THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

DEGREE COURSE

B.Sc. CHEMISTRY

UNDER CBCS

(Revised)

(with effect from 2011-2012)

The Course of Study and the Scheme of Examinations

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. hrs/ Week	Credit	Exam hrs	Max. Marks		
								IA	Exam.	Total
I Year I Semester	I	Language	Paper I		6	3	3	25	75	100
	II	English	Paper I		6	3	3	25	75	100
	III	Core	Paper I	General Chemistry I	6	6	3	25	75	100
	III	Core Practical	-	Volumetric Analysis	3	-	-	-	-	-
	III	Allied I	Paper I	Physics I	4	4	3	25	75	100
	III	Allied Practical	-	Allied Practical	3	-	-	-	-	-
	IV			**Environmental Studies**	2	2	3	25	75	100
I Year II Semester	I	Language	Paper II		6	3	3	25	75	100
	II	English	Paper II		6	3	3	25	75	100
	III	Core	Paper II	General Chemistry II	6	6	3	25	75	100
	III	Core Practical	Practical I	Volumetric Analysis	3	3	3	40	60	100
	III	Allied I	Paper II	Physics II	4	4	3	25	75	100
	III	Allied Practical	Practical I	Allied Practical	3	2	3	20	30	50
	IV			**Value Education**	2	2	2	-	50	50
II Year III Semester	I	Language	Paper III		6	3	3	25	75	100
	II	English	Paper III		6	3	3	25	75	100
	III	Core	Paper III	General Chemistry III	3	3	3	25	75	100
	III	Core Practical	-	Inorganic Qualitative Analysis and Preparation	3	-	-	-	-	-
	III	Allied II	Paper III	**(To choose 1 out of 4)** 1. Plant Biology and Biotechnology I 2. Zoology I 3. Biochemistry I 4. Mathematics I	4	4	3	25	75	100
	III	Allied Practical	-	Allied Practical	3	-	-	-	-	-
	IV	Skill based Subject I	Paper I	Water treatment and Analysis	3	3	3	25	75	100

Year / Semester	Part	Subject	Paper	Title of the Paper	Ins. hrs/ Week	Credit	Exam hrs	Max. Marks		
								IA	Exam.	Total
		Non-Major Elective I	Paper I	Medicinal Chemistry	2	2	3	25	75	100
II Year IV Semester	I	Language	Paper IV		6	3	3	25	75	100
	II	English	Paper IV		6	3	3	25	75	100
	III	Core	Paper IV	General Chemistry IV	3	3	3	25	75	100
	III	Core	Practical II	Inorganic Qualitative Analysis and Preparation	3	3	3	40	60	100
	III	Allied II	Paper IV	**(To choose 1 out of 4)** 1. Plant Biology and Biotechnology II 2. Zoology II 1. Biochemistry II 2. Mathematics II	4	4	3	25	75	100
	III	Allied Practical	-	Allied Practical	3	2	3	20	30	50
	IV	Skill based Subject II	Paper II	Food Chemistry and Nutrition	3	3	3	25	75	100
		Non-Major Elective II	Paper II	Chemistry in Every Day Life	2	2	3	25	75	100
III Year V Semester	III	Core	Paper V	Inorganic Chemistry I	5	5	3	25	75	100
	III	Core	Paper VI	Organic Chemistry I	5	5	3	25	75	100
	III	Core	Paper VII	Physical Chemistry I	5	5	3	25	75	100
	III	Core Practical	-	Physical Chemistry	3	-	-	-	-	-
	III	Core Practical	-	Gravimetric Estimation	3	-	-	-	-	-
	III	Core Practical	-	Organic Qualitative Analysis and Preparation	3	-	-	-	-	-
	III	Elective I	Paper I	Pharmaceutical Chemistry	3	5	3	25	75	100
	IV	Skill based Subject III	Paper III	Dairy Chemistry	3	3	3	25	75	100
III Year VI Semester	III	Core	Paper VIII	Inorganic Chemistry II	4	4	3	25	75	100
	III	Core	Paper IX	Organic Chemistry II	4	4	3	25	75	100
			Paper X	Physical Chemistry II	4	4	3	25	75	100
	III	Core Practical	Practical III	Physical Chemistry	3	3	3	40	60	100
	III	Core Practical	Practical IV	Gravimetric Estimation	3	3	3	40	60	100
	III	Core Practical	Practical V	Organic Qualitative Analysis and Preparation	3	3	3	40	60	100
	III	Elective II	Paper II	Polymer Chemistry	3	5	3	25	75	100
		Elective III	Paper III	Instrumental Analysis	3	5	3	25	75	100
	IV	Skill based Subject IV	Paper IV	Agriculture and Leather Chemistry	3	3	3	25	75	100
	V	Extension Activities			-	1	-	-	-	50
				Total	**180**	**140**				**3900**

If the allied subject is Mathematics, total number of hours per week is 7 hours. The credit per semester is 5. As there is no practicals the total marks will be 3850

THIRUVALLUVAR UNIVERSITY

B.Sc. CHEMISTRY

SYLLABUS

UNDER CBCS

(with effect from 2011-2012)

I SEMESTER

PAPER I

GENERAL CHEMISTRY I

Objective

Basic concepts regarding atomic structure, periodic properties, bonding concepts, quantum chemistry, solids, liquids, gases, hydrocarbons, nomenclature, reactions, principles of volumetric analysis derivation of equations, related problems, 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 s, p, d and f block elements - classification and characteristic properties - 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 electronegatvity scale - Allred and Rochow scale.

UNIT-II:

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

2.2 Basic concepts of bonding in organic chemistry - Hybridisation - tetravalency of carbon - geometry of molecules - methane, ethane, ethylene, acetylene and benzene - Factors affecting covalent bond. Electron displacement effects - inductive - inductomeric - electromeric – resonance - hyperconjugation and steric effects.

