THIRUVALLUVAR UNIVERSITY

BACHELOR OF CHEMISTRY

B.Sc. CHEMISTRY

DEGREE COURSE

CBCS PATTERN
(With effect from 2012 - 2013)

The Course of Study and the Scheme of Examinations:

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
SEMESTER I							**CIA**	**Uni. Exam**	**Total**
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English	Paper-1	6	4	English	25	75	100
3	III	Core Theory	Paper-1	6	6	General Chemistry - I	25	75	100
	III	Core Practical	Practical-1	3	0	Volumetric Analysis	0	0	0
4	III	Allied -1	Paper-1	4	4	**Any one from** 1. Physics –I 2. Botany –I 3. Zoology –I 4. Biochemistry – I 5. Mathematics – I*	15	60	75
	III	Allied Practical	Practical-1	3	0		0	0	0
5	IV	Environmental Studies		2	2		10	40	50
				30	**20**		**100**	**325**	**425**
SEMESTER II							**CIA**	**Uni. Exam**	**Total**
6	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
7	II	English	Paper-2	4	4	English	25	75	100
8	III	Core Theory	Paper-2	6	5	General Chemistry - II	25	75	100
9	III	Core Practical	Practical-1	3	3	Volumetric Analysis	40	60	100
10	III	Allied-1	Paper-2	4	4	**Any one from** 1. Physics –II 2. Botany –II 3. Zoology –II 4. Biochemistry – II 5. Mathematics – II*	15	60	75
11	III	Allied Practical	Practical-1	3	2		10	40	50

S.NO.	Part	Study Components		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
		Course Title							
12	IV	Value Education		2	2	Soft skill	10	40	50
13	IV	Soft Skill		2	1	Value Education	10	40	50
				30	**25**		**160**	**465**	**625**
SEMESTER III							**CIA**	**Uni. Exam**	**Total**
14	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
15	II	English	Paper-3	6	4	English	25	75	100
16	III	Core Theory	Paper-3	3	3	General Chemistry – III	25	75	100
	III	Core Practical	Practical-2	3	0	Inorganic Qualitative Analysis & Preparations	0	0	0
17	III	ALLIED-2	Paper-3	4	4	**Any one from** 1. Physics –I 2. Botany –I 3. Zoology –I 4. Biochemistry – I 5. Mathematics – I*	15	60	75
	III	Allied Practical	Practical-2	3	0		0	0	0
18	IV	Skill Based Subject	Paper-1	3	3	Water Treatment and Analysis	15	60	75
19	IV	Non-Major Elective	Paper-1	2	2	Medicinal Chemistry	10	40	50
				30	**20**		**115**	**385**	**500**
SEMESTER IV							**CIA**	**Uni. Exam**	**Total**
20	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
21	II	English	Paper-4	6	4	English	25	75	100
22	III	Core Theory	Paper-4	3	3	General Chemistry - IV	25	75	100
23	III	Core Practical	Practical-2	3	3	Inorganic Qualitative Analysis & Preparations	40	60	100
24	III	Allied-2	Paper-4	4	4	**Any one from** 1. Physics –II 2. Botany –II 3. Zoology –II 4. Biochemistry – II 5. Mathematics – II*	15	60	75
25	III	Allied Practical	Practical-2	3	2		10	40	50
26	IV	Skill Based Subject	Paper-2	3	3	Food Chemistry	15	60	75
27	IV	Non-Major Elective	Paper-2	2	2	Chemistry in Every Day Life	10	40	50
				30	**25**		**165**	**485**	**650**

S.NO.	Part	Study Components Course Title		Ins. hrs /week	Credit	Title of the Paper	Maximum Marks		
SEMESTER V							**CIA**	**Uni. Exam**	**Total**
28	III	Core Theory	Paper-5	5	5	Inorganic Chemistry - I	25	75	100
	III	Core Practical	Practical-3	3	0	Gravimetric Estimation	0	0	0
29	III	Core Theory	Paper-6	5	5	Organic Chemistry – I	25	75	100
	III	Core Practical	Practical-4	3	0	Organic Analysis and Preparations	0	0	0
30	III	Core Theory	Paper-7	5	5	Physical Chemistry – I	25	75	100
	III	Core Practical	Practical-5	3	0	Physical Chemistry	0	0	0
31	III	Elective	Paper-1	3	3	**Any one from** A. Spectroscopy – I B. Basis of computer programming in C and its applications in chemistry C. Organic Synthesis	25	75	100
32	IV	Skill Based Subject	Paper - 3	3	3	Data Analysis and Separation Techniques	15	60	75
				30	**21**		**115**	**360**	**475**
SEMESTER VI							**CIA**	**Uni. Exam**	**Total**
33	III	Core Theory	Paper-8	4	4	Inorganic Chemistry – II	25	75	100
34	III	Core Practical	Practical-3	3	3	Gravimetric Estimation	40	60	100
35	III	Core Theory	Paper-9	4	3	Organic Chemistry – II	25	75	100
36	III	Core Practical	Practical-4	3	3	Organic Analysis & Preparations	40	60	100
37	III	Core Theory	Paper-10	4	3	Physical Chemistry – II	25	75	100
38	III	Core Practical	Practical-5	3	3	Physical Chemistry Experiments	40	60	100
39	III	Elective	Paper-2	3	3	**Any one from** A. Pharmaceutical Chemistry B. Polymer Chemistry C. Green Chemistry	25	75	100
40	III	Elective	Paper-3	3	3	**Any one from** A. Spectroscopy – II B. Applied Chemistry C. Nano Chemistry	25	75	100
41	IV	Skill based Subject	Paper-4	3	3	Agriculture and Leather Chemistry	15	60	75
42	V	Extension Activities		-	1		10	40	50
		TOTAL		**30**	**29**		**270**	**655**	**925**

Part	**Subject**	**Papers**	**Credit**	**Total credits**	**Marks**	**Total Marks**
Part I	Languages	4	4	16	100	400
Part II	English	4	4	16	100	400
Part III	Allied (Odd Semester) *	2	4	8	75	150
	Allied (Even Semester) *	2	4	8	75	150
	Allied Practical (Even Semester)	2	2	4	50	100
	Electives	3	3	9	100	300
	Core (Theory & Practicals)	15	(3-7)	57	100	1500
Part IV	Environmental Science	1	2	2	50	50
	Soft skill	1	1	1	50	50
	Value Education	1	2	2	50	50
	Lang. & Others/NME	2	2	4	50	100
	Skill Based	4	3	12	75	300
Part V	Extension	1	1	1	50	50
	Total	**42 #**		**140**		**3600**

* **Allied Mathematics**:

	Ins. Hrs/Week	**Credit**	**CIA**	**University**	**Total Marks**
Paper-1	7	4	25	75	100
Paper-2	7	6	25	75	100

# If Mathematics is one of the Allied Subjects total no. of papers will be 41.

THIRUVALLUVAR UNIVERSITY

B.SC. CHEMISTRY

SYLLABUS
UNDER CBCS
(with effect from 2012 - 2013)

SEMESTER I

PAPER – 1

GENERAL CHEMISTRY – I

Objective:

Basic concepts regarding atomic structure, periodic properties, bonding concepts, ionic bond, VSEPR and MO theories, nomenclature of organic compounds, hybridization, reaction intermediates, quantum theory, gases, principles of volumetric analysis, related problems, and applications wherever necessary are to be taught for I-Semester.

UNIT-I

1.1 Atomic structure - Quantum numbers n, l, m and s - Pauli exclusion principle - Energy distribution and orbitals - Hund’s rule of maximum multiplicity - Aufbau's principle - Electronic configurations of elements - Stability of half-filled and completely filled orbitals.

1.2 Classification of elements – General characteristics of s, p, d and f block elements - Periodicity of properties- Definition and periodicity of the following properties- Atomic radii - factors affecting atomic radii - Ionic radii - factors affecting ionic radii.

1.3 Ionization potential - factors affecting ionization potential - Electron affinity - factors affecting electron affinity - Electronegativity - factors affecting electronegativity - Pauling scale - Mulliken electronegativity scale – Applications of electronegativity regarding bonding nature.

UNIT-II

2.1 Ionic bond - Conditions for the formation of ionic bond - General properties - Energetics of formation of NaCl from Na^+ and Cl^- . Hydration energy and lattice energy and their applications – Born – Haber cycle. Fajan's rules - Characteristics of electrovalent compounds - Valence bond theory - Conditions for the formation of covalent bond - General properties - Polarity of bonds - Orbital overlap - Bond lengths and bond energies - hybridization - sigma and pi bonds.

2.2 VSEPR theory - geometries of BO_3^{3-}, NH_4^+, ClF_3, PCl_5, IF_7, and XeF_6 molecules - partial ionic character of covalent bond - percentage of ionic character - Hanny and Smyth equation.

2.3 Molecular Orbital theory - Bonding, anti-bonding orbitals - Relative order of energies of molecular orbitals - MO diagrams of H_2, He_2, O_2, O_2^+, O_2^- and CO - Bond order - stability and magnetic property of the molecules - Comparison of VB and MO theories.

UNIT-III

3.1 Classification of organic compounds - Nomenclature of organic compounds - Functional groups - Homologous series - IUPAC recommendations for naming simple aliphatic and alicyclic compounds.

3.2 Basic concepts of bonding in organic chemistry - Hybridization - tetravalency of carbon - geometry of molecules - methane, ethane, ethylene, acetylene and benzene. Electron displacement effects - inductive - inductomeric - electromeric – mesomeric effect - resonance - hyperconjugation and steric effects.

3.3 Cleavage of bonds - Homolytic and Heterolytic fission of carbon-carbon bond - Methods for determining reaction mechanism - Reaction intermediates - Structure and stability of Carbocations - Carboanions and Free radicals.

UNIT-IV

4.1 Quantum chemistry - Quantum theory of radiation –The Sommerfield extension of Bohr theory- Planck's theory - photoelectric effect - Compton effect - Wave mechanical concept of the atom - de Broglie's relationship –Davisson and Germer experiment- wave nature of electron - Heisenberg’s uncertainty principle.

4.2 Schrodinger wave equation (without derivation) - significance of wave functions, ψ and ψ^2 - probability distribution of electrons - radial probability distribution curves.

4.3 Gaseous state - Kinetic gas equation - derivation - Gas laws from the kinetic gas equation - Kinds of velocities - mean, rms, most probable velocities - Calculation of molecular velocities, Maxwell's distribution of molecular velocities (no derivation) - Effect of temperature on velocity distribution. Equipartition of energy - heat capacity and molecular basis - Virial equation of state - Boyle temperature - coefficient of compressibility and thermal expansion.

UNIT-V

5.1 Definitions of molarity - normality - molality and mole fraction - their calculations - definition and examples for primary and secondary standards. Calculation of equivalent weight of acid, base, oxidizing agent, reducing agent and salt. Principle of Volumetric Analysis.

5.2 Theories of acid-base - red-ox - complexometric, iodometric and iodimetric titrations.

5.3 Theories of indicators - acid-base indicators-choice of indicators - redox - metal ion and adsorption indicators.

SEMESTER II

Paper – 2

GENERAL CHEMISTRY – II

Objectives:

Basic knowledge on alkanes, alkenes, alkynes, cyclo alkanes, dienes, thermochemistry, basic concepts in thermodynamics, first law, derivation of equations, related problems, s and p block elements, group study, mechanism, applications wherever necessary are to be taught for II-Semester.

UNIT-I

1.1 Alkali metals - Li, Na, K, Rb and Cs - Occurrence - Comparative study of elements - oxides, halides, hydroxides and carbonates - Exceptional property of Lithium - Diagonal relationship of Li with Mg.

1.2 Alkaline earth metals - Be, Mg, Ca, Sr and Ba - Occurrence - comparative study of the elements with respect to oxides, hydroxides, halides, sulphates and carbonates - Exceptional property of Beryllium - Diagonal relationship of Be with Al - Comparison of alkaline earth metals with alkali metals - Magnesium acting as bridge element between IIA and IIB groups - Magnesium resembles zinc.

1.3 p-block elements - Boron family - group discussion - anomalous behavior of Boron - diagonal relationship between B and Si - Electron deficiency and electron acceptor behaviour of Boron trihalides - bonding (hydrogen-bridge structure) in diborane.

UNIT-II

2.1 Alkanes - Methods of preparation of alkanes –Wurtz method, Kolbe's method and reduction of alkyl halides. Physical and chemical Properties of alkanes - Mechanism of free radical substitution in alkanes – Halogenation and reactivity. Alkenes - Properties of alkenes – Electrophilic and Free radical addition.

2.2 Addition reactions of alkenes with mechanism- addition of hydrogen, halogens, hydrogen halide (Markownikoff's rule), hydrogen bromide (peroxide effect), sulphuric acid , water, BH_3, O_3 , hydroxylation with $KMnO_4$ - allylic substitution by NBS.

