Tables, Composite data types

Reference Book.

Database Systems using Grade - Nilesh Shah (PHA - 2002)

SEMESTER-III

PAPER-IX : CHEMISTRY (3P2)

Practicals: Synthesis of Organic compounds:

1. Acylation of salicylic acid, aniline, Benzoylation of Aniline and Phenol
2. Aromatic electrophilic substitution: Nitration: Preparation of nitro benzene and p-nitro acetanilide Halogenation: Preparation of p-bromo acetanilide Preparation of 2,4,6-tribromo phenol
3. Diazotization and coupling: Preparation of phenyl azo α -naphthol.
4. Oxidation: Preparation of benzoic acid from benzyl chloride.
5. Esterification: Preparation of methyl p-nitro benzoate from p-nitro benzoic acid
6. Methylation: Preparation of α -naphthyl methyl ether.
7. Condensation: Preparation of benzilidene aniline

SEMESTER-IV (Theory)

PAPER-I: COMMUNICATION SKILLS(4T1)

Unit-I: Listening Skills

- 01 Why & How we Listen
- 02 What People Say
- 03 What People Mean
- 04 How People Speak
- 05 How People Organize Speech

Unit-II: Speaking Skills - 1

- 01 The Syllable
- 02 Word Stress

03 Accent & Rhythm in Connected Speech

Unit-III : Speaking Skills — 2

- 04 Intonation
- 05. Problem Sounds
- 06. Reducing Mother Tongue Interference
- 07 American and British Accents

Unit - IV: Communication Skills

- 01 The Art of Small Talk
- 02 A Casual Conversation
- 03 Short Descriptions

Unit-V: Telephone Skills

- 01 Types of Calls
- 02 Appointments
- 03 Handling Complaints
- 04 Agreeing or Disagreeing
- 05 Telephone Etiquette

Prescribed Text:

A Course in Listening and Speaking- II; Ed G. Rajagopal (CIEFL) (Foundation Books, 2006)

Reference Books.

- 01 Spoken English by V Sasikumar & P.V.Dhamija (CIEFL) (Tata McGraw'-Hi li Publishing Co.)
- 02 Everyday **Dialogues in English** By Robert J.Dixson (Prentice-Hall, New Delhi)
- 03 English Conversation Practice Books I, II & III (OUP, New Delhi)

SEMESTER-IV

PAPER-II: TELUGU(4T2)

Unit – I: ప్రాచీన పద్య భాగం

- 1. నారద గాన మాత్సర్యం - పింగలి సూరన
- 2. వాగ్దాన భంగం - అసూరి మరింగంటి వేంకట నరసింహాచార్యులు
- 3. నారసింహ శతకం - ధర్మపురి శేషప్ప

Unit – II: ఆధునిక పద్య భాగం

- 1. నరుడ నేను, నరుడ నేను - కళోజీ

2. ఆర్థ గీతం - దేవరకొండ బాలగంగాధర తిలక్
3. దేవరకొండ దుర్గం - డా.ముకురాల రామా రెడ్డి

Unit – III: వచన విభాగం

1. ఆర్థ రాత్రి అరుణోదయం - దాశరథి రంగాచార్య
2. సి. పి. బ్రౌన్ సాహిత్య సేవ - జానమద్ది హనుమచ్ఛాస్త్రి
3. మన గ్రామ నామాలు - డా. కపిలవాయి లింగమూర్తి
4. నివురు తొలగిన నిప్పు - పోల్కంపల్లి శాంతా దేవి
5. కొండ మల్లెలు - ఇల్లందల సరస్వతీ దేవి

పాఠ్య గ్రంథం : తెలుగు అకాడమి వారి “సాహితీ కిన్నెర” తెలుగు వాచకం

SEMESTER-IV

Paper-III: ENTREPRENEURSHIP & MANAGEMENT PRACTICES (4T3)

Unit-I : Accounting : Definition, Need, Scope, Functions and Limitation – Interrelationship among various branches of Accounting – Financial Accounting – Nature and Functions – Preparation of Final Accounts of a Sole Trader.

Unit-II : Forms of Business Organization and their salient features – Sole trader, Partnership and Companies – Merits and Demerits.