2.3 Types of organic reactions - 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-III:

3.1 Quantum chemistry - Quantum theory of radiation - Planck's theory - photoelectric effect - Compton effect - Wave mechanical concept of the atom - de Broglie's relationship - wave nature of electron - Heisenberg's uncertainty principle - Schrodinger wave equation (without derivation) - significance of wave functions, ψ and ψ^2 - probability distribution of electrons - radial probability distribution curves.

3.2 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 - transport properties - viscosity - thermal conductivity - diffusion.

3.3 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-IV

4.1 Definitions of molarity - normality - molality and mole fraction - their calculations - definition and examples for primary and secondary standards. Calculation of equivalent weights.

4.2 Alkanes - Methods of preparation of alkanes –Wurtz method, Kolbes 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.

4.3. 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.

UNIT-V

5.1 Theories of acid-base - red-ox - complexometric and iodometric titrations. Theories of indicators - acid-base - redox - metal ion and adsorption indicators and choice of indicators.

5.2 Addition reactions of alkenes with hydrogen and Mechanism - halogens and Mechanism - hydrogen halide (Markownikoff's rule) and Mechanism - hydrogen bromide (peroxide effect) and Mechanism - sulphuric acid - water and Mechanism - hydroboration - ozonolysis - hydroxylation with $KMnO_4$ - allylic substitution by NBS - Epoxidation and Mechanism - Oxidation - reduction - Self-addition or polymerization - Detection of c=c double bond

5.3 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.

ALLIED I

PAPER I

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 - comparison of viscosities of two liquids by graduated burette method

Surface Tension: Surface Tension - interfacial surface tension - determination of surface tension and interfacial tension by the method of drops.

UNIT-II: HEAT

Heat: Specific heat - Callender's Barne's method to determine the specific heat of a liquid-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 - liquefaction of air Linde's method - Helium I and II - production of low temperature- adiabatic demagnatisation

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 - Vibration of strings - Velocity and frequency of vibrations of a stretched string - laws of vibrations along a stretched string - 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 - 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 lines using a grating by normal Incidence.

Polarisation: Optical activity - specific rotatory power - Polarimeter - Determination of specific rotatory power of a solution using the polarimeter

Reference Books

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, Culcutta.
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)

ENVIRONMENTAL STUDIES

(For all UG Degree Courses)

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES :

Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:

Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

Environmental Pollution - Causes - Effects and control measures of Air, Water, Marine, soil, solid waste, Thermal, Nuclear pollution and Disaster Management - Floods, Earth quake, Cyclone and Land slides. Role of individuals in prevention of pollution - pollution case studies.

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION

Urban issues - Energy - water conservation - Environmental Ethics - Global warming - Resettlement and Rehabilitation issues - Environmental legislations - Environmental production Act. 1986 - Air, Water, Wildlife and forest conservation Act - Population growth and Explosion - Human rights and Value Education - Environmental Health - HIV/AIDS - Role of IT in Environment and Human Health - Women and child welfare - Public awareness - Case studies.

UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES

1. KUMARASAMY, K., A.ALAGAPPA MOSES AND M.VASANTHY, 2004. ENVIRONMENTAL STUDIES, BHARATHIDSAN UNIVERSITY PUB, 1, TRICHY

2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHY

3. KALAVATHY,S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHY

II SEMESTER

PAPER II

GENERAL CHEMISTRY II

Objectives :

Basic concepts regarding ionic bond, covalent bond, M.O theory, cyclo alkanes, dienes, thermochemistry, thermodynamics, derivation of equations, related problems, s-block elements, group study, polymerisation, mechanism, applications are to be taught for II-Semester.

UNIT-I:

1.1 Ionic bond - Electronic theory of valence - Conditions for the formation of ionic bond - General properties - Radius ratio rule and its limitations - 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.

1.2 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.

1.3 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-II:

2.1 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.

2.2 Formation of acetylides - alkylation of alkynes with mechanism - oxidation with KMnO4 - ozonolysis - Polymerisation to benzene -

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

2.3 Bayer's strain theory - theory of strainless rings - - Chemistry of decalin - Dienes - stability of dienes - conjugated, isolated and cumulative- stability and Chemical reactivity.

UNIT-III:

3.1 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

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

3.3 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.

UNIT-IV:

4.1 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.

4.2 1:2 and 1:4 additions with mechanism - Free radical addition - polymerization of dienes - Synthesis of dienes - 1:3 butadiene - Isoprene and chloroprene – Allenes.

4.3 Joule's law - Joule-Thomson effect - Joule-Thomson coefficient and its derivation - inversion temperature, its significance and its derivation.

UNIT-V:

5.1 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 alkai metals - Magnesium acting as bridge element between IIA and IIB groups - Magnesium resembles zinc.

5.2 Polymerization - Types of polymerization - Distinction between addition and condensation polymerization - free radical - cationic and anionic polymerizations - mechanism of preparation of polymers - addition polymers and condensation polymers with examples - Thermoplastic and thermosetting polymers

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 I

VOLUMETRIC ANALYSIS

Acidimetry

1. Estimation of borax - Standard Sodium Carbonate
2. Estimation of Sodium Hydroxide - Standard Sodium Carbonate
3. Estimation of Hcl – std 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 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 – std FAS.
11. Estimation of oxalic acid – std oxalic acid.

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

ALLIED I

PAPER II

PHYSICS II

UNIT-I WAVE MECHANICS

Wave Mechanics - De Broglie Waves - Dual nature - Phase velocity - Group velocity-Relation between phase velocity and group velocity-Experimental study of matter waves - Davisson and Germer's experiment - G.P. Thomson's experiment - Heisenberg's uncertainty Principle - The position and momentum of a particle

UNIT-II NUCLEAR PHYSICS

Particle accelerators - cyclotron, particle detectors - GM Counter-Artificial Transmutation - Rutherford's experiment - The Q value equation for a 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 spaceapplication.