2.3 Alkynes - Acidity of alkynes - Addition of hydrogen - Hydroboration - Hydrohalogenation - Addition of hypohalous acid, Hydration - addition of water with $HgSO_4$ catalyst - Addition of alcohols and carboxylic acids - oxidation with $KMnO_4$ – ozonolysis - formation of acetylides.

UNIT-III

3.1 Cycloalkanes - preparation using Wurtz's reaction - Dieckmann's ring closure and reduction of aromatic hydrocarbons - Substitution and ring opening reactions.

3.2 Bayer's strain theory - theory of strainless rings. Dienes – Classification - conjugated, isolated and cumulative- stability of dienes.

3.3 1:2 and 1:4 addition reactions of H_2 and HX with mechanisms –Synthesis of dienes - 1:3 butadiene, Isoprene and chloroprene. Diels Alder reaction.

UNIT-IV

4.1. Liquid crystals - classification and molecular arrangements - Liquid state - density - diffusion - Viscosity - evaporation. Surface tension - effect of temperature on surface tension - parachor - definition and applications only - Coefficient of viscosity - effect of temperature - effect of pressure.

4.2 Solid State - Crystal lattices - Laws of crystallography - Elements of symmetry - crystal systems - unit cell - space lattice - Bravais' lattices - structure of NaCl - structure of CsCl - Miller's indices.

4.3 Thermodynamics - Definition and explanation of terms - System, boundary, surroundings - Homogeneous and heterogeneous system - Isolated system - Closed system - Open system - Intensive and extensive properties - State of a system - Independent state variables - Dependent state variables - Thermodynamic functions - State and path functions.

UNIT-V

5.1 Thermodynamic processes - types of processes - cyclic - reversible - irreversible - isothermal - adiabatic. Exact and inexact differentials - concept of heat and work - Zeroth law of thermodynamics.

5.2 First law of thermodynamics - statement and equation - Cp, Cv relationship - calculation of W, Q, ΔE and ΔH for the expansion of ideal gases under reversible - isothermal and adiabatic conditions.

5.3 Thermochemistry - Heat of reaction - Exothermic and endothermic reaction - Calculation of ΔH from ΔE and vice versa - Thermochemical equations - bond dissociation energy - calculation from thermochemical data - variation of heat of a reaction with temperature - Kirchoff's equation and its significance.

CORE PRACTICAL

Paper – 1 & 2

VOLUMETRIC ANALYSIS

Acidimetry

1. Estimation of borax - Standard Sodium Carbonate

2. Estimation of Sodium Hydroxide - Standard Sodium Carbonate

3. Estimation of HCl – standard oxalic acid.

Iodometry

4. Estimation of Copper - Standard Copper sulphate

5. Estimation of Potassium dichromate - Standard Potassium dichromate

Complexometry

6. Estimation of Magnesium using EDTA.

7. Estimation of Zinc using EDTA

Dichrometry

8 .Estimation of ferrous iron using Diphenyl amine / N-Phenylanthranillic acid as indicator.

Precipitation titration

9. Estimation of Chloride in neutral medium. (Demonstration - experiment)

Permanganometry

10. Estimation of ferrous sulphate – Standard FAS.

11. Estimation of oxalic acid – Standard oxalic acid.

Students must write short procedure for the given estimation in ten minutes during the examination and submit the paper for evaluation.

SEMESTER – III

Paper – 3

GENERAL CHEMISTRY – III

Objective:

Basic concepts regarding principles of inorganic analysis and applications of qualitative analysis, solvents, p-block elements, group study, aromaticity, electrophilic and nucleophilic substitution reactions, elimination reactions, mechanism, second law of thermodynamics, derivation of equations, related problems, applications wherever necessary.

UNIT-I

1.1 Semimicro techniques - Principles of acid-base equilibria - common ion effect - solubility product and their applications in qualitative analysis.

1.2 Principles of inorganic analysis - Reactions involved in the separation and identification of cations and anions in the analysis - Spot test reagents-Aluminon, Cupferon, DMG, Thiourea, Magneson, Alizarin and Nessler's reagent.

1.3 Types of solvents - Protic and aprotic solvents - Amphi-protic / amphoteric solvent - aqueous and non-aqueous solvents - Liquid ammonia as solvent.

UNIT-II

2.1 Carbon family - Comparative study of elements - valencies - oxides - halides - hydrides - oxyacids - catenation - Comparison of properties of carbon and silicon.

2.2 Nitrogen family - Comparative study of N, P, As, Sb and Bi - elements - oxides - oxyacids - halides and hydrides.

2.3 Oxygen family - Comparative study of O, S, Se and Te-elements - catenation - oxides- halides - hydrides and oxy acids - anomalous behaviour of oxygen.

UNIT-III

3.1 Aromaticity - Modern theory of aromaticity - Huckel's (4n +2) rule and its simple applications to benzenoid and non benzenoid systems.

3.2 Electrophilic substitution reactions in aromatic compounds - mechanisms of nitration - halogenation - sulphonation - Friedel-Craft's acylation and alkylation.

3.3 Aliphatic nucleophilic substitutions - Mechanisms of S_N1, S_N2 and S_Ni reactions - effects of structure of substrate - solvent - nucleophile and leaving groups.

UNIT-IV

4.1 Elimination reactions - mechanisms of E1 and E2 reactions - Hoffmann and Saytzeff's rules - Cis and trans eliminations.

4.2 Aromatic nucleophilic substitutions - Unimolecular nucleophilic substitution - mechanism - Bimolecular nucleophilic substitution - mechanism.

4.3 Directive influence - Orientation - Ortho/para ratio - Nuclear and side chain halogenations.

UNIT-V

5.1 Second law of thermodynamics - Need for the II law - Spontaneous process - Criteria of spontaneity - different forms of statements of the second law - Cyclic process - Heat engines.

5.2 Carnot's cycle - Efficiency - Carnot's theorem (statement only) - Concept of entropy - Definition and mathematical statement - Randomness and entropy.

5.3 Standard entropy -Derivation of entropy from Carnot cycle - entropy change of an ideal gas during isothermal process - Entropy changes in cyclic - reversible and irreversible processes.

SKILL BASED SUBJECT

PAPER – 1

WATER TREATMENT AND ANALYSIS

Objective:

To learn about various methods of treatment and analysis of water.

UNIT-I

1.1 Introduction - characteristics of water - alkalinity - hardness - unit of hardness - Total solids - Oxidation - transparency - Silica content.

1.2 Purification of water for drinking purpose - potability of water - clarification - coagulation - contact & electro chemical coagulation - sterilization & disinfection of water - precipitation - aeration - ozonisation - Chlorination.

UNIT-II

2.1 Water softening methods - Clark's process - lime soda process - modified lime soda process - permutit or zeolite process - Ion exchange process - demineralization of water.

2.2 Determination of hardness of water - Titration method - complexometric method using EDTA - expressing hardness - equivalents of calcium carbonate - problems to determine temporary & permanent hardness.

UNIT-III

3.1 Hard water and industries - industrial water treatment - boiler feed water method of softening - prevention of plumbo solvency - scales in boilers - consequences - internal conditioning methods.

3.2 Desalination of brackish water - elecrodiaysis - Reverse osmosis - removal of Fe, Mn and Silicic acid - effluent treatment of water from paper industry, petrochemical, fertilizer industry and power station.

UNIT-IV

Water analysis - sampling of water for analysis - chemical substances affecting potability - colour, turbidity odour, taste, temperature, pH and electrical conductivity.
Analysis of solids present in water - suspended solids - dissolved solids - total acidity - alkalinity - free CO_2 - free chlorine - Ca, Mg, Fe, Mn, Ag & Zn.

UNIT-V

5.1 Analysis of chemical substances affecting health - NH_3, Nitrate, Nitrite, cyanide, sulphate, sulphide, chloride, fluoride - measurement of toxic chemical substances - analysis of chemical substances indicative of pollution - Dissolved oxygen - Bio Chemical Oxygen Demand (BOD) - Chemical Oxygen Demand (COD)

5.2 Bacteriological examination of water - total count test - E.coli test - E.coli index - most probable number method - Biological examination of water - physical examination of water - radioactivity of water - methods of removing radioactivity from water.

Reference Books:

1. Industrial Chemistry (including chemical - engineering) - B.K. Sharma - Goel publishing house, Meerut.
2. Pollution control in process industries - S.P. Mahajan - Tata McGraw - Hill Publishing Company Ltd., New Delhi.
3. Water pollution and management - C.K. Varashney - Wiley Eastern Ltd., Chennai - 20.

NON-MAJOR ELECTIVE

PAPER – 1

MEDICINAL CHEMISTRY

Objectives:

- To learn the basic idea of drugs and name of common drugs
- To learn about BP, diabetics etc

UNIT-I

CLINICAL HEALTH AND BIOCHEMICAL ANALYSIS: Definition of Health, WHO standard, Sterilization of surgical instruments. Biochemical analysis of urine and serum. Blood - Composition, grouping and Rh factor.

UNIT-II

COMMON DRUGS: Antibiotics, Antipyretics, Analgesics, Anti-inflammatory agents, Sedatives, Antiseptics, Antihistamines, Tranquilizers, Hypnotics and Antidepressant drugs - Definition,

Examples, uses and side effects.

UNIT-III

VITAL AILMENTS AND TREATMENT: Blood pressure - hypertension and hypotension, Diabetes, Cancer, AIDS - Causes,

symptoms and medicines.

UNIT-IV

INDIAN MEDICINAL PLANTS: Palak, Vallarai, Kizhanelli, Thumbai, Hibiscus, Adadodai, Thoothuvalai, Nochi, Thulasi,

Aloe vera - Chemical constituents and medicinal uses.

UNIT-V

FIRST AID AND SAFETY: Treatment of shock, haemorrage, cuts and wounds. Burns - classification and first aid.

Asbestos, silica, lead paints, cement, welding fumes and gases - Hazard alert and precautions for safety.

Reference Books :

1. Jayashree Ghosh - Applied Chemistry - S. Chand and Company Ltd., 2006
2. S.C Rastogi, Biochemistry, Tata McGraw Hill Publishing Co., 1993.
3. Rasheeduz Zafar - Medicinal Plants of India - CBs Publishers and Distributors, 2000.
4. B.L Oser, Hawk's Physiological Chemistry, Tata-McGraw - Hill Publishing Co. Ltd.
5. A.H Beckett and J.B Stenlake - Practical Pharmaceutical Chemistry, Vol.I - CBS Publishers and Distributors, 2000.

SEMESTER – IV

PAPER – 4

GENERAL CHEMISTRY – IV

Objective:

Noble gases, polymerization, polyhydric alcohol, unsaturated alcohols, phenols, preparation, properties, important name reactions, mechanism, thermodynamics, derivation of equations, partial molar properties, chemical potential, related problems, , applications.

UNIT-I

1.1 Noble gases - Electronic configurations - position in the periodic table - Chemical inertness of noble gases - reasons

1.2 Clathrates -definition and applications.

1.3 Compounds of xenon - hybridization and geometries of XeF_2, $XeF_{4,}$ XeF_6 and $XeOF_4$. (preparation and properties – not necessary)

UNIT-II

2.1 Polymerization - Types of polymerization - Distinction between addition and condensation polymerization - free radical - cationic and anionic polymerizations

2.2 Mechanism of preparation of polymers - addition polymers and condensation polymers with examples

2.3 Thermoplastic and thermosetting polymers

UNIT-III

3.1 Phenols - acidic character of phenols - Kolbe's reaction - Reimer - Tiemann reaction - Gattermann - Lederer - Manasse and Houben - Hoesh reactions

3.2 Di - and tri-hydric phenols - preparation, properties and uses of catechol and pyrogallol.

3.3 Preparation and properties of naphthols.

UNIT-IV

4.1 Entropy changes in physical transformations - Calculation of entropy changes with changes in T, V and P - entropy of mixing of ideal gases.

4.2 Free energy and work function - Gibbs free energy - Helmholtz work function - their variations with temperature - pressure and volume - Criteria for spontaneity.

4.3 Gibbs-Helmholtz equations - derivation and applications. Clausius- clapeyron equation – Derivation and Application.

UNIT-V

5.1 Third law of thermodynamics - Entropy at absolute zero - Planck’s formulation of third law - Nernst heat theorem - statement of III law of thermodynamics.

5.2 Evaluation of absolute entropy from heat capacity measurements - exceptions to III law - application of III law.

5.3 Partial molar properties - Chemical potential - Gibbs-Duhem equation - effect of temperature and pressure on chemical potential.

