H.H. THE RAJAH'S COLLEGE (AUTONOMOUS)
PUDUKKOTTAI-622 001

PG & RESEARCH DEPARTMENT OF CHEMISTRY

B.Sc., CHEMISTRY

COURSE STRUCTURE UNDER
CREDIT BASED COURSE SYSTEM

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR
2015 – 2016 ONWARDS

B.Sc., CHEMISTRY - SYLLABUS

H.H. THE RAJAH'S COLLEGE (AUTONOMOUS B$^+$)

PUDUKKOTTAI

B.Sc., CHEMISTRY COURSE STRUCTURE UNDER CBCS

(For the candidates to be admitted from the academic year 2015 – 2016 onwards)

Semester	Subject code	Subject title	Ins. Hours / Week	Credit	Exam Hrs	Marks		Total
						Int.	Ext.	
I	JSCHA1	Inorganic, Organic and Physical chemistry – I	6	5	3	25	75	100
	JSBCHEC1	Agricultural chemistry *	2					
	JSCES	Environmental studies	2	2	3	25	75	100
	JSCHB2P	Inorganic Qualitative Analysis Practical	3	-	-	-	-	-
II	JSCHC2	Inorganic, Organic and Physical chemistry-II	6	5	3	25	75	100
	JSCHB2P	Inorganic Qualitative Analysis practical	3	4	3	40	60	100
	JSBCHEC1	Agricultural chemistry *	2	4	3	25	75	100
	JSCVE	Value Education	2	2	3	25	75	100
III	JSCHD3	Inorganic, Organic and Physical chemistry – III	5	4	3	25	75	100
	JSCHF4P	Volumetric Analysis Practical	3	-	-	-	-	-
	JSBCHEC2	Polymer Chemistry*	2					
	JSNMCHEC1	Water Treatment and Analysis	2	2	3	25	75	100
IV	JSCHE4	Inorganic, Organic and Physical chemistry-IV	5	4	3	25	75	100
	JSCHF4P	Volumetric Analysis Practical	3	4	3	40	60	100
	JSBCHEC2	Polymer Chemistry*	2	4	3	25	75	100
V	JSCHEC1	Analytical chemistry (Elective Paper-I)	5	5	3	25	75	100
	JSCHG5	Inorganic chemistry-I	4	4	3	25	75	100
	JSCHH5	Organic chemistry-I	4	4	3	25	75	100

	JSCHI5	Physical chemistry-I	5	4	3	25	75	100
	JSCHM6P	Organic & Gravimetric analysis practical	3	-	-	-	-	-
	JSCHN6P	Physical chemistry practical	3	-	-	-	-	-
	JSBCHEC3	Computer Programming (soft skill-I)	2	2	3	25	75	100
	JSNMCHEC1	Water treatment and Analysis	2	2	3	25	75	100
VI	JSCHJ6	Inorganic chemistry-II	5	5	3	25	75	100
	JSCHK6	Organic chemistry-II	5	5	3	25	75	100
	JSCHL6	Physical chemistry-II	4	4	3	25	75	100
	JSCHEC2	Medicinal chemistry (Elective paper-II)	5	5	3	25	75	100
	JSCHEC3	Industrial chemistry (Elective paper-III)	4	4	3	25	75	100
	JSGS	Gender Studies	1	1	3	25	75	100
	JSCHM6P	Organic & Gravimetric analysis practical	3	4	6	40	60	100
	JSCHN6P	Physical chemistry practical	3	4	3	40	60	100
		Allied						
	JSCHYC4	Allied chemistry (Theory Paper)	4	5	3	25	75	100
	JSCHYD4P	Allied chemistry (Practical)	3	5	3	40	60	100

SEMESTER – I

SUBJECT CODE: JSCHA1

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY-I

UNIT – I

Chemical bonding – I

Ionic bond : Lattice Energy – Born – Haber cycle –NaCl as an example– Pauling and Mulliken's scales of electronegativity – polarizing power and polarisability – partial ionic character from electronegativity – Transition from ionic to covalent character and vice versa – Fajan's rules. VSEPR Theory – shapes of simple Inorganic molecules – CH_4, NH_3, H_2O, PCl_5, BrF_3,$BeCl_2$ SF_6, IF_7, $XeF_6$and BF_3. Hydrogen Bond : Nature, types of effects on properties of compounds.