UNIT-IV : CRYSTALLOGRAPHY AND FIBRE OPTICS

Crystallography: The crystal structure - Unit cell - Miller indices - Reciprocal lattice vectors-properties of Reciprocal Lattice-Bragg's law-Types of bonding in crystal-crystal packing - examples of simple structures like NaCl, CaCl and Diomand.

Fiber Optics: Principle - classification of optical fibres - modes of propagation-single mode-multi mode - advantages and disadvantages. 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 - elementary ideas of Integrated circuits-Fabrication of Integrated circuits by monolithic technology - Advantages and limitations of an integrated circuit - LSI, MSI and VLSI.

Reference Books

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.
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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, Culcutta.
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 PHYSICS PRACTICALS

1. Young's Modulus - Non-uniform bending method using Pin and Microscope.
2. Rigidity modulus - Static Torsion method using Scale and Telescope.
3. Rigidity Modulus - Torsional oscillation method (without symmetric masses)
4. Comparison of co-efficient of viscosities - Burette method.
5. Specific heat capacity of a liquid - by Newton's law of cooling
6. Sonometer - Determining A.C Frequency. (Screw Gauge is given)
7. Newton's Rings - Radius of curvature.
8. Spectrometer Grating - Normal incidence - Wavelength of mercury lines.
9. Potentiometer - measurement of internal resistance of a cell
10. Potentiometer - calibration of low range voltmeter.
11. Determination of M and B_H using Deflection magnetometer in Tan C position and vibration magnetometer.
12. Figure of merit and voltage sensitiveness of galvanometer.
13. Construction of AND, OR gates using diodes and NOT by transistors.
14. Zener diode - Voltage Regulation.

VALUE EDUCATION
(For all UG Degree Courses)

UNIT-I

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV

Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.

Reference Books

1. T. Anchukandam and J. Kuttainimathathil (Ed) Grow Free Live Free, Krisitu Jyoti Publications, Bangalore (1995)
2. Mani Jacob (Ed) Resource Book for Value Education, Institute for Value Education, New Delhi 2002.
3. DBNI, NCERT, SCERT, Dharma Bharti National Institute of Peace and Value Education, Secunderabad, 2002.
4. Daniel and Selvamony - Value Education Today, (Madras Christian College, Tambaram and ALACHE, New Delhi, 1990)
5. S. Ignacimuthu - Values for Life - Better Yourself Books, Mumbai, 1991.
6. M.M.M.Mascaronhas Centre for Research Education Science and Training for Family Life Promotion - Family Life Education, Bangalore, 1993.

WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe/.org/education.html/

www.clallam:;org/lifestyle/education.html/

www.sun.com/../edu/progrmws/star.html/

www.infoscouts.com

www.secretofsuccess.com

www.1millionpapers.com

http://militarlyfinance.umuc.edu/education/edu-network.html/

III SEMESTER

PAPER II

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, thermodynamics, derivation of equations, related problems, applications wherever necessary.

UNIT-I:

1.1 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.

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

1.3 Types of solvents - Physical properties of solvent - Protic and aprotic solvents - Amphi-protic / amphoteric solvent - aqueous and non-aqueous solvents - Liquid ammonia and Liquid SO_2 as solvent.

UNIT-II:

2.1 Aromaticity - Modern theory of aromaticity - Huckel's (4n +2) rule and its simple applications - Aromatic hydrocarbons - Resonance in benzene - Delocalised cloud in benzene.

2.2 Electrophilic reagents - Electrophllic substitution reactions in aromatic compounds - general mechanisms - nitration - halogenation - sulphonation - Friedel-Craft's acylation and alkylation.

2.3 Aliphatic nucleophilic substitutions - Nucleophilic reagents - Mechanisms of SN_1, SN_2 and SNi reactions - effects of structure of substrate - solvent - nucleophile and leaving groups.

UNIT-III:

3.1 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.

3.2 Carnot's cycle - Efficiency - Carnot's theorem (statement only) - Concept of entropy - Definition - Randomness and entropy - Numerical definition of entropy -.

3.3 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

UNIT-IV

4.1 '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.

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

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

UNIT-V:

5.1 Carbon family - Group discussion - catenation - Comparison of properties of carbon and silicon valencies - oxides - halides - hydrides and oxyacids. Classification - preparation - properties and uses of carbides .

5.2 Elimination reactions - Bimolecular elimination reaction (E_2) - Unimolecular elimination reaction (E_1) - mechanisms of E_1 and E_2 reactions - Hoffmann and Saytzeff's rules - Cis and trans eliminations

5.3 Free energy and work function - Gibb's free energy - Helmholtz work function - their variations with temperature - pressure and volume - Criteria for spontaneity

ALLIED II

(to choose any 1 out of the given 4)

PAPER III.1

PLANT BIOLOGY AND BIOTECHNOLOGY I

UNIT-I: Cell Biology

Prokaryotic and Eukaryotic cell (plant cell)

Cell organells - Chloroplst, Mitochondrion and Nucleus.

Cell division - Mitosis and Meiosis.

UNIT-II: Anatomy

Tissues - meristematic and permanent tissues. Primary structure of dioct leaf. Structure of Monocot root and Monocot stem. Normal Secondary thickening of dicot stem.

UNIT-III: Bacteria and Viruses

Bacteria - General characters - shape - flagellation - grams staining. Structure of E. Coil - reproduction - (Vegetative and asexual), Economic importance. Viruses - General characteristics - structure of virus, structure of Tobaco mosaic virus, Bacteriophage.