CORE PRACTICAL

PAPER – 3 & 4

INORGANIC QUALITATIVE ANALYSIS AND PREPARATION

Analysis of mixture containing two cations and two anions of which one will be an interfering ion. Semi micro methods using the conventional scheme to be adopted.

Cations to be studied.

Lead, Copper, Bismuth, Cadmium, Iron, Aluminium, Zinc, Manganese, Cobalt, Nickel,

Barium, Calcium, Strontium, Magnesium and Ammonium.

Anions to be studied

Carbonate, Sulphide, Sulphate, Nitrate, Chloride, Bromide, Fluoride, Borate, Oxalate and Phosphate.

Preparation of Inorganic compounds.

1. Tetraammine Copper II sulphate
2. Tris (thiourea) Copper I chloride
3. Potassium trioxalato ferrate II
4. Ferrous ammonium sulphate
5. Microcosmic salt
6. Manganous sulphate

SKILL BASED SUBJECT

PAPER – 2

FOOD CHEMISTRY

Objective :

To obtain knowledge about different foods, their nutritive values and food preservation.

UNIT-I

1.1 Cereals definition - Classification, Processing - Structure of Cereals - Composition and nutritive value. Pulses definition - Classification - Processing - Structure of Pulses - Composition and nutritive value - Toxic Constituents in pulses - medicinal value of cereals and pulses.

1.2 Sugar and related products. Sugar Structure and Properties. Nutritive value - Sugar composition in different food items. Sugar related product - Classification & nutritive value. Artificial sweeteners - example - advantages and disadvantages.

UNIT-II

2.1 Vegetables - classification - composition & nutritive values - Fruits- Classification - Composition & nutritive values.

2.2 Fungi and algae as food - enzymatic browning and non enzymatic browning - Nutritive value of some common foods - milk, egg., soyabeans

UNIT-III

3.1 Beverages - definition and examples - Classification of beverages

Fruit beverages - Milk based beverages - malted beverages - examples.

Alcoholic and non alcoholic beverages - examples.

3.2 Appetizers - definition - classification - examples - Water - functions and deficiency.

UNIT-IV

4.1 Food Preservatives - definition - classification - Food Spoilage - definition - Prevention.

4.2 Methods of preservation - classification - Low and high temperature - preservatives examples - Dehydration - osmotic pressure - food irradiation.

UNIT-V

5.1 Food additives - Definition – classification - their functions - chemical substance.

5.2 Packaging of foods - classification-Materials used for packaging.

Reference Books:

1. Food Science - III Edition - B. Sri Lakshmi.

New Age International Publisher, 2005.

2. Food Chemistry - Lilian Hoagland Meyer CBS Publishers & Distributors, 2004.

3. Food Science, Nutrition and Health - Brian.A.Fox, Allan G.Cameron Edward Arnold, London.

4. Fundamentals of Foods and Nutrition - Mudambi. R.Sumathi, and Raja gopal, M.V. - Wiley Eastern Ltd., Madras.

5. Handbook of Food and Nutrition - M. Swaminathan - Bangalore Printing and Publishing Co. Ltd., Bangalore.

NON-MAJOR ELECTIVE

PAPER – 2

CHEMISTRY IN EVERY DAY LIFE

Objectives:

- To know the basics of chemistry in our life
- To know about the food colours, Plastics, drugs etc

UNIT: I

1.1 General Survey of Chemicals used in everyday life.

1.2 Cosmetics: Talcum Powder, Tooth pastes, Shampoos, Nail Polish, Perfumes,

Soaps, and detergents - General formulations and preparation - possible

Hazards of cosmetics use.

UNIT-II

2.1 Food and Nutrition: Carbohydrates, Proteins,Fats,Minerals and Vitamins, definitions,sources and their physiological importance - balanced diet.

2.2 Adulterants in milk, ghee, oil, coffee powder, tea, asafoetida, chilli powder, pulses and turmeric powder - identification.

UNIT-III

3.1 Colour chemicals used in food - soft drinks and its health hazards.

3.2 Food preservatives-Definition-Examples-Methods of preservation-Low and high temperature-Dehydration-Osmotic pressure-Food irradiation.

UNIT-IV

4.1 Plastics, polythene, PVC, bakelite, polyesters, resins, and their applications.

4.2 Natural Rubber-Synthetic rubbers-Vulcanization - definition and its applications.

UNIT-V

5.1 Chemicals in food production - fertilizers used in natural sources - Fertilizers urea, NPK and Super phosphates need - uses and hazards.

5.2 Pesticides – definition and examples.

Reference Books:

1. Chemical Process Industries - Norris Shreve Joseph A.Brine .Jr.
2. Perfumes, Cosmetic and Soaps - W.A. Poucher (Vol 3).
3. Environmenta Chemistry - A .K. DE.
4. Industrial Chemistry, B.K. Sharma- Goel publishing house Meerut.
5. Food Science - B. Srilakshmi - III Editio - New Age International Publishers 2005.
6. Food Chemistry Lillian Hoagland Meyer - CBS publishes & distributors - 2004.
7. Fundamental concepts of Applied Chemistry - Jayashree Ghosh - S.Chand & Co Ltd., New Delhi.
8. Applied chemistry - K.Bagavathi Sundari - MJP Publishers.

SEMESTER – V

PAPER – 5

INORGANIC CHEMISTRY – I

Objectives:

- To understand the principle of gravimetric analysis.
- To give students a firm grounding in Co-ordination chemistry.
- To study about the halogens and related compounds.

UNIT-I

1.1 Principles of gravimetric analysis - Characteristics of precipitating agents - choice of precipitants - conditions of precipitation - specific and selective precipitants - DMG, cupferron, salicylaldehyde, ethylene diamine - use of sequestering agents.

1.2 Co-precipitation - post precipitation - differences - minimisation of error - precipitation from homogeneous solution - calculation in gravimetric methods - use of gravimetric factor.

1.3 Thermoanalytical methods - principle involved in thermogravimetric analysis and differential thermal analysis - characteristics of TGA and DTA - thermograms – factors affecting TGA and DTA curves - discussion of various components of the instrument with block diagrams - Applications of thermogravimetry - Applications of DTA - thermometric titration. Electrogravimetry - principle and applications.

UNIT-II

CO - ORDINATION COMPOUNDS:

2.1 Definition of terms used - classification of ligands - chelation and effect of chelation - applications of EDTA - Co-ordination number and stereo chemistry of complexes –

2.2 Nomenclature. Bridged (or) polynuclear complexes – inner metallic complexes.

2.3 Isomerism in complexes - Ionisation Isomerism, hydrate Isomerism, linkage somerism, ligand Isomerism, Co-ordination Isomerism, polymerization Isomerism, geometrical and optical Isomerism in 4 and 6 co - ordinated complexes.

UNIT-III

3.1 Werner theory - EAN rule - theory of bonding - valence bond theory - hybridisation - geometry and magnetic properties - failure of VBT

3.2 Crystal field theory - spectrochemical series - splitting of d - orbitals in octahedral, tetrahedral and square planar complexes - crystal field stabilisation energy - calculation of CFSE in octahedral and square planar complexes.

3.3 Low spin and high spin complexes – explanation of magnetic properties, colour and geometry using CFT

UNIT-IV

4.1 Comparison of VBT and CFT.

4.2 Application of Co-ordination compounds in qualitative and quantitative analysis - Detection of potassium ion, separation of Cu and Cd ions, Estimation of Ni using DMG and Al using oxine.

4.3 Pi-acceptor ligands - bonding, hybridisation, structures and properties of carbonyls of Ni, Cr, Fe, Co, Mn, W and V - compounds of P and As as acceptor ligands.

UNIT-V

5.1 Halogen-comparative study of F, Cl, Br, I and At - elements - reactivities - comparison of F and O - hydracids - oxides.

5.2 Classification of halide - fluorides of oxygen - exceptional properties of fluorine.

5.3 oxy acids of halogens - Structure. Interhalogen compounds – pseudohalogens - basic properties of halogens- positive iodine – evidences.

PAPER – 6

ORGANIC CHEMISTRY – I

Objectives:

- To effectively impart knowledge about Carbohydrate chemistry Stereochemistry, Heterocyclic chemistry and polynuclear hydrocarbons
- To make the students more inquisitive in learning the mechanistic details in Organic Chemistry through the teaching of the named reactions
- To learn the synthetic applications of certain organic compounds

UNIT- I

1.1. **Carbohydrates :** classification - reactions of glucose and fructose - osazone formation, muta rotation and its mechanism - structural elucidation of glucose and fructose - pyranose and furanose forms.

1.2 Determination of ring size- Haworth projection formula - configuration of glucose and fructose - epimerization - chain lengthening and chain shortening of aldoses - inter conversion of aldoses and ketoses

1.3 **Disaccharides and poly saccharides:** reactions and Structural elucidation of sucrose. Structural elucidation and properties of cellulose

UNIT- II

2.1 **Stereoisomerism:** definition-classification into optical and geometrical isomerism. Projection formulae : Fischer, Flying Wedge, Sawhorse and Newmann projection formulae - rotation of optical isomers - Cahn - Ingold - Prelog rules - R, S notation of optical isomers with one and two asymmetric carbon atoms - D, L notations.

Optical activities in compounds not containing asymmetric carbon atoms: biphenyl, allenes and spiranes.

2.2. **Geometrical isomerism :** cis - trans, syn - anti and E, Z notations - geometrical isomerism in maleic and fumaric acids and unsymmetrical ketoximes - methods of distinguishing geometrical isomers using melting points, dipole moment, solubility, dehydration, cyclisation, heat of hydrogenation and combustion.

2.3 **Conformational analysis :** introduction of terms - conformers, configuration, dihedral angle, torsional strain, conformational analysis of ethane and n-butane including energy diagrams - conformers of cyclohexane - axial and equatorial bonds - ring flipping – conformers of mono and dimethylcyclohexane-1, 2 and 1,3 interactions.

UNIT- III

3.1 Carbonyl polarization - reactivity of carbonyl group - acidity of alpha hydrogen; Malonic, acetoacetic and cyano acetic esters - Characteristic reactions of active methylene group - synthetic uses of malonic, acetoacetic and cyano acetic esters.

3.2. **Tautomerism:** definition - keto-enol tautomerism - identification, acid and basecatalyzed mechanisms, evidences - amido-imidol, nitro- acinitro tautomerisms.

3.3 Mechanism of aldol, Perkin and benzoin condensations and Knoevenagel, Claisen, Wittig, Cannizzaro, Reformatsky and Michael reactions.

UNIT- IV

4.1 Heterocyclic compounds - Huckel’s rule - Preparation, properties and uses of furan, pyrrole, and thiophene.

4.2 Preparation, properties and uses of pyridine and piperidine. Methods of opening of heterocyclic rings - oxidation, reduction, Hoffmann’s exhaustive methylation, Van Braun’s methods. Comparative study of basicity of pyrrole, pyridine and piperidine with amines.

4.3 Synthesis and reactions of quinoline, isoquinoline and indole with special reference to Skraup, Bischler Napieralski and Fischer Indole syntheses.

UNIT- V

5.1 Polynuclear hydrocarbons - synthesis, properties and uses of naphthalene, anthracene and phenanthrene - structural elucidation of naphthalene - chemistry of naphthaquinones.

5.2 Dyes - Theory of colour and constitution - classification according to the structure and method of application. Preparation and uses of 1) Azo dye - methyl orange 2) Triphenyl methane dye - Malachite green 3) Phthalein dye - phenolphthalein 4) Vat dye - Indigo 5) anthraquinone dye – Alizarin.

5.3 Diazo methane and diazo acetic ester - preparations, structure and synthetic uses.

PAPER – 7

PHYSICAL CHEMISTRY – I

Objectives:

- To study about the solutions and colligative properties
- To know about Chemical Equilibrium.
- To study phase rule.
- To promote interest in surface chemistry, catalysis & chemical kinetics.

Unit-I

Colligative properties & Adsorption:

1.1 Colligative properties-Lowering of vapour pressure-Osmosis and osmotic pressure-relation between osmotic pressure and vapour pressure of an ideal solution-reverse osmosis.

1.2 Elevation of boiling point and depression of freezing point-derivations and determinations vant Hoff factor.

1.3 Adsorption: Distinction between chemical and physical adsorption, adsorption isotherms – Freundlich adsorption isotherm- Langmuir adsorption isotherm – Derivation, measurement of surface area.

Unit-II

Phase rule:

2.1 Definition of terms: Phase, components and degrees of freedom – Derivation of Gibbs phase rule

2.2 One component system: Water and sulphur system – Reduced phase rule- Two component system: Simple eutectic system: Pb-Ag system, KI-water system freezing mixtures.

2.3 Thermal analysis and cooling curves, Compound formation with congruent melting point Zn – Mg, $FeCl_3$ – Water system. Compound formation with incongruent melting point Na – K System.