UNIT – II

Chemical bonding – II

Covalent bond : Valence bond theory – Types of overlapping of orbitals – sigma and pi bonds – Molecular orbital Theory – Bonding and antibonding orbitals – bond order-- MO diagram of simple homonuclear and hetero nuclear diatomic molecules and their ions H_2, He, N_2, O_2, F_2, O_2^+, CO, CN-, HCl and NO – comparison of VB and MO theories.

UNIT – III

Basic Principles of Organic Chemistry

IUPAC nomenclature of branched and unbranched alkanes, alkyl groups, alkenes, dienes and alkynes. --Structure of organic molecules based on sp^3, sp^2 and sp Hybridisation (Methane, Ethylene and Acetylene) Electron Displacement effects – Inductive, Mesomeric, electromeric, resonance, hyperconjugative and steric effects – Hydrocarbons – monofunctional compounds – Bifunctional compounds – Types of Isomerism (structural and stereoisomerism) with suitable examples.

UNIT – IV

Aromatic Hydrocarbons And Aromaticity

Aromaticity – Huckel's (4n+2) rule and its simple applications –Anti aromaticity—Resonance in benzene – mechanism of aromatic electrophilic substitution – Nitration, Sulphonation, Halogenation, Friedel – Crafts alkylation and acetylation reaction – Orientation and reactivity in substituted benzenes.

UNIT – V

Gaseous State

Maxwell's distribution of molecular velocities (Derivation not required) – Types of molecular velocities – mean, most probable and root mean square velocities – collision diameter, mean free path and collision number – Transport properties – Thermal conductivity, viscosity and diffusion – Law of equi – partition of energies – degree of freedom – molecular basis of heat capacity – Real gases – vander Waals equation of state – derivation – significance of critical constants – virial equation of states – Law of corresponding states – compressibility factor.

References

1. P.L. Soni & Mohan Katyal, Text book of Inorganic chemistry 20th revised Edn. Sultan chand 1992.
2. R.B. Puri & L.R. Sharma, "Principles of Inorganic chemistry", Sultan chand, 1989.
3. P.L.Soni & H.M. Chawla "Text book of Organic Chemistry", Sultan chand & sons 1994 Delhi.
4. K S Tewari, S N Mehrotra and N K Vishonoi, "A text book of organic chemistry".
5. M K Jain, "Organic Chemistry" Shoban Lal Nagin chand and co.,
6. B R Puri & L R Sharma and Madan S Pathania, "Principles of physical chemistry" Shoban Lal Nagin Chand and co., Delhi.
7. R D Madan, "Modern Inorganic Chemistry" 1987, S Chand and co.,
8. P L Soni, "Text book of Organic chemistry", Sultan chand & co.,
9. B.S.Bahl and Arun Bahl – Advanced organic chemistry.
10. R.T. Morrison and RW. Boyd – Organic chemistry

SUBJECT CODE: JSBCHEC1

Agricultural Chemistry

Unit – I

Water sources for agriculture – water treatment & water analysis

Sources of water -: Estimation of hardness of water, acidity, alkalinity. pH value, amount of free CO_2, fluoride, Arsenic, Nitric content, chloride content and their estimations. --.Biological oxygen demand (BOD), chemical oxygen demand (COD), chlorine demand and their determinations. Waste water treatment.

Unit – II

Chemistry of soil-soil classification and soil analysis

Definition of soils. Classification of soils. Properties of soils-physical properties and mechanical analysis. Structure and texture. Soil water, soil air and soil temperature. Chemical properties-soil mineral matter-soil colloids, ion-exchange reactions. Soil fertility & it's evaluation. Soil organic matter and their influence on soil properties. C-N ratio effects, soil reactions. Soil pH, acidity, alkalinity, buffering of soils and its effects on the availability of N, P, K, Ca, Mg, I, Al, Mn & sulphate acid. Soil salinity, acid & alkaline soils-their formation and reclamation.