UNIT-IV: Structure and Life History of

a) Chlorella, Sargassum and Gracilaria

b) Albugo, Penicilium and and Agaricus

UNIT-V: Structure and Life History of

a) Funaria

b) Lycopodium

c) Cycas

Economic importance of Chlorella, Penicillium and Agaricus.

PAPER III.2

ZOOLOGY I

Objective :

To study the systemic and functional morphology of invertebrates and Chordates.

UNIT-I

Study types including Life histories. Protozoa - Entamoeba, Porifera-Sycon. Coelenterata-Obelia geniculata. Platyhelminthes-Taenia solium

UNIT-II

Annelida-Earthworm, Arthropoda-Prawn, Mollusca-Fresh water mussel, Echinodermata-Sea Star.

UNIT-III

Chordata-Prochordates , General Characters, Morphology of Amphioxus

Vertebrates : Shark.

UNIT-IV

Type Study Frog and Calotes.

UNIT-V

Type Study Pigeon and Rabbit.

Note : In chordata 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. [Chordata] 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. Invertebrata Zoology 12th Edition. S. Chand Co. Ltd., New Delhi.

PAPER III.3

BIOCHEMISTRY I

UNIT- I :CHEMISTRY OF CARBOHYDRATES.

Definition and classification of Carbohydrates, Linear and ring form of all monosaccharides (Glucose and Fructose), Physical and chemical properties of carbohydrates, Occurrence, structure, physical and chemical properties of disaccharide (Sucrose and Lactose), polysaccharides (Starch and Cellose).

UNIT- II : CHEMISTRY OF AMINO ACIDS.

Definition , classification and properties of Amino acids, isoelectric point, Isoelectric pH, Zwitter ion. Reaction with Ninhydrin, 1-fluro-2, 4, dinitrobenzene [FDNB] and Sieg Fried's carbamino reaction. Essential and Non essential Amino acids.

UNIT-III : CHEMISTRY OF PROTEINS

Classification based on shape and size, solubility and biological function. Peptide bond. Structure of protein - Primary, secondary, tertiary and quaternary. N-Terminal determination - Edmans and dansyl chloride methode. C-Terminal determination. Denaturation.

UNIT-IV: CHEMISTRY OF LIPIDS

Introduction, definition of fatty acids, classification, nomenclatures, structures, properties of fatty acids. Structure and function of prostaglandins, triacyl glycerol, phospholipids [lecithin, cephalin, phosphotidyl inositol, phosphotidyl serine], Spingomyelin, Plasmologen, Glycolipids and Cholesterol. Bile salts Functions.

UNIT-V CHEMISTRY OF NUCLEIC ACID

Definition- Nucleoside, nucleotide and polynucleotide. Double helical structure of DNA and its biological function, structure of RNA: tRNA, mRNA and rRNA-

occurrence, chemistry and its biological function, difference between DNA and RNA, Properties - Tm, Hypo and Hyper Chromicity.

BOOKS RECOMMENDED

1. Lehinger's principle of Biochemistry (2000), Nelson and Cox.
2. Harper's Biochemistry - Rober K. Murray, Daryl K.Grammer, McGrawHill, Lange Medical Books
3. Fundamentals of Biochemistry - J.L Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry - Dr. Amit Krishna De, S. Chand & Co., Ltd. et al
5. Biochemistry - Dr. Ambica shanmugam, published by author.
6. Bio molecules - C. Kannan, MJP publishers, Chennai-5

PAPER III.4

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

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics.* Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. Vikas Publications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* . Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai.

SKILL BASED SUBJECT I

PAPER I

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 & disinfections of water - precipitation - aeration - ozonisation - Chlorination.

UNIT-II

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

2.2 Determination of hardness of water - Titration method - complexo metric 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 Megraw - hill Publishing company Ltd., New Delhi.
3. Water pollution and management - C.K. Varashney - wiley Eastern Ltd., Chennai - 20.

NON-MAJOR ELECTIVE I

PAPER I

MEDICINAL CHEMISTRY

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 R_h 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 constituent 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.

Books For Reference:

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.

IV SEMESTER

PAPER IV

GENERAL CHEMISTRY IV

Objective:

p-block elements & group study, aromatic nucleophilic substitution reactions, 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 'p'block elements - Nitrogen family - Comparative study of N,P, As, Sb and Bi - elements - oxides - oxyacids - halides and hydrides - valency states.

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

1.3 Oxy-acids of sulphur including Peroxy acids and Thionic acids.

UNIT-II:

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

2.2 Unsaturated alcohols - preparation - Properties and uses of allyl alcohol.

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

UNIT-III:

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

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

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

UNIT-IV:

4.1 Noble gases - Electronic configurations - Reasons for placing in zero group - position in the periodic table - Chemical inertness of noble gases - reasons - Applications - Clathrates.

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

4.3 partial molar properties - Chemical potential - Gibbs-Duhem equation - effect of temperature and pressure on chemical potential - chemical potential in systems of ideal gases.

UNIT-V:

5.1 compounds of xenon - hybridization and geometries of XeF_2 - XeF_4 - XeF_6 - $XeOF_4$.

5.2 Ring substitution in phenol - Mechanisms of esterification - nitration - sulphonation - halogenation - coupling with diazonium salts.

53. Chemical potential of solvent in Binary Ideal liquid solutions - Duhem - Margules equation & Applications

CORE PRACTICAL II

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.

II Preparation of Inorganic compounds.