Unit-III

Solutions:

3.1 Raoult's law – Ideal solution, Henry's law. Temperature composition diagrams – ideal liquid mixture (Toluene – Benzene) Non ideal mixture (Water– ethanol and water – hydrogen chloride) – Azeotropic mixtures- Distillation of immiscible liquids.

3.2 Partially miscible liquids: Phenol – Water, Triethylamine – Water systems.

3.3 Nernst distribution law – Thermodynamic derivation – limitations- Applications of Nernst distribution law – Solvent extraction and Determination of Hydrolysis constant.

Unit-IV

Chemical Kinetics:

4.1 Definitions of terms- Derivations of expressions for Zero, First, Second and Third order rate equations -Study of kinetics by Volumetric, Polarimetric and dilatometric methods. Determination of order of the reactions.

4.2 Complex reactions – consecutive, parallel and reversible reactions (no derivation only examples) Effect of temperature on reaction rate – temperature coefficient – concept of activation energy – Arrhenius equation.

4.3 Theories of reaction rates – Bimolecular collision theory- ARRT-Thermodynamic - aspects of ARRT. Comparison of collision theory and ARRT.

Unit-V

Chemical Equilibrium:

5.1 Chemical equilibrium: Law of mass action- Law of chemical equilibrium-Thermodynamic derivation of Law of chemical equilibrium.

5.2 Vant Hoff reaction Isotherm-standard free energy change- Temperature Dependence of equilibrium Constant- Vant Hoff isochore- Le chatelier principle and its applications.

5.3 Enzyme catalysis: Mechanism and Kinetics of enzyme catalysis - Michaelis Menton Equation- effect of temperature on enzyme catalysis.

ELECTIVE

PAPER – 1

A. SPECTROSCOPY – I

Objective:

To impart knowledge about different spectroscopic techniques.

UNIT-I

1.1. Definition of spectrum - Electromagnetic radiation - quantization of different forms of energies in molecules (translational, rotational, vibrational and electronic) - Born Oppenheimer approximation.

1.2. Microwave Spectroscopy - theory of microwave spectroscopy - selection rule - Calculation of moment of inertia and bond length of diatomic molecules.

UNIT-II

UV - Visible Spectroscopy - Absorption laws. Calculations involving Beer Lambert's law - instrumentation - photo colorimeter and spectrophotometer- block diagrams with description of components - theory - types of electronic transitions - chromophore and auxochromes - Absorption bands and intensity -factors governing absorption maximum and intensity.

UNIT-III

3.1. I. R. Spectroscopy – principle - modes of vibration of diatomic, triatomic linear (CO_2) and nonlinear triatomic molecules (H_2O) - stretching and bending vibrations - selection rules. Expression for vibrational frequency (derivation not needed).

UNIT-IV

4.1. I.R.Spectroscopy - instrumentation - sampling techniques. Applications of IR Spectroscopy – nterpretation of the spectra of alcohols, aldehydes, ketones and esters – aliphatic and aromatic. Hydrogen bonding.

UNIT-V

5.1 Raman Spectroscopy : Rayleigh and Raman scattering, stokes and antistokes lines. Differences between Raman and I.R.Spectroscopy. Rotational Raman spectra of Noncentrosymmetric molecules (HCl). Mutual exclusion principle (CO_2 and N_2O)

Reference Books:

1. Elements of Analytical Chemistry - R. Gopalan, P.S. Subramanian, K. Rengarajan - S. Chand and sons (1997).
2. Fundamentals of Analytical Chemistry - D.A. Skoog and D.M. West - Holt Reinhard and Winston Publication - IV Edition (1982).
3. Principles of Instrumental Methods of Analysis - D.A Skoog and Saunders - College publications - III edition (1985).
4. Analytical Chemistry - S.M. Khopkar - New Age International.
5. Instrumental Methods of Chemical Analysis - Chatwaal - Anand -Himalaya Publishing House - (2000).
6. Analytical Chemistry - R.Gopalan - Sultan Chand.
7. Analytical Chemistry S.Usharani, Macmillan.
8. Instrumental Methods of Analysis - Willard Merit Dean and Settle – Saunders College Publication.
9. Physico Chemical Techniques of Analysis - P.B. Janarthanam-Vol- I & II - Asian Publishing.
10. Instrumental Methods of Chemical Analysis – B.K. Sharma - Goel Publications.

PAPER – 1

B. BASICS OF COMPUTER PROGRAMMING IN C AND ITS APPLICATIONS IN CHEMISTRY

Objective:

- To introduce the basics of computers.
- To learn C language and its applications in solving problems in Chemistry.

Unit-I

Basic computer organization, processor and memory – main memory, secondary storage devices and storage hierarchy. Software – relationship between hardware and software – types of software. Planning the computer program – algorithm and flowcharts. Basics of operating systems.

Unit-II

Computer languages – machine language, assembly language, assembler, compiler, interpreter and programming languages - C language – introduction, C compiler, operating systems and preprocessor directives - variables, constants, operators, input and output functions.

Unit-III

Control structures – conditional, looping, goto, break, switch and continue statements, functions, arrays and pointers.

Unit-IV

Applications in Chemistry – calculation of the radius of the first Bohr orbit for an electron, calculation of half-life time for an integral order reaction, calculation of molarity, molality and normality of a solution, calculation of pressure of ideal or Vanderwaal’s gas, Calculation of electronegativity of an element using Pauling’s relation.

Unit-V

Applications in Chemistry - Calculation of empirical formulae of hydro carbon, calculation of reduced mass of a few diatomic molecules, determination of the wave numbers of spectral lines of hydrogen atom, calculation of work of expansion in adiabatic process, calculation of pH, solubility product and bond energy using Born - Lande equation, calculation of standard deviation and correlation coefficient.

Reference Books:

1. K.V. Raman, Computers in Chemistry, 8th Edition, Tata McGraw Hill, 2005.
2. Venugopal and Prasad, Programming with C, 11th Edition, 1971.
3. E. Balaguruswamy, Programming in C, 2nd Edition, 1989.

PAPER – 1

C. ORGANIC SYNTHESIS

Objective:

- To introduce the basics of retro synthesis.
- To learn about ring synthesis

UNIT-I
DISCONNECTION APPROACH:

1.1 An introduction to synthons and synthetic equivalent.

1.2 Disconnection approach, functional group interconversion.

1.3 The importance of the order of events in organic synthesis, one group C-X and two group C-X disconnections. Chemoselectivity, reversal of polarity.

UNIT-II
PROTECTING GROUPS:

2.1 Principle of protection of alcohol group and amine group.

2.2 Principle of protection of carbonyl group and carboxyl group.

2.3 Activation of functional group.

UNIT-III
ONE GROUP C-C DISCONNECTIONS:

3.1 Alcohols and carbonyl compounds.

3.2 Regioselectivity and Alkene synthesis.

3.3 Use of acetylenes and aliphatic nitrocompounds in organic synthesis.

UNIT-IV
TWO GROUP C-C DISCONNECTIONS:

4.1 Diels-Alder reaction, 1, 3 - difunctionalised compounds.

4.2 α,β unsaturated carbonyl compounds, Control in carbonyl condensations.

4.3 1, 5 - difunctionalised compounds, Michael addition and Robinson annulation.

UNIT-V
RING SYNTHESIS:

5.1 Saturated heterocycles.

5.2 Synthesis of 3-,4-,5- and 6- membered rings,aromatic heterocycles.in organic synthesis.

5.3 Application of the above in the synthesis of camphor, longifoline, cortisone & reserpine.

Reference Books:

1. W.Carruthers, Some modern methods of Organic synthesis, Cambridge University Press, UK.
2. F.A.Carey and R.J. Sundberg,Advanced Organic Chemistry,Part-B, Plenium Press.
3. H.O.House and W.A.Benjamin, Modern Synthetic Reactions.

SKILL BASED SUBJECT

PAPER – 3

DATA ANALYSIS AND SEPARATION TECHNIQUES

Objectives:

- To learn the data analysis, signifigant figure and error
- To learn Chromatographic separation techniques

UNIT-I

1.1 Data analysis – theory of errors – idea of significant figures and its importance with examples – precision – accuracy – methods of expressing accuracy .

1.2 Error analysis – minimizing errors – method of expressing precision – average deviation – standard deviation and confidence limit.

UNIT-II

2.1 Purification of solid organic compounds – extraction – use of immiscible solvents – soxhlet extraction – crystallization – use of miscible solvents – fractional crystallization – sublimation.

2.2. Purification of liquids – experimental techniques of distillation – fractional distillation – vacuum distillation – steam distillation – tests for purity.

UNIT-III

3.1 Chromatography-principles and techniques of column, paper and thin layer chromatography- R_f value- applications.

3.2 Ion exchange chromatography-principle-experimental techniques and applications.

UNIT-IV

4.1 HPLC and GC- Principle, instrumentation and applications

4.2 GC-MS and LC-MS-Principle, instrumentation and applications

UNIT-V

5.1 Introduction to computer and its application in chemistry – characteristics of a computer – types of computer – block diagram of a digital computer – the art of programming – general features of a programming language – algorithm and flow charts.

5.2 Introduction to C – structure of a C programme – character set of C data types – identifiers – reserved words – variables – constants – keywords – escape sequence – type conversion C operation (basic aspects only). Application of computer in chemistry – determination of molarity, normality and molality of solutions – calculation of pH.

Reference Books:

1. Elements of Analytical Chemistry - R. Gopalan, P.S. Subramanian, K. Rengarajan - S. Chand and sons (1997).
2. Fundamentals of Analytical Chemistry - D.A. Skoog and D.M. West - Holt Reinhard and Winston Publication - IV Edition (1982).
3. Principles of Instrumental Methods of Analysis - D.A. Skoog and Saunders - College publications - III edition (1985).
4. Analytical Chemistry - S.M. Khopkar - New Age International.
5. Instrumental Methods of Chemical Analysis – Chatwal - Anand-Himalaya Publishing house - (2000).
6. Analytical Chemistry - R.Gopalan - Sultan Chand.
7. Analytical Chemistry S.Usharani, Macmillan.
8. Instrumental Methods of Analysis - Willard et al - c x B S.
9. Physico Chemical Techniques of Analysis - P.B.JanarthanamVol- I & II - Asian Publishing.

10. Instrumental Methods of Chemical Analysis – B.K. Sharma - Goel publication
11. Gini Courter and Annette Marquis, Microsoft Office 2000, BPB Publications, New Delhi, 1999.
12. Julia Kelly, Using Microsoft Excel 2000, Prentice-Hall of India, New Delhi, 1999.
13. Robert de Lavie, A spreadsheet workbook for Quantitative Chemical Analysis, McGraw-Hill, Inc. New Delhi, 1997.
14. K.V. Raman, Computers in Chemistry, Tata McGraw-Hill Ltd., New Delhi, 1993.
15. V.K. Srivastava and K.K. Srivastava, Introduction to Chromatography: Theory and Practice, S. Chand and company, New Delhi, 1987.
16. R.M. Roberts, J.C. Gilbert, L.B. Rodewald, and A.S. Wingrove, Modern Experimental Organic Chemistry, 4th edition, Holt Saunders International Edition.

SEMESTER – VI

PAPER – 8

INORGANIC CHEMISTRY – II

Objectives:

- To impart knowledge about radioactivity and nuclear chemistry.
- To understand the metallic bond and bio-inorganic chemistry.
- To learn about d and f block elements.
- To provide knowledge about industrial chemistry.

UNIT-I

NUCLEAR CHEMISTRY:

1.1 Introduction - composition of nucleus - nuclear forces operating between the nucleons - N/P ratio, curves, stability belts - the whole number rule and packing fraction - isotopes, isobars, isotones and isomers.

1.2 Nuclear binding energy - Mass defect - simple calculations involving mass defect and binding energy per nucleon - magic numbers - liquid drop model - shell model .

UNIT-II

2.1 Natural radioactivity - Detection and measurement of radioactivity - radioactive series including neptunium series - group displacement law - Rate of disintegration and half - life period - Average life period.

2.2 Artificial radioactivity - induced radioactivity - uses of radioisotopes - hazards of radiations - nuclear fission - nuclear energy - nuclear reactors - nuclear fusion - thermo nuclear reactions - energy source of the sun and stars.

UNIT-III

3.1 Metallic bond - theories - electron pool theory - valence bond theory - MO theory - semiconductors - n and p type semiconductors.

3.2 Bioinorganic chemistry - Biological aspects of Fe, Zn, Mg, Co and Mo - Role of Na, K, Ca, and P - Biological functions and toxicity of some elements.