Unit – III

Fertilizers -I

Effect of N, P, K secondary nutrients and micro nutrients on plant growth and development. Importance of nitrogenous fertilizers. Nitrogen cycle and fixation of atmospheric nitrogen. Principle and manufacture of ammonium nitrate, ammonium sulphate, urea and nitrolim.

Unit – IV

Fertilizers -II

Phosphate fertilizers, preparation and uses of mono and diammonium phosphates. Super phosphate and triple super phosphate. Potassium fertilizers – potassium nitrate. Potassium chloride, potassium sulphate. Mixed fertilizers. Methods of compost in green manuring, concentrated organic manures and their chemical composition. Oil cakes, horn and hoof metal.

Unit –V

Pesticides and insecticides

Classification – insecticides, fungicides, herbicides, rodenticides. General methods of preparation, application and toxicity. Insect killers and repellents – fluorine compounds, boron compounds, arsenic compounds, organo mercuric compounds, DDT, BHC, 2, 4-Dinitro compounds, pyridine compounds and endosulfan.

References

1. Nature and properties of soils – Harry, O-Buckman Nyle C.Brandy
2. Soil Science – A. Sankara
3. Insecticides, pesticides and agro-based industries – R.K. Gupta, R C Palfal and K.Goel.
4. Soil Science, Jackson.

SUBJECT CODE:JSCES

ENVIRONMENTAL STUDIES

UNIT – I

Nature of environment and environment studies: Definition, scope and importance- need for public awareness. Renewable and non-renewable resources and their management – A preliminary knowledge on the following resources – forest, water, mineral, food and energy.

UNIT – II

Ecosystems : Concept of an ecosystem, structure of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, food chains, food webs and ecological pyramids, types of ecosystems.

UNIT – III

Biodiversity and its conservation: Introduction, definition genetic, species and ecosystem diversity - Biogeographically classification of India, values of biodiversity -consumptive use, productive use, social ethical, aesthetic and option values. Threats to biodiversity- habits loss, poaching of wildlife, man wildlife conflicts, Endangered and endemic species of India, conservation of biodiversity.

UNIT – IV

Environmental pollution: Definition, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal and (g) Nuclear pollution : Solid Waste Management : causes, effects and control measures of urban and industrial wastes.

UNIT – V

Social issues and problems: From unsustainable to sustainable development, urban problems related to energy conservation. Population growth, variation among nations population. Environmental Acts, Explosion – family welfare program, environment and human health, human rights, value education, HIV/AIDS, women and child welfare.

References

1. Environmental science and Engineering – A.Koushik and P.Koushik.
2. Environmental science working with earth – G.Tyler and Miller.

SUBJECT CODE:JSCHB2P

INORGANIC QUALITATIVE ANALYSIS PRACTICAL

Analysis of a mixture containing two cations and two anions of which, one will be an interfering ion. Semi micro methods using the conventional scheme with hydrogen sulphide may be adopted.

Cations to be Studied

Lead, Copper, Bismuth, Cadmium, Iron, Aluminum, Zinc, Manganese, Cobalt, Nickel, Barium, Calcium, Strontium, Magnesium and Ammonium.

Anions to be Studied

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

SEMESTER – II

SUBJECT CODE:JSCHC2

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – II

UNIT – I

Chemistry of S-Block Elements

General characteristics of s-block elements – a comparative study of elements of group IA – Differences between Lithium and other alkali metals-- Extraction of lithium and its uses – Diagonal relationship between Lithium and Magnesium. A comparative study of elements of Group IIA – Diagonal relationship between Beryllium and Aluminum.

UNIT – II

Principles of Chemical Analysis

Qualitative Analysis : Principles of solubility product and common ion effect – complexation reactions including spot tests – principles of elimination of interfering anions – Reaction involves in the separation and identification of cations and anions, Volumetric Analysis : primary and secondary standards – Definition of Normality and molarity – types of Titration - acid - base , redox, precipitation and complexometric Titrations, Indicators – Neutralisation, redox, adsorption and metal ion indicators Effect of change in pH – simple calculation involving volumetric laws.

UNIT – III

Chemistry of Alkanes and Cyclo Alkanes

Methods of preparation of alkanes and cycloalkanes – mechanism of free radical substitution in alkanes – conformational study of ethane , butane and cyclo hexane – Relative stability of cycloalkanes – Bayer's strain theory – its limitations and modification.