Unit-III : Management – Meaning and Definition – Functions of Management – Planning, Organizing, Staffing, Coordination and Control – Principles of Management

Unit-IV: Entrepreneurship and Environment – Nature and Importance of entrepreneur – Functions and Classifications of entrepreneur – Entrepreneur vs Professional Manager – Women Entrepreneurs – Training programs for entrepreneurship development

Unit-V: Institutions for Entrepreneurship Development – Role of Consultancy Organisations – Role of Financial Institutions – Bank Finance to Entrepreneurs – Role of Development Financial Institutions – Venture Capital – Role and Significance

Books

1. Introduction to Accountancy: by T. S. Grewal
2. Accountancy - I: by Jain & Narang
3. Business Organization & Management: by Y. K Bhushan

4. Essentials of Management: by Koontz O'Donnel
5. Entrepreneurship Development: by Vasant Desai

SEMESTER-IV
PAPER-IV : BIOLOGY (4T4)

Course: Microbiology and Biotechnology

Total: 30 hours

Unit-I :

1. Definition, scope and history of Microbiology- Differences between prokaryotic and eukaryotic microorganisms. Classification of microorganisms – General principles and nomenclature – Whittaker's five kingdom concept and Carl Woese's three domain classification system.
2. Nutritional diversity in microorganisms – autotrophs, chemotrophs, heterotrophs, lithotrophs and Organotrophs
3. Development of immunology – type of immunity. innate, acquired active and passive. Cells of immune system (B- and T-lymphocyte, natural killer cells, monocytes, macrophages, neutrophils, Basophiles and Eosinophiles)

Unit-II :

1. Microbes important in food microbiology – food spoilage, food poisoning, food preservation, Industrial production of yeast and yeast products, SCP, enzymes.
2. Range of fermentation process, components of fermentation, design of microbial fermentor, types of fermentations, industrial production of streptomycin, lactic acid, ethyl alcohol, methane.
3. Microorganisms of the environment (Soil, air, water) Microbial interactions – mutualism, commensalism. Role of microorganisms in sewage treatment. Outlines of biodegradation of environmental pollutants

Unit-III :

1. Introduction and scope of Biotechnology
2. DNA & RNA as the genetic material, structure and forms of DNA.
3. DNA replication — Different types of replication, molecular level of semi-conservative type of replication
4. Organization of eukaryotic genes (exons, introns, promoters and terminators), Mitochondrial and chloroplast genomes

5. Transcription in Prokaryotes & Eukaryotes and post transcriptional modifications.

Unit-IV

1. Translation: Genetic code & its features; Synthesis of Polypeptide chain- Initiation, elongation & Termination in Prokaryotes and eukaryotes
2. Regulation of gene expression in prokaryotes & eukaryotes, operon concept: Lac operon.
3. Restriction endonucleases, ligases, phosphatases, methylases, kinases.
4. Cloning vectors: plasmids, cosmids, phagernids and shuttle vectors.
5. Introduction, scope and applications of plant tissue culture

SEMESTER-IV

PAPER-V : COMPUTER SCIENCE (4T5) VISUALPROGRAMMING

Unit-: Introduction to Visual Basic

WORKING WITH WINDOWS AND FORMS: Creating the Interface, Form Events, Form methods, Properties of a Form - THE VISUAL BASIC CONTROLS: Control categories, The Form Designer, The Label Control, the Text Box Control, Command Buttons, Check Box Control, Option Box Controls, Arrays, Control arrays - OTHER CONTROLS: Horizontal and Vertical Scroll Box, Frames, List Boxes, Controls that work like Arrays, Combobox - COMMON DIALOG BOX CONTROL: Drive List Box, Directory List Box, File List Box

Unit-II :

CONCEPTS IN VISUAL BASIC 6: Event Driven Environments, Subroutines, Code Routines, Functions, Procedures, Other module types - The In-put and Out-put, Variables, Controls and Maths, Branching and Decision, Looping and Iteration, Introduction to Visual Basic, Arrays, Control Arrays and Procedures, Sub programmes

INTRODUCTION AND PRINTING: The Debugged, Printing with Windows, Working with Dates, Times and Formats.

CREATING MENU STRUCTURE: The Menu Design Window, Adding the Menu Bar, Creating a Menu, Customizing a Menu, Creating a Pop-up Menu, Creating Toolbars, Adding Buttons to Toolbars, Adding Images to Toolbars, Adding Pull-Down Menus.

Unit-III

GRAPHICS AND IMAGES AND PICTURES: ACTIVE X CONTROLS: Data Bound Active X Controls, Using the Animation Control, Using the Communication Control

USING OLE CONTROL:

HADLING DATABASES: Creating Databases with Visual Data Manager, Defining a Table, Introducing Crystal Reports THE SCROLL BARS, GRID AND MOUSE

Reference Books,

1. Complete Reference VB - 6; Noel Jerke
2. VB - 6; Gary Cornell (TMH)

SEMESTER-IV

PAPER-VI: CHEMISTRY-I(4T6)

UNIT-I

1. General Principles of Metallurgy and production of non ferrous metals 15h

Pyrometallurgy: Drying and calcination, roasting, smelting, product 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 process: chemical and physical refining processes.