UNIT-IV

4.1 Comparative study of Ti,V, Cr, Mn and Fe group metals - occurrence, oxidation states, magnetic properties and colour - preparation and uses of ammonium molybdate, V_2O_5 and UF_6.

4.2 Comparative study of lanthanides and actinides, occurrence, elements, oxidation states, magnetic properties, colour and spectra - lanthanide contraction - causes, consequences and uses - comparison between lanthanides and actinides.

UNIT-V

5.1 Industrial chemistry - Fuel gases - calorific value - composition and sources - formation of water gas, semi water gas, carburetted water gas, producer gas, oil gas, natural gas, LPG and bio gas (manufacture not required)

5.2 Composition and setting of cement - manufacture of cement - examples for pigments - constituents of paints and their functions - type of glasses - manufacture of glass.

CORE PRACTICAL

PAPER – 3

GRAVIMETRIC ESTIMATION

1. Estimation of sulphate as barium sulphate.

2. Estimation of barium as barium sulphate.

3. Estimation of barium as barium chromate.

4. Estimation of lead as lead chromate.

5. Estimation of calcium as calcium oxalate monohydrate.

PAPER - 9

ORGANIC CHEMISTRY – II

Objectives:

- To understand the basic concepts organic photochemistry
- To kindle interest in students in learning bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc.
- To generate keen interest and thinking in understanding the mechanisms of Molecular Rearrangements

UNIT- I

1.1 Organic photochemistry: Types of photochemical reactions- photo dissociation- gas phase photolysis - isomerisations- cyclisation- dimerisation and oxetane formation. Norrish-I and II reactions. Barton reaction- photo Fries rearrangement -photochemical formation of smog-photochemistry of vision.

1.2 Mechanism of reduction with sodium borohydride, lithium aluminium hydride, Wolf Kishner reduction, MPV reduction and Rosenmund reduction.

UNIT-II

2.1 Amino acids : Classification of amino acids - preparations and properties of alpha amino acids - with special reference to Gabriel phthalimide synthesis, Strecker synthesis, Erlenmeyer synthesis- zwitter ion , isoelectric point. Poly peptides and proteins:. Classification of proteins based on physical and chemical properties and physiological functions -peptide synthesis - Bergmann synthesis.

2.2 Primary structure of proteins - end group analysis - Edman method, Sanger’s method secondary structure of protein - helical and sheet structures - denaturation of proteins

UNIT-III

3.1 Nucleic acids: Nucleoside, nucleotide, degradation of nucleotide chain - structure of nucleic acids - RNA and DNA - elementary idea about protein synthesis. Synthesis of pyrimidine and purine bases - guanine, adenine, uracil, cytosine and thymine.

3.2 Terpenes - isoprene rule –structural elucidation of menthol and alpha terpeniol

UNIT-IV

4.1 Vitamins – Classification-Structural elucidation of pyridoxine. Antibiotics - Structural elucidation of chloroamphenicol.

4.2 Alkaloids- General methods of Isolation and structural elucidation of piperine and nicotine.

UNIT-V

5.1 Molecular rearrangements: Classification – anionotropic and cationotropic, inter molecular and intra molecular rearrangements- Mechanisms, evidences, migratory aptitude, inter or intra molecular of the following rearrangements : Pinacol-pinacolone, Benzilic acid, Cope, oxy Cope, rearrangements.

5.2 Mechanisms, evidences, migratory aptitude, inter or intra molecular of the following rearrangements Beckmann, Hoffmann, Curtius, Baeyer-Villiger, Claisen (sigmatropic) and Fries (Two mechanisms) rearrangement.

CORE PRACTICAL

PAPER – 4

ORGANIC QUALITATIVE ANALYSIS AND PREPARATIONS

Analysis of organic compounds containing one functional group and characterization with a derivative.

Reactions of the following functional groups:

Aldyhyde, ketone, carboxylic acid (mono and di), ester, carbohydrate (reducing and non-reducing), phenol, aromatic primary amine, amide, nitro compound, diamide and anilide.

Organic Preparations:

Acylation

1. Acetylation of salicylic acid or aniline.
2. Benzoylation of aniline or phenol.

Nitration

3. Preparation of m-dinitrobenzene
4. Preparation of p- nitroacetanilide

Halogenation

5. Preparation of p-bromoacetanilide
6. Preparation of 2,4,6-tribromophenol

Diazotisation /coupling

7. Preparation of methyl orange

Oxidation

8. Preparation of benzoic acid from toluene or benzaldehyde.

Hydrolysis:

9. Hydrolysis of ethyl benzoate (or) methyl salicylate (or) Benzamide.

Reference Book for Practicals:

1. Vogel's text book of chemical analysis
2. Practical Chemistry - A.O. Thomas - Scientific book center, Cannanore.
3. Practical Chemistry - 3 Volumes -S. Sundaram and others.
4. Vogel's text book of practical organic chemistry - Longman

PAPER – 10

PHYSICAL CHEMISTRY – II

Objectives:

- To learn the basic concept of photo chemistry.
- To learn about Electro chemistry and its applications.

UNIT-I

Photochemistry:

1.1 Interaction of radiation with matter, differences between thermal and photochemical processes. Laws of photochemistry: Grothus-Draper law, Stark-Einstein law, Jablonski diagram depicting various processes occurring in the excited state (internal conversion, intersystem crossing) Qualitative description of fluorescence, phosphorescence, chemiluminescence quantum yield- photosensitized reactions

1.2 Kinetics of photochemical combinations- H_2-Cl_2 and H_2-Br_2 reactions.

UNIT-II

Electrochemistry- I:

2.1 Conduction in metals and in electrolyte solutions, specific conductance and equivalent conductance, measurement of equivalent conductance. Variation of equivalent and specific conductance with dilution-Ostwalds dilution law.

2.2 Debye Huckel theory of strong electrolytes-Onsagar equation (no derivation) Significance and limitations. Kohlrausch law and its applications.

UNIT-III

Electrochemistry- II:

3.1 Migration of ions-ionic mobility- Transport number and its determination-Hittorff method and moving boundary method-abnormal transport number

3.2 Applications of conductometric measurements-determination of degree of dissociation of weak electrolytes, ionic product of water, solubility product of a sparingly soluble salt, Conductometric titrations. pH concept-buffer solutions, buffer activity-Henderson equation-applications of buffer solutions.

UNIT – IV

Electrochemistry – III:

4.1 Solubility product and its relationship with solubility - Hydrolysis of salts- expressions for hydrolysis constant, degree of hydrolysis and pH of aqueous salt solutions.

4.2 Electromotive force- Electrolytic and Galvanic cells-Daniel cell, Standard Weston cadmium cell reversible and irreversible cells, conventional representation of electrochemical cells. EMF of a cell and its measurement. Computation of cell EMF.- Nernst equation

4.3 Types of reversible electrodes: gas, metal-metal ion, metal-insoluble salt- anion, amalgam and redox electrodes. Single electrode potential, standard hydrogen electrode-reference electrodes-standard electrode potential, sign conventions. Derivation of thermodynamic quantities of cell reactions (ΔG ,ΔH and ΔS,)

UNIT – V

Electrochemistry- IV:

5.1 Cells-types - Concentration cells with and without transference, liquid junction potential.

5.2 Applications of emf measurements-valency of doubtful ions, solubility product and activity coefficient, potentiometric titaration- Determinition of pH using hydrogen, quinhydrone and glass electrodes.

5.3 Decomposition potential and overvoltage (basic concepts)- fuel cells (H_2-O_2 cell)
Lead storage battery.

REFERENCE BOOKS :

INORGANIC CHEMISTRY :

1. Inorganic Chemistry - P.L. Soni - Sultan Chand (2006).
2. Inorganic Chemistry - B.R. Puri, L.R. Sharma and K.C. Kallia - Vallabh Publications (2003).
3. Selected Topics in Inorganic Chemistry - W.U. Malik, G.D. Tuli and R.D. Madan - S. Chand Publications (2003).
4. Inorganic Chemistry - J.E. Huheey, Harper and Collins - NY IV edition (1993).
5. Concise Inorganic Chemistry - J.D. Lee - III edition - Von Nostrand.
6. Industrial Chemistry - B.K Sharma - Goel Publications (1983).
7. Industrial Chemistry R.K. Das - Kalyani Publications, New Delhi (1982).
8. Coordination Chemistry - S.F.A. Kettle - ELBS (1973).
9. Coordination Chemistry - K. Burger - Butterworthy (1973).
10. Vogel’s Handbook of Quantitative Inorganic Analysis - Longman.
11. Text Book of Qualitative Inorganic Analysis - A.I. Vogel - III edition (1976).
12. Source Book on Atomic Energy – S. Glasstone- East-West Press Pvt. Ltd. (1967).
13. Nuclear and Radiochemistry - John Wiley and Sons (1964).
14. Nuclear Chemistry - H.J. Arnikar - Wiley Eastern Co., - II edition (1987).
15. Advanced Inorganic Chemistry - Cotton and Wilkinson - V Edition - Wiley and Sons (1988).

ORGANIC CHEMISTRY :

1. Organic Chemistry - R. T. Morrison and Boyd - Pearson Education.
2. Organic Chemistry - I. L Finar - Volume I and II - Pearson Education.
3. Text Book of Organic Chemistry - P.L.Soni - Sultan Chand & Sons.
4. Advanced Organic Chemistry - Bahl and Arun Bahl - Sultan Chand and Co. Ltd.
5. Stereochemistry, Conformations and Mechanisms - Kalsi - New Age.
6. Organic Chemistry of Natural Products - Volume I and II- O.P. Agarwal - Goel Publishing House
7. A Guide Book to Mechanisms in Organic Chemistry - Peter Sykes - Pearson Education.
8. Stereo Chemistry of Organic Compounds - D. Nasipuri - New Age.
9. Chemistry of Natural Products - Gurdeep Chatwal- Himalaya Publishing House.

10. Reactions and Reagents - O.P. Agarwal- Goel Publishing House.
11. Organic Reaction Mechanisms - Gurdeep Chatwal- Himalaya Publishing House.
12. A Text Book of Organic Chemistry K.S.Tewari,N.K.Vishol,S.N.Mehrotra-Vikas Publishing House.
13. Organic Chemistry- M.K.Jain and S.C.Sharma-Shoban Lal and Nagin Chand.
14. Reaction, Mechanism and Structure- Jerry March- John Wiley and Sons.
15. Organic Chemistry - Bruice - Pearson Education.

PHYSICAL CHEMISTRY :

1. Principles of Physical Chemistry - B.R. Puri and Sharma - Shobanlal Nagin Chand & Co.,
2. Text Book of Physical Chemistry - P.L. Soni - Sultan Chand & Co.
3. Physical Chemistry - Negi and Anand – Eastern Wiley Pvt.Ltd..
4. Physical Chemistry - Kundu and Jain - S. Chand & Co.
5. Physical Chemistry - K.L Kapoor - Macmillan - 4 volumes
6. Elements of Physical Chemistry - Glasstone and Lewis - Macmillan.
7. Text book of Physical Chemistry - S.Glasstone- Macmillan (India) Ltd.
8. Fundamentals of Physical Chemistry - Maron and Landor - Colier - Macmillan.
9. Physical Chemistry - G.W. Castellan - Narosa publishing house.
10. Physical Chemistry - Walter J. Moore - Orient Longman.
11. Numerical Problems on Physical Chemistry Gashal, Books and Allied (P) Ltd.,
12. Universal General Chemistry, C.N.R. Rao, Macmillan.
13. Group Theory and its Chemical Applications - P.K.Bhattacharya - Himalaya Publishing House.

CORE PRACTICAL

PAPER – 5

PHYSICAL CHEMISTRY EXPERIMENTS

1. Kinetics

Determination of the order of the following reactions.

a). Acid catalysed hydrolysis of an ester (methyl or ethyl acetate)

b). Saponification of an ester (methyl or ethyl acetate)

c). Iodination of acetone.

2. a) Molecular weight of a solute - Rast's method using naphthalene, or diphenyl as solvents.

2. b) Determination of K_f of solvent

3 Heterogeneous equilibria:

a) *Phenol-water system – CST

b) Effect of impurity – 2% NaCl or succinic acid solutions on phenol water system - determination of the concentration of the given solution

4. Determination of the transition temperature of the given salt hydrate. Na2 S2O3, 5 H2,O, CH3 COONa, 3H2O, SrCl2, 6H2O, MnCl2, 4H2O

5. Electrochemistry

Conductivity

a) Determination of cell constant and equivalent conductivities of solutions of two different concentrations.
b) Conductometric titration of a strong acid against a strong base.

6. Potentiometric titration of a strong acid against a strong base.

7. Colorimetry - determination of unknown concentration using Photoelectric colorimeter.

8. Determination of pKa of acetic acid using pH Meter.

*need not be given in examination.