UNIT – IV

Organo Halogen Compounds

General methods of preparation and reactions of alkyl halids – mechanism S_N1, S_N2 and S_Ni reaction. Mechanism of E1 and E2 reactions. Hofmann and Saytzeff's rule. Elimination versus substitution. General methods of preparation and reactions of halobenzenes – mechanism of Aromatic nucleophilic sunstitution – Benzyne mechanism.

UNIT – V

Atomic Structure

De Broglie's equation and its experimental verification – Heisenberg's uncertainty principle – Schrodinger wave equation – physical significance of Ψ and Ψ^2 – shapes of s, p and d orbital. Pauli's exclusion principle, Hund's rule and Aufbau principle – Electronic configuration of atoms – Nodal planes and nodal points in atomic orbitals – g and u character of atomic orbitals.

References

1. P.L. Soni & Mohankatyal, Text book of Inorganic Chemistry 20th revised Edn. Sultan chand 1992.
2. R.B. Puri & L.R. Sharma, "Principles of Inorganic chemistry", Sultan chand, 1989.
3. P.L.Soni & H.M. Chawla "Text book of Organic Chemistry", Sultan chand & sons 1994 Delhi.
4. K S Tewari, S N Mehrotra and N K Vishonoi, "A text book of organic chemistry".
5. M K Jain, "Organic Chemistry" Shoban Lal Nagin chand and co.,
6. B R Puri & L R Sharma and Madan S Pathania, "Principles of physical chemistry" Shoban Lal Nagin Chand and co., Delhi.
7. Vogel's "Text book of Quantitative Chemical Analysis" E L B S.
8. R D Madan, "Modern Inorganic Chemistry" 1987, S Chand and co.,
9. P L Soni, "Text book of Organic chemistry", Sultan chand & co.,
10. J.D. Lee, Concise Inorganic Chemistry.
11. B.S.Bahl and Arun Bahl – Advanced organic chemistry.
12. R.T. Morrison and RW. Boyd – Organic chemistry

SUBJECT CODE:JSCVE

Value Education

Unit – I

Meaning and nature of value education : Meaning of concept value – origin – nature – classification of value – view of eminent thinkers – meaning of value education – need for value education.

Unit – II

Objectives and development of human values : Role of school and colleges in the development of human values – objectives of value oriented education. Ethical and social values – Gandhiji's non violence – Gokak committee.

Unit – III

Strategies and approaches to value education : Role of education in school, family, teacher personal value development – concept ional frame work strategy suggested by J R Frankel NCERT approach to value Education – Role play technique in value education – value based curriculum – teachers role.

Unit – IV

Source of values : Source of values – Traditional Indian values sources of values – culture, Education, Religion – Hinduism, Christianism, Islam, Buddhism – Indian constitution as source for democratic values – equality secularism democracy – Research and resources in value education.

Unit – V

Methods of teaching and documents on Human value education : Methods of teaching value education – Guidelines for developing values among students. Problems in promoting value Education – Documents of value education – Recommendation of the committee appointed by the central advisory Board of Education 1986-1992.

References

1. J.C Aggarwal, Education of values Environment and Human Rights Shipra Publications, New Delhi 2005.
2. Dube, S C., Modernization and development, The search for an alternative paradigm, Zee books Ltd. London : 1988.
3. Mansell R and When U, Knowledge societies : Information Technology for sustainable Development, Oxford University press, New York.
4. World bank knowledge for Development world development report, Oxford University Press, New York.

SEMESTER – III

SUBJECT CODE:JSCHD3

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – III

UNIT – I

P-Block Elements

Boron Family : preparation, properties, uses and structure of Boron nitride, Boron carbide, Borazole and diborane. Carbon Family : A comparative study of group IVA elements – preparation properties and uses of carbon di sulphide. Nitrogen Family : A comparative study of group VA elements – preparation properties and uses for Hydrazine, Hydroxylamine and Hydrazoic acid.

UNIT – II

Xenon and its compounds

Position of inert gases in the periodic table – structure and shape of xenon compounds – (XeF_2, XeF_4, XeF_6, XeO_3, $XeOF_2$ and $XeOF_4$). Application of inert gases. Interhalogen compounds and pseudo halogens – basic nature of Iodine.