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

UNIT-II

1.Natural and synthetic Dyes

15h

Definition and classification of dyes – natural dyes, synthetic dyes based on chemical constitution of dyes, chemical nature of dyes, applications of dyes.

Structure of Natural dyes: Indigo, Tyrian purple, Alizarine, Indigotin.

Structure of synthetic dyes: Nitro dyes, Nitroso dyes, Azo dyes (Mono azo dyes, Bis azo dyes) Diaryl methane dyes, Triaryl methane dyes, xanthenes dyes, phenolphthalein, Fluoroseine, Acridine dyes.

Synthesis of dyes: Mono azo dye, Bis azo dyes(congo red), auromine O, Malachite Green, Crystal Violet, Rhodamine B, Acridine Yellow, Indigotin, Binding of dyes to fabric. Applications of dyes.

UNIT-III

Electro chemistry-II

8h

Electrochemical cells – reversible cells electromotive force and its measurements, Single electrode potential types of electrodes – gas, metal metal ion, oxidation-reduction, metal-metal insoluble salt, amalgam electrodes. Electrode reactions, Nernst equation – Standard electrode - reference electrodes. Hydrogen electrode and calomel electrode, electrode potential – Electrochemical series and its significance – Applications of emf measurements – Potentiometric titrations (acid-base, redox and precipitation) – problems.

2.Thermodynamics-II

7h

Second law of thermodynamics. Need for the second law. Different statement of the law. Carnot cycle and its efficiency. Carnot theorem Thermodynamic scale of temperature. Concept of entropy, enthalpy as a state function. Entropy as a state function of volume and temperature, and pressure and temperature. Entropy change in physical processes. Free energy - Gibbs function(G) and Helmholtz function(A) as thermodynamic quantities, A & G as criteria for thermodynamic equilibrium and spontaneity - their advantage over entropy. Variation of free energy with temperature, volume and pressure. Gibb's – Helmholtz equation.

UNIT-IV

1.Seperation techniques

15h

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, solid and liquid phases used in TLC, eluotropic series, development of the chromatogram, detection of spots, factors effecting R_f values and applications of TLC.

Paper Chromatography: Principle, choice of paper and solvent systems, development of chromatogram- ascending, descending, radial and two dimensional chromatography, detection of spots and applications of paper chromatography.

SEMESTER-IV

PAPER-VII: CHEMISTRY-II(4T7)

UNIT-I

1. Coordination Chemistry - II Bonding theories of metal complexes (15 Hours)

Crystal field theory: Salient features, Splitting of metal orbitals in regular and distorted octahedral, square planar, tetrahedral, square pyramidal and trigonal bipyramidal geometries. Measurement of crystal field splitting energy, High spin and low spin octahedral complexes. Crystal field stabilization energy. Factors affecting the magnitude of crystal field splitting Jahn-Teller distortion Applications and limitations of crystal field theory.

Molecular orbital theory: Nephelauxetic effect, Molecular orbital diagrams of octahedral, tetrahedral and square planar complexes. Molecular orbital treatment of π -bonding in complexes.

UNIT-II

1. Reaction mechanisms-I (15 Hours)

Investigation of reaction mechanisms: kinetics, isotopes, study of intermediates and product analyses- study of reaction intermediates: ionization and stability of carbonium ions, carbanions, carbenes, nitrenes, free radicals and arynes-mechanism in aromatic nucleophilic substitutions: S_NAr , Benzyne mechanisms - elimination reactions: Various types of eliminations and their mechanistic pathways, orientation in eliminations, elimination vs substitutions - Study of nucleophilic substitution with specific reference to the neighboring group participation (through π and σ bonds)- Factors effecting the reactivity and mechanism of nucleophilic substitutions (substrate structure, nature of the leaving group and attacking nucleophile etc)

UNIT-III

1. Chemical Kinetics - I

(15 Hours)

Rate of reaction - order and molecularity of reactions. Concentration dependence of rate. Rate law and rate constants - mathematical treatment for zero order, first order, second order, pseudo - first order, half-life and mean-life. Determination of order of a reaction by differential, integration, half- life and isolation methods. Simultaneous reactions - parallel reactions - opposing reactions - consecutive reactions, Effect of temperature on reaction rates - collision theory. Arrhenius equation and concept of activation energy. Theory of absolute reaction rates, Thermodynamic formulations - calculation of activation parameters.