Students must write short procedure / formula with explanation in ten minutes for evaluation during the university practical examination.

ELECTIVE

PAPER – 2

A. PHARMACEUTICAL CHEMISTRY

Objective :

- To effectively impart knowledge about various diseases and their treatment.
- To learn about the importance of Indian medicinal plants.
- To known about the different types of drugs.

(Preparation, Synthesis and Structural determination are not required for the Compounds mentioned.

UNIT-I

1.1 Definition of the following terms: drug, pharmacophore, pharmacology, pharmacopoeia, bacteria, virus, chemotherapy and vaccine.

1.2 Causes, symptoms and drug for jaundice, cholera, malaria and filaria. First aid for accidents - antidotes for poisoning.

UNIT-II

2.1 Causes, detection and control of anaemia and diabeties. Diagnostic test for sugar, salt and cholesterol in serum and urine.

2.2 Indian medicinal plants and uses-Tulasi, Neem, Kizhanelli, Mango, Semparuthi, Adadodai and Thoothvelai.

UNIT-III

3.1 Antibacterials: Sulpha drugs-examples and actions-prontosil sulphathiazole, sulphafurazole
Antibiotics-definition and action of penicillin, streptomycin, chloramphenicol - SAR of chloramphenicol only.

3.2 Antiseptics and disinfectants - definition and distinction-phenolic compounds, chloro compounds, and cationic surfactant.

UNIT-IV

4.1 Analgesics, Antipyretics and anti inflammatory agents : Definition and actions - narcotic and non narcotic- morphine and its derivatives, pethidine and methodone- salicylic derivative, paracetamol, ibuprofen - disadvantages and uses.

4.2 Causes, and treatment of cancer - AIDS - AZT, DDC.

UNIT-V

5.1 Anaesthetics - definition-local and general - volatile nitrous oxide, ether, Chloroform, cyclo propane- trichloroethylene - uses and disadvantages.

5.2 Drugs affecting CNS - Definition, distinction and examples for tranquilizers, sedatives, hypnotics, psychedelic drugs - LSD Hashish- their effects.

Reference Books:

1. A Text Book of Pharmaceutical Chemistry - Jayashree Ghosh - S. Chand Company Ltd.
2. Pharmaceutical Chemistry - S. Lakshmi -Sultan Chand.
3. Pharmacology and Pharmatherapeutics - R.S. Satoskar - Popular Prakashan - Vol.I and Vol II.
4. Medicinal Chemistry - Asuthosh Kar - New Age International Publishers.
5. A Text Book of Synthetic drugs - O.D. Tyagi - Ammol Publications.
6. Introduction to Biological Chemistry _- J. Awapara Prentice Hall.
7. A text book of Biochemistry - Ambika.S.
8. Biochemistry - A.L.Lehinger.
9. Essentials of Biological Chemistry - James Fanley - East West Press.

PAPER – 2

B. POLYMER CHEMISTRY

Objective :

To know about the types of polymers, polymerization techniques and commercial polymers.

UNIT-I

Polymers : Basic Concept, classification of polymers on the basis of structures and applications. Distinction among plastics, elastomers, and fibers, Homo and hetero polymers, copolymers, properties of polymers, glass transition temp. (Tg) - definition, factors affecting Tg, Relationship between Tg and molecular weight.

UNIT-II

Molecular Weight of polymers, Number average, weight average, sedimentation and viscosity - average molecular weights, Molecular weights and degree of polymerization. Reactions - Hydrolysis, Hydrogenation, addition, substitution, cross linking - vulcanization and cyclisation.

UNIT-III

Polymerization techniques: Bulk, solution, suspension & emulsion polymerization - melt polycondensation. Polymer processing - Calendaring, die casting, rotational casting.

UNIT-IV

Chemistry of commercial polymers- General methods of preparation, properties and uses of the following - Teflon, polyethylene, polystyrene, polyesters, poly amides, polycarbonates and PVC.

UNIT-V

Advances in polymers; Bio-Polymers, biomaterials, polymers in medical field, High temperature and fire resistant polymers – Silicones.

Reference Books:

1. Text Book of Polymer Science, Bill meyer F.W. Jr. John Wiley & Sons 1984.
2. Polymer Science , Gowarikar. V.R. Viswanathan, N.V. Jayader Sreedhar.
3. Wiley Eastern Ltd., New Delhi, 2005
4. Polymer Chemistry, Sharma.B.K Goel Publishing House, Meerut- 1989.
5. Polymer Chemistry. Arora M.G. Vadar M.S. - Anmol publications (p) Ltd.,
6. New Delhi 1989.
7. Polymer Chemistry - An introduction - M.P. Stevens, oxford.

PAPER – 2

C. GREEN CHEMISTRY

Objective:

- To know the basics of Green Chemistry and its developments.
- To know the basic ideas of Nano chemistry.

UNIT-I
Green Chemistry – Introduction:

1.1 Need for green chemistry – principles of green chemistry – atom economy – definition with example (ibuprofen synthesis) – green oxidant – hydrogen peroxide.

1.2 Microwave assisted organic synthesis – apparatus required – examples of MAOS (synthesis of fused anthroquinones, acetalization of a byproduct of sugar industry, 1, 3-dipolar cycloaddition of nitrones to fluorinated dipolarophiles, Leukart reductive amination of ketones) – advantages and disadvantages of MAOS.

1.3 Organic reactions by sonication method – apparatus required – examples of sonochemical reactions (Heck, Hundsdiecker and Wittig reactions).

UNIT-II
Green Reactions:

2.1 Acetylation of primary amine, base catalyzed aldol condensation (synthesis of dibenzalpropanone), halogen addition to C=C bond (bromination of trans-stilbene), [4+2] cycloaddition reaction (Diels-Alder reaction between furan and maleic acid).

2.2 Rearrangement reaction (benzyl-benzilic acid rearrangement), coenzyme catalyzed benzoin condensation (thiamine hydrochloride catalyzed synthesis of enzoin, Pechmann condensation for coumarin synthesis (clay catalyzed solid state synthesis of 7-hydroxy-4-methylcoumarin).

2.3 Electrophilic aromatic substitution reactions (nitration of phenol, bromination of acetanilide) – green oxidation reactions (synthesis of adipic acid, preparation of manganese (III) acetylacetonate) – zeolite catalyzed Friedel-Crafts acylation.

UNIT-III
Green Solvents:

3.1 Ionic liquids: simple preparation – types – properties and application – ionic liquids in organic reactions (Heck reaction, Suzuki reactions, epoxidation), industrial (battery) and analytical chemistry (matrices for MALDI-TOF MS, gas chromatography stationary phases – advantages and disadvantages.

3.2 Super critical CO_2 – preparation, properties and applications (decaffeination, dry cleaning) – environmental impact.

3.3 Diels-Alder reaction in water – catalysis in water (aerobic oxidation of alcohols catalyzed by Pd(II) / bathophenanthroline).

UNIT-IV

Basics of Nanochemistry:

4.1 Definition, length scales and importance of nanoscale and its technology – self assembly of materials – self assembly of molecules – porous solids, nanowires, nanomachines and quantum dots.

4.2 Nano particles: Introduction – types of nanoparticles – preparation, properties and uses of gold, silicon, silver, zinc oxide, iron oxide, alumina and titania nanoparticles.

4.3 Techniques to synthesize nanoparticles – top down and bottom up approaches – common growth methods.

UNIT-V

Nano Materials and their Characterization:

5.1 Preparation, properties and applications of carbon nanotubes, nanorods, nano fibre and nanoclay – toxic effects of nanomaterials.

5.2 Electron microscopes – scanning electron microscopes (SEM) – transmission electron microscopes (TEM) – scanning probe microscopy – atomic force microscopy (AFM) – scanning tunneling electron microscope (STEM) – basic principles only.

Books for Study:

1. Green Chemistry: Environmental Friendly Alternatives, Rs. Sanghi and M.M.Srinivatava, Narosa Publishing House, New Delhi.
2. Green Chemistry, V.K. Ahluwalia, Narosa, New Delhi (2011).
3. Nanotechnology, S.Shanmugam, MJP Publishers, Chennai. (2010).
4. A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
5. Nanobiotechnology, S. Balaji, MJP Publishers, Chennai. (2010).
6. Nano: The Essentials, T. Pradeep, Tata Mc-Graw Hill, New Delhi (2007).

Books for Reference:

1. Methods and Reagents for Green Chemistry, P. Tundo, A. Perosa and F. Zechini, John Wiley & Sons Inc., New Jercy, (2007).
2. The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
3. Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
4. Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).

ELECTIVE

PAPER – 3

A. SPECTROSCOPY – II

Objective:

To impart knowledge about different spectroscopic techniques.

UNIT-I

1.1 NMR Spectroscopy - principle of nuclear magnetic resonance – basic instrumentation - number of signals - chemical shift - shielding and deshielding. Spin spin coupling and coupling constants. TMS as NMR standard.

UNIT-II

2.1 Interpretation of NMR spectra of simple organic compounds such as Acetone, Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, Ethyl Bromide, Toluene and Isopropyl phenyl ketone.

UNIT-III

3.1 Mass spectroscopy - basic principles instrumentation - molecular ion peak, base peak, metastable peak, isotopic peak their uses. Fragmentation – Nitrogen rule - determination of molecular formulae – mass spectrum of simple organic compounds – identification – alcohols, aldehydes, aromatic hydrocarbons.

UNIT-IV

4.1 Interpretation of mass spectra of simple organic compounds such as Acetone, Anisole, Benzaldehyde, Ethyl acetate, Ethylamine, Ethyl Bromide, Toluene and Isopropyl phenyl ketone. Mc-Lefferty Rearrangement.

UNIT-V

5.1 E.S.R.Spectroscopy - condition - theory of esr spectra - hyperfine splitting - esr spectra of simple radicals - CH_3,CD_3,Naphthalene radical ions only.

Reference Books:

1. Basic concept of Analytical Chemistry- S. M. Khopkar.
2. Analytical Chemistry - R. Gopalan.
3. Chemical Analysis: An Instrumental Approach- A.K. Srivastava and P.C. Jain.
4. Spectroscopic Identification of Organic Compounds - R. M. Silverstein, G. C. Basseler & T. C. Morill.
5. Organic Spectroscopy - W. Kemp.
6. Spectroscopic Methods in Organic Chemistry – D Williams & I. Fleming.
7. Fundamentals of Molecular Spectroscopy - C. N. Banwell.
8. Applications of Absorption Spectroscopy of Organic Compounds – Dyer.
9. Introduction to Molecular Spectroscopy – Barrow.
10. Spectroscopy of Organic Compounds – P.S.Kalsi.
11. Instrumental Methods of Chemical Analysis – B.K.Sharma.
12. Analytical Chemistry: An Introduction - D.A. Skoog, D.M. West and F.J. Holler.
13. Analytical Chemistry: Theory and Practice - U.N. Dash.

PAPER – 3

B. APPLIED CHEMISTRY

Objective:

- To impart knowledge on biological, dairy, leather, soil and dye chemistry.

Unit-I

Biological Chemistry:

Elementary treatment of digestion and absorption of carbohydrates, proteins and fats. Elementary treatment of enzymes, cofactors, prosthetic groups and theory of enzyme action. Physiological functions of adrenaline, thyroxin, oxytocin, insulin and sex harmones. Micronutrients and their biological role in human systems.

Unit-II

Dairy Chemistry:

Milk - Definition, Physicochemical properties of milk, constituents of milk and their physicochemical properties, chemical change taking place in milk due to processing parameters- boiling, pasteurization, sterilization and homogenization. Definition and composition of creams, butter, ghee and ice creams. Milk powder-definition, need for making powder. Principles involved in drying process- spray drying and drum drying.

Unit-III

Leather Chemistry:

Introduction, chief process used in leather manufacture, structure of hide and skin, leather processing-process before tannage- tanning process- vegetable tanning and chrome tanning. Tannery effluent and by product problems and treatment

Unit-IV

Soil Chemistry:

Introduction-soil classification, properties of soil, soil water, soil air, soil temperature, soil minerals, soil colloids, soil reaction and buffering, soil pH, soil acidity, soil salinity and alkalinity, soil fertility and soil formation.

Unit-V

Water Chemistry- Hardness, degree of hardness, temporary and permanent hardness, scale formation, removal of hardness - Reverse osmosis and ion exchange methods – principle and functions.