Tetraammine Copper II sulphate
Tris (thiourea) Copper I chloride
Potassium trioxalato ferrate II
Ferrous ammonium sulphate
Microcosmic salt
Manganous sulphate

ALLIED II

(to choose any 1 out of the given 4)

PAPER IV.1

PLANT BIOLOGY AND BIOTECHNOLOGY 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, Rutaceae 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 Tissure Culture

Absorption of water, physiological role of micro and macro elements their deficiency symptoms Photosynthesis - light reaction - Calvin cycle Respiration - Glycolysis - Kreb's cycle - electron transport system. Nitrogen cycle. Growth hormones - Auxins - Gibberellins and cytokinins. Tissue culture and its significance (basic principles).

UNIT-IV: Ecology

Ecosystem - basic components of ecosystem fresh water ecosystem. Energy flow in ecosystem - Trophic level, Food chain and food web. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses - interaction of genes - Complementary factors. Theories of evolution - Lamarckism, Darwinism and Devries.

BOOKS SUGGESTED

1. Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.
2. Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.
3. Rev. Fr. Ignacimuthy, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.
4. Rao, K.N. Krishnamoorthy, K.V. and Rao. G. (1975) Ancillary Botany. S. Viswanathan Private. Ltd., Chennai.

PAPER IV.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 - kidney failure and transplantation.

UNIT-III

Diseases of Circulatory system - Blood Pressure, Heart diseases-Ischemia, Myocardial infarction, Rheumatic heart diseases, Stroke.

UNIT-IV

Pollution - Environmental degradation, methods 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.

PAPER IV.3

BIOCHEMISTRY II

UNIT-I : METABOLISM

Glycolysis, TCA Cycle, ETC, HMP Shunt and its energy yeids. Deamination, transamination reaction , SGOT and SGPT. Urea cycle, Beta oxidation of fatty acids.

UNIT-II : HORMONES

Brief outline of various endocrine glands and their secretion. Physiological role of insulin, glucagon, thyroid and sex hormones

UNIT-III ENZYMES

Definition classification of enzymes, Mechanism of enzyme action. Lock and key mechanism, induced fit theory. Enzyme specificity, isoenzymes. Factors affecting enzyme activity - pH, temperature, substrate concentration. Michaelis menten equation, Enzyme inhibition - competitive, Non competitive, Un competitive.

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 as genetic material.

UNIT-V : VITAMINS AND MINERALS

A brief outline of occurrence and biological functions of Vitamins and Minerals [Na, K, Cl, Ca, P, I, Fe, Mg & S]

BOOKS RECOMMENDED

1. Lehinger's principle of Biochemistry (2000), Nelson and Cox.
2. Harper's Biochemistry - Rober K. Murray, Daryl K.Grammer, McGrawHill, Lange Medical Books
3. Fundamentals of Biochemistry - J.L Jain, Nitin Jain, S. Chand & Company.
4. Biochemistry - Dr. Amit Krishna De, S. Chand & Co., Ltd. et al
5. Biochemistry - Dr. Ambica shanmugam, published by author.
6. Bio molecules - C. Kannan, MJP publishers, Chennai-5

PAPER IV.4

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), $\int_0^{\pi/2} \sin^m x \cos^n x\, dx$ (no proof , problems only), properties of definite 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

1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* . Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) Allied Mathematics Vol-I, II S.Chand & company Ltd., New Delhi-55.
5. Isaac, Allied Mathematics. New Gamma Publishing House, Palayamkottai

ALLIED PRACTICAL

PLANT BIOLOGY AND BIOTECHNOLOGY

1. To make suitable micropreparation describe and identify materials of Algae, Fungi, Bryophyte, Pteriophyte, Gymmosperm and angiosperm prescribed.
2. To describe in technical terms, Plants belong to any of the families prescribed and identify the family.
3. To dissect a flower, construct floral diagram and write floral formula.
4. To describe simple experimental setup in plant physiology.
5. To describe and identify the micro preparation materials of Embryology prescribed.

ALLIED PRACTICAL

ZOOLOGY

MAJOR PRACTICAL

CD*/Model/Chart - Anatomical observation and comment

Cockroach - Digestive and nervous system.

Frog - Digestive and Urino-genital system. Arterial system & Venous system

MINOR PRACTICAL

Slides / Model / Chart - Identification (draw and label)

1. Body setae of Earthworm
2. Mouth parts of mosquito
3. Mouth parts of Honeybee

4. Any one suitable / relevant vertebrate Brain
5. Placoid scale of shark

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, shark-entire, Shark [placoid scale] Frog, Calotes Pigeon entire [feather], Rabbit

Sphygnomanometer

* References :

1. Prof. Baskaran, HOD of Zoology
   Iyyanadar Janagiammal College
   Sivakasi, Ph.No. 04562 – 254100
2. WWW.Prodissector.Com.
3. WWW.Sciencelass.Com.
4. WWW.ento.vt.edu.

ALLIED PRACTICAL

BIOCHEMISTRY

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.

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.

BOOK 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 Biochemistry - Ranjana Chawla.
4. Laboratory manual in Biochemistry - Jayaraman
5. Biochemical methods - S.Sadasivan and Manickam
6. Introduction to practical Biochemistry - David T. Plummer.

SKILL BASED SUBJECT II
PAPER II
FOOD CHEMISTRY & NUTRITION

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 Vitamins - their importance - classification - water soluble & fat soluble vitamins - vitamin A, Vitamin D, Vitamin E, Vitamin K, Vitamin B complex group - Vitamin C - sources and their importance - requirements - deficiency diseases.

5.2 Minerals and trace elements - sources and their importance - antioxidants.'

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. - Willey Eastern Ltd., Madras.
5. Handbook of food and nutrition - M. Swaminathan - the Bangalore Printing and publishing co. Ltd., Bangalore.

NON-MAJOR ELECTIVE II
PAPER II
CHEMISTRY IN EVERY DAY LIFE

UNIT-I

1.1 General Survey of Chemicals used in every day 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 Chemicals in food production - fertilizers used in natural sources - Fertilizers urea, NPK and Super phosphates need - user and hazards.