UNIT – III

Alcohols and Ethers

Classification and nomenclature --Distinction between primary, secondary and tertiary alcohols – Grignard synthesis of alcohols – chemistry of glycol, glycerol and allylalcohol. Preparation properties and uses of 1, 4-dioxan, diethylether, anisole and phenetole.

UNIT – IV

Nitro Compounds and Amines

Methods of preparation and reduction of nitro benzene under different conditions. Conversion of nitrobenzene into ortho, para and meta dinitro benzene. Preparation, properties and uses of TNT and picric acid. Relative basic character of aliphatic and aromatic amines – Ring substitution reaction of aniline – Diazotisation and its mechanism – preparation and synthetic applications of benzenediazonium chloride.

UNIT – V

Solid State

Isotropic and anisotropic solids – space Lattice and unit cell – seven crystal systems – Bravais lattices for cubic system – Miller indices and representation of planes – symmetry elements in crystals. X-ray diffraction by crystals – Derivation of Bragg's equation – structure of NaCl, KCl and CsCl. Determination of Avagadro number.

References

1. P.L. Soni & Mohankatyal, Text book of Inorganic Chemistry 20th revised Edn. Sultan chand 1992.
2. R.B. Puri & L.R. Sharma, "Principles of Inorganic chemistry", Sultan chand, 1989.
3. P.L.Soni & H.M. Chawla "Text book of Organic Chemistry", Sultan chand & sons 1994 Delhi.
4. K S Tewari, S N Mehrotra and N K Vishonoi, "A text book of organic chemistry".
5. M K Jain, "Organic Chemistry" Shoban Lal Nagin chand and co.,
6. B R Puri & L R Sharma and Madan S Pathania, "Principles of physical chemistry" Shoban Lal Nagin Chand and co., Delhi.
7. Vogel's "Text book of Quantitative Chemical Analysis" E L B S.
8. R D Madan, "Modern Inorganic Chemistry" 1987, S Chand and co.,
9. P L Soni, "Text book of Organic chemistry", Sultan chand & co.,
10. B.S.Bahl and Arun Bahl – Advanced organic chemistry.
11. R.T. Morrison and RW. Boyd – Organic chemistry

SUBJECT CODE:JSCHF4P

Volumetric Analysis Practical

1. Permanganometry

1. Estimation of Ferrous ion
2. Estimation of Oxalic acid
3. Estimation of Calcium

2. Iodometry and Iodimetry

1. Estimation of copper
2. Estimation of potassium dichromate
3. Estimation of AS_2O_3

3. Argentimetry

Estimation of Chloride

4. Complexometric titrations

Estimation of Zn or Mg using EDTA.

SUBJECT CODE:JSBCHEC2

POLYMER CHEMISTRY

UNIT – I

Classification of Polymer

Basic concepts and classification of polymers – Degree of polymerization, functionality. Types of polymerization—Addition, condensation and copolymerization. Types of plastics—Thermo plastic and thermosetting polymers.

UNIT – II

Mechanism of polymerization

Chain polymerization, Ionic Polymerization, Coordination Polymerization. Free-radical chain polymerization, Cationic polymerization, Anionic polymerization, Poly condensation – Non – Catalyzed and Acid – Catalyzed poly condensation. Zeiglar Natta catalysts.

UNIT – III

Characterization and Structure

Physical properties of polymers -- Chemical and Geometrical structure of polymer molecules, Tacticity – Polymer micro structure – micro structures based on the chemical structure.

UNIT – IV

Important Polymers

Polyethylene, polypropylene, polystyrene, polyacrylonitrile, polymethyl, methacrylate and polyesters, polyvinylchloride, polytetrafluoroethylene, polyisoprenes, Epoxy resins , polyamides and bakelite

UNIT –V

Determination of molecular weight of polymers

Molar mass and size of polymers – Average molecular weight, Number – Average and weight – Average molecular weights. Methods of molecular weight determination – End group analysis and viscometry.

References

1. V R Gowarikar, N V Viswanathan and Jeyadev Sreedhar, Polymer Science, Wiley Eastern Limited, New Delhi 1986.
2. R B Seymour, Introduction to polymer Chemistry, Mc Graw Hill, New York, 1971.
3. F W Billmeyer, Text Book of polymer science, Wiley Interscience, New York, 1971.