Reference Books:

1. G.R. Agarwal, Kiran Agarwal and O.P. Agarwal, Agarwal's Text Book of Biochemistry, 11th Edition, Goel Publishing House, 2000.
2. Jayashree Ghosh, Fundamental Concepts of Applied Chemistry, 1st Edition, S.Chand & Co. Ltd, New Delhi, 2006.
3. Clarence Henry Eckles, Willes Barnes Combs, Harold Macy, Milk and Milk Products, 4th Edition, Tata McGraw Hill Publishing Company Ltd, Reprint 2002.
4. B.K.Sharma, Industrial Chemistry, 13th Edition, Goel Publishing House, Reprint 2008.
5. Dilip Kumar Das, Introductory Soil Science, 1st Edition, Kalyani Publishers, Reprint 2002.
6. Gurdeep Chatwal, Organic Chemistry of Natural Products, Vol. 2, Himalaya Publishing House, Reprint, 2000.
7. M. Satake, Y. Mido, Chemistry of colour, 1st Edition, Discovery Publishing House, Reprint 2003.

PAPER – 3

C. NANO CHEMISTRY

Objective:

- To introduce the basics of nanotechnology.
- To learn the instrumental techniques used in characterization of nano materials.

UNIT-I

Basics of Nanochemistry:

Introduction – definition – length scales – importance of nanoscale and its technology – self assembly of materials – self assembly of molecules – porous solids, nanowires, nanomachines and quantum dots.

UNIT-II

Nano Particles:

Introduction – types of nanoparticles – preparation, properties and uses of gold, silicon, silver, zinc oxide, iron oxide, alumina and titania nanoparticles.

UNIT-III

Synthetic Techniques:

Techniques to synthesize nanoparticles – top down and bottom up approaches – common growth methods – characterization of nanoparticles – applications and toxic effects of nanomaterials.

UNIT-IV

Nano Materials:

Preparation, properties and applications of carbon nanotubes, nanorods, nano fibre and nanoclay.

UNIT-V

Instrumental Techniques:

Electron microscopes – scanning electron microscopes (SEM) – transmission electron microscopes (TEM) – scanning probe microscopy – atomic force microscopy (AFM) – scanning tunneling electron microscope (STEM) – basic principles only.

Books for Study:

1. Nanotechnology, S.Shanmugam, MJP Publishers, Chennai (2010).
2. A Handbook on Nanochemistry, Patrick Salomon, Dominant Publishers and Distributers, New Delhi.
3. Nanobiotechnology, S. Balaji, MJP Publishers, Chennai (2010).

Books for Reference:

1. The Chemistry of Nanomaterial: Synthesis, Properties and Applications, Vol. I and II, CNR Rao, Springer (2006).
2. Nanotechnology: Basic Science and Emerging Technologies, Mick Wilson, Kamali Kannangara, Geoff Smith, Michelle Simmons, Burkhard Raguse, Overseas Press (2005).
3. Nanochemistry, G. B. Segreev, Elsevier, Science, New York, (2006).

SKILL BASED SUBJECT

PAPER – 4

AGRICULTURE AND LEATHER CHEMISTRY

Objective :

To learn about Agriculture and Leather Chemistry

UNIT-I

Soil Chemistry:

Introduction: Formation of Soil. Classification of soil and properties of soil - soil Acidity - Causes of acidity - soil alkalinity - determination of soil pH - Buffering of soils - Amending the soil - Reclamation of acid soil - Liming agents.

UNIT-II

Soil Fertility and Productivity:

Organic Manures - Farmyard Manure - Compost - Oil cakes - Bone meal - Meat meal - Fish meal - Blood meal and green Manures - Fertilizers - Classification of fertilizers - Requisites of a good fertilizers - Nitrogenous fertilizers - Phosphatic fertilizers - super Phosphate of lime - Triple super phosphate - NPK fertilizers - ill effects of fertilizers - effect of mixed fertilizers on soil pH - Micronutrients - role of micronutrients sources - Need for nutrient balance - Soil management and Micronutrients needs.

UNIT-III

Pesticides:

Classification of Insecticides - Stomach poisons - Contact poisons and Fumigants - Insecticides - Organic Insecticides - DDT - Gammexane - Malathion - Parathion - Fungicides - Herbicides - Rodenticides - Pesticides in India - Adverse environmental effects of pesticides.

UNIT-IV: Leather Chemistry (9 Hours)

Introduction - Constituents of Animal Skin - Preparing skins and hides - Cleaning and soaking - Liming and degreasing - Manufacture of Leather - Leather Tanning - Vegetable Tanning - Chrome Tanning and Mineral Tanning - Dyeing and Fat liquoring - Leather finishing - oil tanning - by products.

UNIT-V

Tannery effluents - Pollution and its control - Water pollution and Air pollution - waste management - primary, secondary - tertiary treatment - pollution prevention.

Reference Books:

1. Industrial Chemistry by B.K. Sharma. Goel Publishing House, Meerut.
2. Applied Chemistry by K.Bagavathi - Sundari, MJP Publishers.
3. Fundamental concept of Applied Chemistry by Jayashree Ghosh, S. Chand & Company Ltd.,
4. Chemical treatment of hides a leather by J. Partridge Noyes, Park Ridge,N.J.
5. Agricultural Chemistry Vol I & Vol II edited by B.A. Yagodin - New
6. Century books (P) Ltd.,
7. The nature and properties of soils - IX Edition - Nyle.C.Bready - S.Chand.
8. and Company Ltd.,
9. Soils and soil fertility - Louis M.Thompson - and Frederick. R.Troch - Tata
10. Mc. Graw hill.
11. Text book of Soil Science - T.D. Biswas and S.K. Mukerijee - II Edition.
12. Soil Science - A.Sankara.
13. Fundamental of Leather Science - Wood roffe Publications of CLRI - Chennai.
14. Nature and properties of soils - Harry, O. Buckman.

ALLIED

PAPER – 1

PHYSICS – I

UNIT – I: PROPERTIES OF MATTER

Elasticity : Hooke's Law – Elastic Constants – bending of beam – Bending moment – Cantilever Depression at the loaded end of a cantilever – determination of Young's modulus by non-uniform bending.

Torsion : Torsion couple – Potential energy in a twisted wire – Torsional pendulum – Time period – Rigidity Modulus – Determination of rigidity modulus by Torsional oscillation (without masses).

Viscosity: Viscosity of a liquid – Viscous force – Co-efficient of viscosity of a liquid – Poiseuille's formula – Comparison of viscosities of two liquids by graduated burette method.

Surface Tension: Surface Tension – Excess of pressure inside a curved surface – Synclatic system – Surface Tension and interfacial surface tension by the method of drops.

UNIT – II: HEAT

Heat: Specific heat – Newton's law of cooling – determination of specific heat of a liquid using Newton's law of cooling – Emissivity and Emissive Power.

Low Temperature: J.K. Effect – Positive Effect – Negative Effect – Temperature of Inversion – Super conductors. Type I and II – Meisner Effect – Helium I and II.

UNIT – III: ELECTRICITY AND MAGNETISM

Electricity: Potentiometer – Principle – Calibration of low range voltmeter – Measurement of internal resistance of cell – measurement of an unknown resistance.

Magnetism – Moment and pole strength of a magnet – Deflection magnetometer – Tan C position – Vibration magnetometer – Theory – Period of Oscillation – Determination of M and B_H using the deflection magnetometer in Tan C position and the vibration magnetometer.

UNIT – IV: SOUND AND ACOUSTICS OF BUILDING

Sound: Transverse vibration of strings – Velocity and frequency of vibrations of a stretched string – laws – sonometer – A.C. Frequency – Steel Wire – Brass wire.

Ultrasonics – Production by Piezo – electric method – properties and uses.

Acoustics of buildings: Reverberation – Reverberation time – Sabine's formula (definition only) – Sound absorption co-efficient of surface – conditions for the perfect acoustics.

UNIT – V: GEOMETRICAL OPTICS AND PHYSICAL OPTICS

Defects of Images (Lens): Spherical aberration – minimizing spherical aberration by using two thin lenses in contact – chromatic aberration – Achromatic combination of two thin lenses in contact.

Physical Optics: Interference – Air Wedge – Description – Test for optical flatness of glass plate – Determination of diameter of a thin wire by air wedge.

Diffraction: Theory of transmission grating – Normal Incidence – Determination of Wavelength of monochromatic source and Wavelength of mercury line using a grating by normal Incidence.

Polarisation: Optical activity – Specific rotatory power – Polarimeter – Determination of specific rotatory power of a solution using the polarimeter.

Books for Study & REFERENCE

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).

PAPER – 1

BOTANY – I

UNIT-I: Cell Biology

Prokaryotic and Eukaryotic cell (plant cell)

Cell organells - Chloroplast, Mitochondrion and Nucleus.

Cell division – Mitosis.

UNIT-II: Anatomy

Tissues - Meristematic and permanent tissues. Primary and Normal Secondary thickening of Dicot stem.

UNIT-III: Bacteria and Viruses

Bacteria - General characters - shape - flagellation - Structure of E. Coil - reproduction - (Vegetative and asexual), Economic importance. Structure of Tobaco Mosaic Virus, Bacteriophage.

UNIT-IV: Structure and Life History of

a) Chlorella and Gracilaria

b) Albugo, Penicilium and Agaricus

UNIT-V: Structure and Life History of

a) Funaria

b) Lycopodium

c) Cycas

Economic importance of Chlorella, Penicillium and Agaricus.

PAPER - 1

ZOOLOGY – I

Objective:

To study the systemic and function morphology of invertebrates and chordates.

UNIT –I

Study types including life history. Protozoa – Entamoeba, Porifera- sycon. Coelenterata – Obelia geniculata. Platyhelminthes – Taenia solium.

UNIT – II

Annelida – Earthworm, Arthropoda – Prawn, Mollusca- Fresh water mussel, Ecninodermata – Sea star.

UNIT – III

Chordata – General characters, Prochordates: Morphology of Amphioxus Vertebrates : Shark.

UNIT – IV

Types study frog and calotes.

UNIT – V

Type study pigeon and Rabbit.

Note: In chordate to study only Morphology, digestive system, respiratory system, circulatory system and urinogenital system.

REFERENCES:

1. Ayyar, E.K. and T.N. Ananthakrishnan, 1992. Manual of Zoology. Vol.
   I & II, S. Viswanathan [printers and Publisher] Pvt. Ltd.
   Madras, 891p.
2. Kotpal series, 1988 – 1992. Rastogi Publication, Meerut.
3. Jordan E.L. and P.S. Verma 1993. Invertebrate zoology 12th edition S. Chand Co. Ltd., New Delhi.
4. Jordan.E. L., and P.S. Verma 1995.Chordate Zoology and Elements of Animal Physiology S. Chand & Co.Ltd. New Delhi.

PAPER – 1

BIOCHEMISTRY – I

UNIT - I :

Chemistry of Carbohydrates Definition and Classification of carbohydrates, linear and ring forms (Haworth formula) for monosaccharides for glucose and fructose. Disaccharides-sucrose and lactose. Physical properties-mutarotation and kiliani cynohydrin synthesis. Chemical properties-Oxidation, reduction, osazone formation. Disaccharide-sucrose and lactose-occurrence, structure; Physical and chemical properties. Polysaccharides: starch and cellulose-occurrence, structure, physical and chemical properties.

UNIT - II :

Chemistry of aminoacids: Definition and classification of aminoacids, common properties of aminoacids, amphoteric nature, isoelectric point, iselectric pH and Zwitter ion. Reaction with ninhydrin, 1-fluoro-2, 4-dinitronitrobenzene (FDNB) and Sieg Fried—s carbamino reaction.

UNIT - III :

Chemistry of Proteins : Classifications-shape and size, solubility and physical properties and functional properties. Physical properties: salting in and salting out, denaturation, peptide bond. Structure of protein: primary, secondary, tertiary and quaternary. N-terminal determination-Edman—s and Dansyl chloride method. C-terminal determination-Van-Slyke reaction, Phosgene reaction.

UNIT - IV :

Chemistry of Lipids : Definition, classification and functions. Occurrence, chemistry and biological functions- simple lipids: tertiary compound lipids (e.g. phospholipids), derived lipids: steroids (e.g. cholesterol). Saturated fatty acids: arachidic acid. Unsaturated fatty acids: linolenic acid. Physical property - emulsification. Chemical properties-saponification, rancidity, definition of acid number, saponification number, iodine number and Reichert-Meissl number. Bile acid and bile salt functions.

UNIT - V :

Chemistry of Nucleic acids : Definition, nucleoside, nucleotide and polynucleotide. Double helical model of DNA and its biological functions. Structure of RNA: tRNA, mRNA and rRNA-occurrence, chemistry and its biological functions. Differences between DNA and RNA properties: cot curve and cot value, Tm, hypo and hyper chromicity.

References :

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.

2. Harper—s Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.

3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.

4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.

5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.

6. Biomolecules-C. Kannan , MJP Publishers,Chennai-5.

Paper – 1

MATHEMATICS – I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) -Summation -Simple problems.