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 Pharmaceutical drugs - Analgesics and antipyretics - antibiotics - definitions examples and applications.

5.2. Antiseptics - disinfect ants - definitions examples and application.

5.3 Explosives : Classifications - Examples.

Reference :

1. Chemical process industries - Norris Shreve Joseph A.Brine .Jr.
2. Perfumes, Cosmetics and soaps - W.A. Poucher (Vol 3).
3. Environmental Chemistry - A .K. DE
4. Industrial Chemistry, B.K. Sharma- Goel publishing house, Meerut.
5. Food Science - III Edition - B. Srilakshmi - 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

V SEMESTER

PAPER V

INORGANIC CHEMISTRY I

Objectives :

1. To understand the principle of gravimetry.
2. To give students a firm grounding in Co-ordination chemistry.
3. 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 - Co-precipitation - post precipitation - differences - reduction of error - peptisation - precipitation from homogeneous solution - calculation in gravimetric methods - use of gravimetic factor.

1.2 Thermoanalytical methods - principle involved in thermogravimetic 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 - Nomenclature.

2.2 Bridged (or) polynuclear complexes - inner metallic complexes - Isomerism in complexes - Ionisation Isomerism, hydrate Isomerism, linkage Isomerism, 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. 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.

4.2 Pi-acceptor ligands - bonding, hybridisation, structures and properties of carhonyls 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 - classification of halides - fluorides of oxygen - exceptional properties of fluorine.

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

PAPER VI

ORGANIC CHEMISTRY I

Objective :

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

UNIT- I

1.1. Carbohydrates : classifications - reactions of glucose and fructose - ozasone 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 base catalyzed 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, Hoffman'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, Bisler Napieralskii 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) anthraquinione dye - Alizarin

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

PAPER VII
PHYSICAL CHEMISTRY I

Objectives

1. To study about the solutions and collogative properties
2. To know about Chemical Equilibrium.
3. To study phase rule.
4. To promote interest in surface chemistry, catalysis & chemical kinetics.

UNIT-I

1.1 Solutions of gases in liquids - Henry's law - solution of liquids in liquids - Raoult's law - vapour pressure of ideal solutions - activity of a component in an ideal solution - Thermodynamics of ideal solutions - Free energy change of mixing for an ideal solution - volume change and enthalpy changes of for an ideal solution - vapour pressures of real or non-ideal solutions - vapour pressure - composition and Boiling point- composition curves of completely miscible binary solutions-Fractional distillation of binary liquid solutions.

1.2 Azeotropic mixtures - Distillation of immiscible liquids - solubility of partially miscible liquids - phenol water system - CST and effect of impurities on CST.

UNIT-II: Colligate properties and chemical equilibrium:

2.1 Lowering of vapour pressure - osmosis and osmotic pressure - relation between osmotic pressure and vapour pressure lowering of an ideal solution - theories of semipermeability - reverse osmosis - elevation of boiling point - depression of freezing point - derivations and determination - vant Hoff factor.

2.2 Chemical equilibrium: law of mass action - law of Chemical equilibrium- thermodynamic derivation of law of Chemical equilibrium - Vant Hoff reaction isotherm - standard free energy change - standard free energy change and equilibrium constant - temperature dependence of equilibrium constants - Vant Hoff isochore - Le chatelier principle.

UNIT-III : Phase Equilibria

3.1 Gibb's phase rule - statement and definition of terms - Application to one component systems - Water and sulphur system - Reduced phase rule - Two component systems - simple eutectic system - lead - silver system - Freezing mixtures .

3.2 Thermal analysis and cooling curves - compound formation with congruent melting point - Zn-Mg system, Ferric chloride - water system - compound formation with incongruent melting point Na-K system

UNIT- IV : Surface Chemistry

4.1 Adsorption - Physisorption and Chemisorptions - Applications of adsorption - Adsorption of gases by solids - Freundlich adsorption isotherm - Langmuir's theory of adsorption - BET theory of multilayer adsorption - determination of surface area - adsorption isotherms.

4.2. General characteristics of catalytic reactions Acid-base catalysis- Enzyme catalysis Mechanism and kinetics of enzyme catalyzed reactions - Michaelis-Menten equation - Effect of temperature on enzyme catalysis - Heterogeneous catalysis - Surface reactions-kinetics of surface reactions.

UNIT-V: Chemical Kinetics

5.1 The rate equation - order & molecularity of a reaction - first order reactions - second order reactions - third order reactions - zero order reactions - Half life time of a reaction - methods of determining order of a reaction - order and molecularity of simple reactions - experimental methods in the study of kinetics of reaction - volumetry, , polarimetry , and colorimetry - effect of temperature on reaction rates - concept of activation energy - energy barrier - Effect of catalyst.

5.2 Collision theory and derivation of rate constant for bimolecular reactions - theory of absolute reaction rates - thermodynamic derivation for the rate constant for a bimolecular reaction from it - comparison of collision theory and ARRT - significance of entropy , enthalpy and free energy of activation.

ELECTIVE I

PAPER I

PHARMACEUTICAL CHEMISATRY

Objective :

1. To effectively impart knowledge about - various diseases and their treatment.
2. To learn about the importance of Indian medicinal plants.
3. 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, pharmachophore, 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 disinfectans - definition and distinction-phenolic compounds, chloro compounds, and cationic surfactant.

UNIT IV

4.1 Analgesics, Antipyretics and antiinflamatory 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- trichloroethylen - uses and disadvantages.

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

SKILL BASED SUBJECT III

PAPER III

DAIRY CHEMISTRY

Objective :

To understand the chemical composition of milk and milk processing.
To learn about the various milk product.