(For II -PHYSICS)

NME 1 - CHEMISTRY IN EVERY DAY LIFE

UNIT-I

Food Chemistry

Carbohydrates – starch changes of carbohydrates on cooking – proteins – oils and fats – rancidity – hydrogenation changes in vegetables on cooking – milk and diary products – food processing – food additives – synthetic flavouring agents – food presentation and food adulteration.

UNIT-II

House-hold chemicals

Soaps and detergents : composition and function-- Cleaning agents – soap – detergents – Laundary detergents – brighteners – bleaching agents – disinfectants.

Cosmetics : Tooth paste – shampoo, Hair dyes – skin chemicals – Lipsticks perfumes – colognes – After shave precipitation – Deodorants – Anti persipirants.

UNIT-III

Fibres, Resins and plastics :

Definition – Natural and synthetic fibres – Natural and synthetic resins – bakelite, urea, formaldehyde resins, Teflon, nylons and Dactron.

Rubber : Natural and synthetic rubber – composition of natural rubber – Neoprene rubber, styrene butadiene rubber (SBR).

UNIT-IV

Silicate Industry

Cement, glass and ceramics – raw materials and manufacture of cement, glass and ceramics.

UNIT-V

Fuels

Definition – classification advantages and disadvantages of gaseous fuels producer gas, water gas, Gobar gas LPG and biogas.

References

1. Industrial Chemistry – B.K.Sharma
2. Engineering Chemistry - P.C. Jain & Monika Jain
3. Industrial Chemistry – B. N. Chakarbarty
4. Engineering Chemistry – Kuria Kose **&** Chemical technology - Shukla

SEMESTER – IV

SUBJECT CODE:JSCHE4

INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY – IV

UNIT – I

Chemistry of f-block elements

General characteristics of f-block elements – Lanthanides – separation by ion exchange and solvent extraction methods – electronic configuration, oxidation state, magnetic properties and complexation behaviour of lanthanides and actinides. Lanthanide contraction – comparison of lanthanides and Actinides, chemistry of Thorium and uranium – ores extraction and uses.

UNIT – II

Redox reactions and non-aqueous solvents

Oxidation – reduction reactions and solvents- Oxidation number concept – Balancing redox equations by oxidation number and ion – electron methods – Equivalent weight of oxidizing and reducing agents. Solvents - Different types of solvents – liquid Ammonia as non – aqueous solvent – Advantages and disadvantages of using liquid ammonia as solvent.

UNIT – III

Organo metallic compounds

Preparation, properties and uses of organo magnesium compounds, organo zinc compounds – organo Lithium compounds – chemistry of organo lead, organo copper, organo phosphorus and organo boron compounds.

UNIT – IV

Surface Chemistry and Catalysis

Adsorption – types, Factors influencing adsorption, Adsorption Isotherms- Freundlich's and Langmuir Isotherms. Adsorption Chromatography.

Homo and Heterogeneous Catalysis- Promoters, Activators, Catalytic Poisoning and Negative catalysis- Hydrogenation of Ethylene.

UNIT – V

Thermodynamics and thermochemistry

System and surrounding – isolated closed and open systems – Intensive and extensive properties – Thermodynamic processes – isothermal, adiabatic, cyclic, reversible and Irreversible processes. State and path functions – Exact and Inexact differentials – concept of heatand work. First law of Thermodynamics – statement – definition of Internal Energy (E), enthalpy (H) and heat capacity – Relationship between Cp and Cv. Calculation of q, w, dE and Dh for expansion of ideal gas under isothermal and adiabatic reversible and irreversible process – Joule – Thomson co-efficient (μ_{JT}) for ideal and real gases – Inversion temperature variation of heat of reaction with temperature. Kirchoff's equation Bond energy and its calculation from thermochemical data – Integral and differential heats of solution and dilution.