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots- Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a matrix -Consistency of equations - Eigen roots and eigen vectors - Cayley-Hamilton theorem (without proof)-Verification and computation of inverse matrix.

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ - Hyperbolic and inverse hyperbolic functions - Logarithms of complex numbers.

UNIT-V: DIFFERENTIAL CALCULUS

n-th derivatives - Leibnitz theorem (without proof) and applications – Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics,* Vol. I & II. Muhil Publishers, Chennai.

Reference Books

P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.

S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. Vikas Publications, New Delhi.

P.R.Vittal (2003) *Allied Mathematics* . Marghan Publications, Chennai

P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.

Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

ALLIED

Paper – 2

PHYSICS – II

UNIT – I: WAVE MECHANICS

Wave Mechanics – De Broglie Waves – Dual Nature – Experimental Study of Matter Waves – Davission and Germer's Experiment – G.P. Thomson's Experiment _ Heisenberg's uncertainty Principle – The position and moment of a particle.

UNIT – II : NUCLEAR PHYSICS

Particle accelerators – cyclotron, particle detectors – GM Counter Artificial Transmutation – Rutherford's Experiment – The Q value equation for nuclear reaction – Threshold energy – Nuclear Reactions.

Conservation Laws: Conservation of Charge – Conservation of Nucleons – Conservation of Mass – Energy – Conservation of Parity – Quantities conserved and quantities not conserved in a nuclear reaction.

Biological effects of radiation – control of radiation hazards.

UNIT – III : ENERGY PHYSICS

Sources of conventional energy – Need for non-conventional energy resources – solar energy utilization – solar water heater – solar drier – conversion of light into electrical energy – solar cell – merits and demerits of solar energy – wind energy – its conversion systems – energy from Bio mass – Bio gas generation – Industrial and space application.

UNIT – IV : CRYSTALLOGRAPHY AND FIBRE OPTICS

Crystallography : The crystal structure – Unit Cell – Miller indices – Reciprocal Vectors – Properties of Reciprocal Lattice – Bragg's Law.

Fibre Optics : Principle – classification of optical fibres – fiber optic communication system block diagram.

UNIT – V : ELECTRONICS

Electronics : Zener diode – Characteristics – Voltage regulation using zener diode – LED – uses of LED.

Digital Electronics : AND, OR, NOT, NAND and NOR gates – NAND and NOR as universal building blocks – Fabrication of a Integrated circuit by monolithic technology – Advantages and limitations of an integrated circuit – LSI, MSI and VLSI.

Books for Study & REFERENCE

1. Allied Physics – R. Murugesan S. Chand & Co. First Edition (2005).
2. Allied Physics – Dr. K. Thangaraj, Dr. D. Jayaraman Popular Book Department, Chennai.
3. Allied Physics – Prof. Dhanalakshmi and others.
4. Elements of Properties of Matter – D.S. Mathur, S. Chand & Co. (1999).
5. Heat and Thermodynamics – N. Brijlal and Subramaniam S. Chand & Co.
6. A text book of Sound – by M. Narayanamoorthy and other National Publishing Companies (1986).
7. Modern Physics – R. Murugesan S. Chand & Co. (2004).
8. Electronic Principles and Applications – A.B. Bhattacharya, New Central Book Agency, Calcutta.
9. Introduction to Solid State Physics – C. Kittel, 5th Edition Wiley Eastern Ltd.
10. Renewable & Sustainable energy sources – Agarwal.
11. Introduction to Fiber optics by K. Thyagarajan and Ajay Ghatak, Cambridge, University Press (1999).

ALLIED PRACTICAL

PAPER – 1 & 2

PHYSICS

(Any 15 Experiments)

1. Youngs modulus – non uniform bending – pin and microscope.
2. Rigidity modulus – Static Torsion Method Using Scale and Telescope.
3. Ridigity modulus – Torsional oscillation method (without symmetric masses).
4. Determination of Co-efficient of Viscosity – Graduated Burette.
5. Surface Tension and Interfacial Tension – By drop weight method.
6. Specific Heat Capacity of a liquid – by Newton’s Law of Cooling.
7. Sonometer – Determining A.C. Frequency. (Screw Gauge is given).
8. Sonometer – frequency of tuning fork.
9. Newton’s Rings – Radius of Curvature.
10. Air Wedge – Determination of thickness of thin wire.
11. Spectrometer Grating – Minimum Deviation – Mercury Lines.
12. Spectrometer – Refractive Index of a liquid – Hollow Prism.
13. Potentiometer – Calibration of High Range Ammeter.
14. Potentiometer – Calibration of Low Range Voltmeter.
15. Determination of M and B_H using Deflection Magnetometer in Tan C position and vibration magnetometer.
16. Figure of merit and voltage sensitiveness of table galvanometer.
17. Construction of AND, OR gates using diodes and NOT by transistors.
18. Zener diode – Voltage Regulation.
19. NAND / NOR as universal gate.
20. Demorgan’s theorem verification.

PAPER – 2

BOTANY – II

UNIT-I: Taxonomy

General outline of Bentham and Hooker’s system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

Structure of mature anther. Structure of mature ovule and its types. Fertilization.

UNIT-III: Plant Physiology & Plant Tissue Culture

Physiological role of micro and macro elements their deficiency symptoms Photosynthesis - light reaction - Calvin cycle Respiration - Glycolysis - Kreb’s cycle - electron transport system. Growth hormones – Auxins. Tissue culture and its principles.

UNIT-IV: Ecology

Ecosystem - fresh water ecosystem. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses. Theories of evolution - Lamarckism, Darwinism.

Books Suggested

Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.

Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.

Rev. Fr. Ignacimuthu, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.

Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

ALLIED PRACTICAL

PAPERS – 1 & 2

BOTANY

Description of plants in technical terms belonging to the families mentioned in the theory part.

To study the internal structure of Anatomy material, Pteridophytes and Gymnosperms.

Identification and Description of Micro Preparation materials mentioned in the theory part.

Description of experimental setup of plant physiology.

PAPER – 2

ZOOLOGY – II

Objective:

To study the principles of cell biology, genetics, developmental Biology, Physiology, ecology and evolution.

UNIT – I

Cell Biology – structure of animal cell, genetics: Molecular structure of genes – Gene Function. Genetic Engineering and its application, sex linked inheritance.

UNIT – II

Embryogenesis – cleavage and gastrulation of Amphioxus. Human Physiology: Excretion structure of kidney and mechanism of urine formation.

UNIT – III

Disease of circulatory system - blood pressure, heart diseases – Ischemia, Myocardial Infarction, Rheumatic heart diseases, stroke.

UNIT – IV

Pollution – Environmental degradation, method of sewage treatment, effluents, solid wastes and recycling process – Green house effect – Global warming – Acid Rain.

UNIT – V

Evolution theories – Lamarkism & Darwinism.

REFERENCES:

1. Ekambarantha Ayyar, and Ananthakrishnan, T.N. 1993 Outlines of Zoology, Vol I & II Viswanathan and co Madras.
2. Sambasiviah I, Kamalakara Rao. A.P. Augustine Chellappa, S [1983] Text book of Animal Physiology, S. Chand & co., New Delhi.
3. Verma and Agarwal [1983]Text book of animal Ecology, S. Chand & co., New Delhi.
4. Verma and Agarwal and Tyagi [1991] Chordate embryology S. Chand & Co. New Delhi.
5. Rastogi and Jayaraj [2000] Text Book of Genetics. Rastogi Publications, Meerut.
6. Verma and Agarwal 2000 Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. chand & Co.

ALLIED PRACTICAL

PAPER – 1 & 2

ZOOLOGY

I MAJOR PRACTICAL

DISSECTIONS

Cockroach :- Digestive and nervous system

II MINOR PRACTICAL

MOUNTING

Mouth parts of Mosquito, Cockroach and Honey bee

Placoid scales of shark

III Spotters

Entamoeba, Sycon, Obelia, Taenia Solium (entire, scolex)earthworm (entire, Pineal setae) Prawn (entire), Fresh water mussel, sea star, T.S of arm of sea star to show tube feet, Amphioxus – Entire, Amphioxus – T.S through pharynx, Shark, Frog, Calotes, Pigeon and Rabbit – Entire, feathers of Pigeon.

Sphygnomanometer, Stethoscope, Rain gauge.

REFERENCES :

Verma .P.S. 2011 A manual of practical Zoology – INVERTEBRATES. Chand, Co., Ltd., Ram Nagar, New Delhi.

Verma.P.S. 2011 A manual of practical Zoology – CHORDATES. Chand & Co., Ltd., Ram Nagar, New Delhi.

PAPER – 2

BIOCHEMISTRY – II

UNIT - I :

Metabolism Glycolysis,TCA cycle, HMP shunt and its energy yield. Deamination, transamination reaction, SGOT and SGPT. Urea cycle, Biosynthesis of fatty acids, beta oxidation.

UNIT - II :

Metabolic Disorders Jaundice, hypoxia, glycogen storage diseases, pentosuria, ketosis, lipidosis, edema, gout. Dehydration: definition, causes, symptom and prevention.

UNIT - III :

Enzymes Definition, classification of enzymes with one example. Mechanism of enzyme action. Lock and key mechanism, induced fit theory. Property: specificity. Isoenzyme: Definition with one example. Factors affecting enzyme activity: pH, temperature and substrate concentration. Michaleis- Menton equation. Enzyme inhibition: competitive, uncompetitive and non competitive. Biological functions of enzymes

UNIT - IV :

Molecular Biology Replication: Definition, types, mode of action of replication, mechanism of replication. General mechanism of transcription and translation. Genetic code. DNA and RNA act as genetic material.

UNIT - V :

Vitamins and Minerals A brief outline of occurrence and biological function of Vitamins and minerals (Na, K, Cl, Ca, P, I , Fe, Mg & S)

References :

1. Lehninger Principles of Biochemistry-David L. Nelson, Michael M. Cox, Macmillan Worth Publishers.

2. Harper—s Biochemistry-Rober K. Murray, Daryl K. Grammer, McGraw Hill, Lange Medical Books. 25th edition.

3. Fundamentals of Biochemistry-J.L. Jain, Sunjay Jain, Nitin Jain, S. Chand & Company.

4. Biochemistry-Dr. Amit Krishna De, S. Chand & Co., Ltd.

5. Biochemistry-Dr. Ambika Shanmugam, Published by Author.

6. Biomolecules-C. Kannan , MJP Publishers,Chennai-5.

ALLIED PRACTICAL

PAPER – 1 & 2

BIOCHEMISTRY

PRACTICAL I

Volumetric Estimation

1. Estimation of HCl using Na_2CO_3 as link and NaOH as primary standard.
2. Estimation of Iron in Ferrous Ammonium Sulphate using potassium permanganate as link solution and oxalic acid as primary standard.
3. Estimation of Glucose by Benedict's method.
4. Estimation of Glycine by formal titration.
5. Estimation of Ascorbic acid.

PRACTICAL II

Qualitative analysis

1. Carbohydrates: Glucose, fructose, galactose, mannose, maltose, lactose and arabinose and xylulose.
2. Amino acids: Arginine, cysteine, tryptophan and tyrosine.

Colorimetric analysis (only for demonstration)

1. Estimation of protein by Biuret method.
2. Estimation of DNA using diphenyl amine.
3. Estimation of glucose by O -Toluidine.

Books Recommended:

1. Practical Clinical Biochemistry - Harold Varley, CBS, New Delhi.
2. Medical Laboratory Technology-Kanai L. Mukherjee, Tata McGraw Hill., Vol. I, II, III.
3. Clinical Chemistry - Ranjana Chawla.
4. Laboratory manual in Biochemistry - Jayaraman.
5. Biochemical methods - S.Sadasivan and Manickam.
6. Introduction to Practical Biochemistry - David T. Plummer

PAPER – 2

MATHEMATICS – II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Integral Calculus

Bernoulli's formula for integration by parts - Reduction formulae

for: $\int x^{m}e^{ax}dx$, $\int \sin^{n}x\, dx$, $\int \cos^{n}x\, dx$ (with proof & problems),

$\pi/2$

$\int \sin^{m}x\cos^{n}x\, dx$ (no proof , problems only), properties of definite

0

integrals and simple problems.

UNIT-II: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume -Fourier series for functions in $(0,2\pi)$ and $(-\pi, \pi)$.

UNIT-III: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types , Lagrange's equations.

UNIT-IV: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-V: Vector Analysis

Scalar point functions - Vector point functions - Gradient ,divergence, curl - Directional derivatives - Unit to normal to a surface - Line and surface integrals - Guass, Stoke's and Green's theorems(without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II. Muhil Publishers, Chennai

Reference Books

P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.

S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. Vikas Publications, New Delhi.

P.R.Vittal(2003). *Allied Mathematics* . Marghan Publications, Chennai.

P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.

Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

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