UNIT-I

Definition, Composition, Milk lipids, Milk proteins, vitamins and minerals. Factors affecting the composition of milk - adulterants, preservatives, and neutralizer - examples and their - detection.

UNIT-II

Properties of milk - Flavour and aroma, acidity, specific gravity, viscosity and conductivity. Estimation of fat, acidity and total solids in milk.

UNIT-III

Processing of milk - effect of heat on milk, chemical changes taking place in milk due to processing, sterilization, homogenization and pasteurization, vacuum pasteurization and Ultra high temperature pasteurization

UNIT-IV

Milk Products: Cream - definition, chemistry of creaming process, Butter - definition, composition, theory of churning, desibutter, salted butter. Ghee - major constituents, common adulterants and their detection.

UNIT-V

Fermented milk products - fermentation of milk - definition and conditions. ICE creams - definition, composition, types, manufacture of ice - cream, stabilizers, emulsifiers, and their role, milk powder - definition, process of making milk powder.

Reference :

1. Applied Chemistry-K.Bagavathi Sundari MJP Publishers Chennai. 2006.
2. Principles of dairy technology - Robert Jenness
3. Indian Dairy Products - Rangappa and Acharya, K.T.
4. Fundamentals of Dairy chemistry - Wond. F.P. Springer.
5. Outlines of Dairy Technology - Sukumar De. – Oxford University Press.
6. Applied chemistry for home science & allied science - T.Jacob, Mcmillan.

VI SEMESTER

PAPER VIII

INORGANIC CHEMISTRY II

Objectives :

1. To impart knowledge about radioactivity and nuclear chemistry.
2. To understand the metallic bond and bio-inorganic chemistry.
3. To learn about f and d block elements.
4. To provide knowledge about the 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 Chemistry of d block elements - characteristics of d block elements - variable valency - magnetic properties and colour - 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 Chemistry of f block elements - comparative account of lanthanides and actinides, occurrence, elements, oxidation states, magnetic properties, colour and spectra - lanthanide contraction - causes, consequences and uses - comparison between 3d and 4f block elements - 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.

PAPER IX

ORGANIC CHEMISTRY II

Objectives:

1. To understand the basic concepts organic photochemistry.
2. To kindle interest in students in learning bio-organic chemistry through the introduction of topics such as Proteins, Nucleic acids, Terpenes, Alkaloids etc
3. 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.

1.2 Norrish-I and II reactions. Barton reaction- photo Fries rearrangement -photochemical formation of smog- photochemistry of vision.

1.3 Mechanism of reduction with sodium borohydride, lithium aluminium hydride, Wolf Kishner reaction, MPV reduction and Rosenmunds 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

2.2 Poly peptides and proteins:. Classification of proteins based on physical and chemical properties and physiological functions -peptide synthesis - Bergman synthesis.

2.3 Primary structure of proteins - end group analysis - Akabori method, reduction method, Edman method, Sanger's method, Dansyl method - secondary structure of protein - helical and sheet structures - denaturation of proteins.

UNIT- III

3.1 Nucleic acids: Nucleoside, nucleotide, degradation of nucleotide chain - stucture of nucleic acids - RNA and DNA - elementary idea about protein synthesis

3.2 Synthesis of pyramidine and purine bases - guanine, adenine, uracil, cytosine and thymine.

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

UNIT- IV

4.1 Vitamins : Classification - structural elucidation of pyridoxine.

4.2 Antibiotics : Classification and structural elucidation of chloroamphenicol

4.3. 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 :,Pinocol-pinocolone, 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

PAPER X

PHYSICAL CHEMISTRY II

Objectives

1. To study photo chemistry, laser and distribution law.
2. To learn about Electro chemistry and its applications.

UNIT- I

1.1 Laws of photochemistry - Fluorescence and phosphorescence - primary and secondary reactions - Kinetics of hydrogen - bromine reaction - photosentisation - chemiluminescence - Lasers - uses of lasers.

1.2 Nernst distribution law - thermodynamic derivation - modification of law in case of association or dissociation of the solute - applications.

UNIT-II: Electrochemistry

2.1 Introduction: Transport number and its determination by Hittorff's and moving boundary method - effect of temperature and concentration on ionic mobility and ionic conductance - Kohlrausch's law and its applications salt hydrolysis and pH of a salt solution, buffer action and explanation

2.2 Applications of conductivity measurements - degree of hydrolysis, solubility product and conductometric titrations.

UNIT-III

3.1. Theory of strong electrolytes - Debye - Huckel - Onsager theory - verification of Onsager equation - Wein effect and Debye Falkenhagen effect - ionic strength - activity and activity coefficients of strong electrolytes.

3.2 Galvanic cells - reversible and irreversible electrodes and cells - standard cell - emf and its measurement - types of electrodes - electrode reactions - electrode potentials - reference electrodes - Standard electrode potentials. Derivation of Nernst equation for electrode potential and cell emf. - sign conventions.

UNIT-IV

4.1 Electrochemical series and its applications - formation of cells - electrode and cell reactions - cell emf - chemical cells and concentration cells with and without transference - examples and derivation of expressions for their emfs - liquid junction potential.

4.2 Applications of emf measurement - calculation of ΔG, ΔH, ΔS and equilibrium constant Determination of pH using quinhydrone and glass electrodes - potentiometric titrations.

UNIT-V

5.1 Polarization - decomposition potential over voltage - storage cells - lead acid battery - mechanism of discharging and recharging - fuel cells.

5.2 Polarography - principle - concentration polarization - dropping mercury electrode - advantages and disadvantages - convection, migration and diffusion currents - Ilkovic equation (derivation not required) and significance - experimental assembly electrodes - current voltage curve - oxygen wave - influence of temperature and agitation on diffusion layer - polarography as an analytical tool in quantitative and qualitative analysis.