References

1. P.L. Soni & Mohankatyal, Text book of Inorganic Chemistry 20th revised Edn. Sultan chand 1992.
2. R.B. Puri & L.R. Sharma, "Principles of Inorganic chemistry", Sultan chand, 1989.
3. P.L.Soni & H.M. Chawla "Text book of Organic Chemistry", Sultan chand & sons 1994 Delhi.
4. K S Tewari, S N Mehrotra and N K Vishonoi, "A text book of organic chemistry".
5. M K Jain, "Organic Chemistry" Shoban Lal Nagin chand and co.,
6. B R Puri & L R Sharma and Madan S Pathania, "Principles of physical chemistry" Shoban Lal Nagin Chand and co., Delhi.
7. Vogel's "Text book of Quantitative Chemical Analysis" E L B S.
8. R D Madan, "Modern Inorganic Chemistry" 1987, S Chand and co.,
9. P L Soni, "Text book of Organic chemistry", Sultan chand & co.,
10. V S Parmer & H M Chawla – "Principles of reactions mechanism in organic chemistry"
11. B.S.Bahl and Arun Bahl – Advanced organic chemistry.
12. R.T. Morrison and RW. Boyd – Organic chemistry
13. I L Finar, "Organic chemistry" Volume – I E L B S, London.

SEMESTER – V

SUBJECT CODE:JSCHEC1

ANALYTICAL CHEMISTRY

UNIT – I

Laboratory hygiene and safety

Storage and handling of corrosive flammable – Explosive – Toxic – Carcinogenic and poisonous chemicals. Simple first aid procedure for accidents – Acid in eye – Alkali in eye – Acid burns – Alkali burns – Bromine burns – poisoning – inhalation of gases –heat burns.

UNIT – II

Data Analysis

Errors in chemical Analysis – Classification of Errors – Determinate Errors – Instrument Errors – Methods of errors – Personal Errors – Constant Errors – Random Errors or Indeterminate Errors – precision – Accuracy and Rejection of Results – Significant figures – Mean Deviation and Standard Deviation Curve fitting – Method of least squares.

UNIT – III

Quantitative Analysis

Standard solution – Titration Equivalence point and End point Indicator Basic requirement of a Titrimetric reaction – Types of Titration – Acid – base Titration – Redox Titration – precipitation Titration and complexometric Titration. Titration Curve – Indicators – Acid base Indicators Mixed indicators and Fluorescent Indicators. Gravimetric Analysis – Characteristics of precipitating agent – choice of precipitants – Specific and selective precipitant – Condition of precipitation – Types of Precipitants – Precipitate formation – purity of Precipitate – Co – Precipitation and post Precipitation, sequestration.

UNIT – IV

Separation and purification Techniques

General principle involved in the separation of Precipitates – Solvent Extraction. Chromatography – principles involved in Absorption – partition and Ion-Exchange-paper thin Layer – column – Gas – Liquid and Ion Exchange Chromatography – Electrophoresis – Applications. Desiccants – Vacuum Drying – Distillation –

Fractional Distillation – steam Distillation Azeotropic Distillation Crystallisation and sublimation Principles and Techniques.

UNIT –V

Thermo Analytical Methods

Principle involved in Thermo Gravimetric Analysis and differential Thermal Analysis – Instrumentation – Characteristics of TGA (CaC_2O_4 – H_2O, $CuSO_45H_2O$) and DTA curves (CaC_2O_4 . H_2O) – Factors affecting TGA and DTA curves. Thermometric Titration (HCl * NaOH). Analytical Electrochemistry – Redox Potential – Measurement and application – Interpretation of chemical behaviour – Electrolytic Separations – Principles of Electro deposition – Electrogravimetry (Estimation of copper and silver).

References

1. R. Gopalan, P S Subramanian and K Rengarajan, Elements of Analytical chemistry. Sultan and Chand, New Delhi, 1995.
2. B K Sharma, Instrumental methods of chemical analysis, Goel Publishing House, Meerut, 1999.
3. S M Khopkar, Basic concepts of Analytical chemistry, New Age International p Limited, New Delhi, 1998.
4. D A Skoog and D M West, Fundamentals of Analytical chemistry, W B Saunders, New York, 1982.

SUBJECT CODE:JSCHG5

INORGANIC CHEMISTRY – I

UNIT – I

Coordination Compounds-I

Types of ligands, IUPAC, nomenclature. Theories of coordination compound – Werner. Sidgwick, Valence bond, Crystal field, molecular orbital and ligand field theories.