UNIT-IV

1. Atomic Emission, Atomic Absorption & X-Ray methods of Analysis (15 Hours)

- A) **Flame emission spectrographic analysis:** General discussion, Instrumentation, Qualitative and quantitative applications of emission spectrography, spectrographic determination of lead in brass and Cu and Pb in white metal.
- B) **Atomic Absorption spectroscopy:** Principles, Instrumentation and Applications
- C) **X-ray methods of analysis:** X-ray absorption, X-ray fluorescence and X-ray emission methods of analysis, Origin of X-rays, instrumentation for X-ray absorption, fluorescence and emission methods. Detection and measurement of the intensity of X-rays; Application of X-ray techniques in qualitative and quantitative analysis.

SEMESTER-IV

PAPER-VIII: COMPUTER SCIENCE LAB (4P1)

Visual Programming

The lab is to be conducted on the basis o/ concepts covered in the corresponding theory paper

SEMESTER-IV

PAPER-IX: CHEMISTRY LAB (4P2)

Practicals : Instrumental Analysis

I. Properties of liquids

1. Measurement of density and viscosity of the given liquids.
2. Measurement of density and surface tension.
3. Measurement of refractive index,

II. Conductometry

4. Determination of cell constant
5. Titration of strong acid with NaOH
6. Titration of weak acid with NaOH.
7. Titration of strong acid with NaOH

III. Potentiometry

8. Determination of standard electrode potential (Cu / Cu²⁺ electrode)
9. Titration of strong acid with NaOH.
10. Titration of weak acid with NaOH

Recommended Textbooks and Reference Books

Inorganic Chemistry:

- 1) Principles of inorganic chemistry by B R. Purr, L R. Sharma and K.C Kalia

- 2) Concise Inorganic Chemistry, by J D Lee
- 3) Basic Inorganic Chemistry, by Cotton and Wilkinson
- 4) Advanced Inorganic chemistry, Vol I, 11 by Satyaprakash, Tuli, Basu and Madan
- 5) Concepts and Models of Inorganic Chemistry, by P E Douglas and T H McDaniel
- 6) Inorganic Chemistry by R R Heslop and P L Rohinson
- 7) Modern Inorganic Chemistry, By C F Bell and K A K Lott
- 8) University Chemistry by Bruce Mahan
- 9) Qualitative Inorganic analysis by A I Vogel
- 10) A textbook of quantitative inorganic analysis by A I Vogel
- 11) Inorganic Chemistry by I E Huheey
- 12) Coordination Chemistry by Basalo and Johnson
- 13) Organometallic Chemistry- An introduction by R C Mehrotra and A Singh
- 14) Inorganic Chemistry by D F Shriver, P W Atkins and C H Langford
- 15) Inorganic Chemistry by Philips and V'illiams, Lab Manuals
- 16) Introduction to inorganic reaction mechanisms by A C Lockhart
- 17) Theoretical inorganic chemistry by McDay and J Selbin
- 18) Chemical bonding and molecular geometry by R J Gillepsy and P L Popelier

Organic Chemistry:

- 1) Organic Chemistry by R T Morrison and R N Boyd
- 2) Organic Chemistry, by T I Solmons
- 3) Organic Chemistry by L G Wade Sr
- 4) Organic Chemistry by D I Cram, G S Hammond and Hendricks
- 5) Modern organic chemistry by J D Roberts and M C Caserio
- 6) Textbook of organic chemistry, by Ferguson
- 7) Problems and their solution in organic chemistry, by I L Finar
- 8) Reaction mechanisms in organic chemistry, by SM Mukheiji and SP Singh
- 9) A guidebook to mechanisms in organic chemistry by Peter sykes
- 10) Heterocyclic chemistry by Gilchrist
- 11) Heterocyclic chemistry by R.K. Bansal

Physical Chemistry

- 1) Physical Chemistry by G M Barrow
- 2) Principles of Physical Chemistry by Prutton and Marron
- 3) Theoretical Chemistry lby LS Giasstone
- 4) Textbook of Physical Chemistry by K L Kapoor
- 5) Thermodynamics for Chemists, by S Glassione

- 6) Chemical Kinetics by K I Laidler
- 7) Kinetics and Mechanism by I W Moore and R G Pearson
- 8) Physical Chemistry through Problems by S K Dogra
- 9) An introduction to electrochemistry by S Glasston
- 10) Fundamentals of Photochemistry, By KK Rohtagi and Mukherjee
- 11) Solid State chemistry by N B Henry
- 12) Chemical Thermodynamics by R P Rastogi and S S Misra
- 13) Thermodynamics by I Jayaram and I C Kuriakose
- 14) Introductory Quantum Chemistry, by A K Chandra
- 15) Introduction to collision chemistry, by Mysels