CORE PRACTICAL III

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.

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

   b)Determination of Kf 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. $Na_2S_2O_3$, 5 H_2,O, CH_3COONa, $3H_2O$, $SrCl_2$, $6H_2O$, $MnCl_2$, 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 explanations in ten minutes for evaluation

CORE PRACTICAL IV

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.

CORE PRACTICAL V

(ORGANIC CHEMISTRY)

(Qualitative analysis and organic preparation)

I. 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.

II. Organic Preparations

Acylation

(a) Acetylation of salicylic acid or aniline.

(b) Benzoylation of aniline or phenol.

Nitration

(c) Preparation of m-dinitrobenzene

(d) Preparation of p- nitroacetanilide

Halogenation

(e) Preparation of p-bromoacetanilide

(f) Preparation of 2,4,6-tribromophenol

Diazotisation / coupling

(g) Preparation of methyl orange

Oxidation

(h) Preparation of benzoic acid from toluene or benzaldehyde.

Hydrolysis:

(i) 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-S. Sundaram - 3 Volumes - S. Viswanthan

4. Vogel's text book of practical organic chemistry - Longman

ELECTIVE II

PAPER II

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.

ELECTIVE III

PAPER III

INSTRUMENTAL ANALYSIS

Objective:

To impart knowledge about different spectroscopy techniques, Chromatography & data analysis.

UNIT-I

1.1 **Data Analysis** - Theory of errors - idea of significant figures and its importance with examples - precision - accuracy - methods of expressing accuracy - error analysis - minimizing errors method of expressing precision - average deviation - standard deviation and confidence limit.

1.2 **Mass spectroscopy**: basic principles of mass spectrum - molecular peak - base peak - isotopic peak - meta stable peak - factors influencing the fragmentation - nitrogen rule - ring rule - determination of molecular formulae with examples - instrumentation

UNIT-II

2.1 **Infra-red spectroscopy**: molecular vibrations - Hooke's law - vibrational frequencies - factors affecting vibrational frequencies - instrumentation - block diagram - source - monochromator - cell sampling echniques - detector and recorders - solvent shift.

2.2 **Raman spectroscopy**: Rayleigh and Raman scattering - Stokes and Anti Stokes lines - instrumentation - block diagram - differences between IR and Raman spectroscopy - mutual exclusion principle - applications.

UNIT – III

NMR spectroscopy : Principle of Nuclear magnetic Resonance - basic instrumentation - shielding mechanism - chemical shift - number of signals - spin-spin coupling and coupling constants - splitting of signals.

NMR spectrum of simple organic compounds such as ethyl bromide, 1,1,2-tribromoethane, ethanol, acetaldehyde,

UNIT-IV

4.1 **UV - Visible spectroscopy -** Absorption laws. Calculations involving Beer Lamberts 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.

separation techniques: principle of adsorption and partition chromatography **columm chromatography** - principle - adsorbents used - preparation of column - adsorption - elution - recovery of substances - Applications

UNIT - V

5.1 **Thin layer chromatography** - principle - choice of adsorbent and solvent - preparation of chromatogram - R_f value - applications. Paper chromatography- solvents used - principle - Rf value factors influencing Rf value - applications - separation of amino acid mixture - radial paper chromatography. Paper electrophoresis - principle and applications

5.2 **Ion exchange chromatography** - principle - resins - action of resins - experimental techniques - applications - separation of metal ions, separation of chloride and Bromide ions - removal of interfering radicals.

SKILL BASED SUBJECT IV

PAPER IV

AGRICULTURAL AND LEATHER CHEMISTRY

Objective :

To learn about Agricultural and Leather chemistry

AGRICULTURE 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

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 *:*

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 Century books (P) Ltd.,
6. The nature and properties of soils - IX Edition - Nyle.C.Bready - S.Chand and Company Ltd.,
7. Soils and soil fertility - Louis M.Thompson - and Frederick. R.Troch - Tata Mc. Graw hill.
8. Text book of soil science - T.D. Biswas and S.K. Mukerijee - II Edition.
9. Soil Science - A.Sankara.
10. Fundamental of leather science - wood roffe.
11. Publications of CLRI - Chennai.
12. Nature and propertie of soils - Harry, O. Buckman

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 enalysis - Longman.
11. Text book of qualitative inorganic analysis - A.I. Vogel - III edition (1976).
12. Source book on atomic energy - Van Nostrand Co., (1969).
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
4. Advanced Organic Chemistry - Bahl and Arun Bahl - S. Chand
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 mechanism in Organic Chemistry - Peter Skyes - 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.
3. Physical chemistry - Negi and Anand - New Age.
4. Physical chemistry - Kundu and Jain - S. Chand.
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, Macmilan.
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.

PHARMACEUTICAL CHEMISTRY:

1. A text book of Pharmaceutical chemistry - Jayashree Ghosh - S. Chand
2. Pharmaceutical Chemistry - S. Lakshmi Sultan Chand
3. Pharmacology and Pharmatherapeutics - R.S. Satoskar - popular prakashan - Vol.I and II.
4. Medicinal Chemistry - Asutosh Kar - New Age
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

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1. Text Book of polymer science, Bill meyer F.W. Jr. John Wilky & Sons 1984.
2. Polymer science - Gowariker. V.R. Viswanathan, N.V. Jayader Sreedhar. Wiley Eastern Ltd., New Delhi. 1978
3. Polymer chemistry, Sharma.B.K Goel publishing house, Meerut- 1989.
4. Polymer chemistry. Arora M.G. Vadar M.S. - Anmol publication (p) Ltd., New Delhi 1989.
5. Polymer chemistry - an introduction - M.P. Stevens, oxford.

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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.
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