UNIT – II

Coordination Compounds-II

Isomerisation – stability of complexes – factors affecting the stability of complexes Unimolecular and bimolecular nucleophilic substitution reactions in octahedral and square planar complexes – Trans effect. Application of coordination compounds – Detection of potassium ions, separation of copper and cadmium ions. Estimation of nickel using DMG and aluminium using oxime. Structure of EDTA and its complexes. Complexometric titration – principles and applications.

UNIT – III

Metal carbonyls

Mono and poly nuclear carbonyls of Ni, Fe, Cr Co and Mn – synthesis, reactions, structure and uses. Nitrosyl compounds – classification, preparation, properties and structure of nitrosyl chloride and sodium nitroprusside.

UNIT – IV

Organometallics

Binary compounds – hydrides, borides, carbides and nitrides – classification, preparation, properties and uses. Organomettallic compounds of alkenes and cyclopentadiene.

UNIT – V

Group Theory And Its Applications

Symmetry elements – symmetry operations – point group of simple molecules (H_2, HCl, CO_2, H_2O, BF_3, NH_3).

References

1. P.L. Soni, Text Book of inorganic chemistry, S.Chand & Co., New Delhi (1999)
2. B.R.Poori & L.R. Sharma : Principles of inorganic chemistry, Shoban Lal, Nagin Chand & Co., New Delhi (2000)
3. R.D. Madan, G.D.Tuli and S.Malick, Selected Topics in Inorganic Chemistry, S.Chand & Co., New Delhi (1988)
4. J.D.Lee : Concise Inorganic Chemistry, E.L.B.S. IV Edn., (1991)
5. Jeffery et al : "Vogel Text Book of Inorganic Quantitative Analysis", Longman (1984)
6. D.A. Skoog and D.M.West : "Fundamentals of Analytical Chemistry" W.B. Saunders, New York (1983)
7. P.K. Bhattacharya : Chemical Applications of Group Theory, Himalaya Publishing House, Mumbai (1998)
8. M.S.Gopinath and V.Ramakrishnan : Group Theory and Applications (1988)

SUBJECT CODE:JSCHH5

ORGANIC CHEMISTRY – I

UNIT – I

Stereo chemistry-I

Stereo Isomerism – I – Stereoisomerism – definition, classification into optical and geometrical isomerisms. Optical Isomerism : optical activity – optical and specific rotations – conditions for optical activity in solid, liquid and gaseous phases – criteria for optical activity – asymmetric centre – chirality – achiral molecule – meaning of + and – and D and L notations – elements of symmetry. Recemization – methods of recemizations (by substituting and tautomerism). Resolution– asymmetric synthesis (partial and absolute asymmetric synthesis) – Walden inversion – Vant Hoffs rule of superposition –. Projection formula – Fischer – Flying wedge – Sawhorse and Newmann projection formula-notation for optical isomers – Cahn – Ingold – Prelog rules – R.S. notations for optical isomers with one asymmetric carbon – Erythro and Threo representations.

UNIT – II

Stereo chemistry – II

Optical activity in compounds containing no symmetric carbons – Biphenyls – Allenes and Spirans. Geometrical isomerism – Cis – Trans, Syn-Anti and E-Z notations – geometrical isomerisms in maleicacids and ketoximes — methods of determining of configuration of geometrical isomers. (no details required) Conformational analysis – conformers of cyclohexane (boat, chair and skew boat forms) Axial and equatorial bonds-ring flipping showing axial and equatorial bonds – ring flipping showing axial – equatorial interconversions – conformations of mono substituted cyclohexane.

UNIT – III

Reactions of Carbonyl Compounds

Carbonyl polarization – reactivity of carbonyl group – acidity of hydrogen – mechanism of Aldol – Perkin, Knoevenegal and Benzoin condensation – mechanism of Claisen – Reformatsky – Wittig and Cannizaro reactions – mechanism of sodium borohydride, Wolf-kishner and MPV reductions – mechanism of haloform reaction

and Michael addition – photo chemistry of carbonyl compounds – Norrish type I and II.

UNIT – IV

Acids and Acid Derivatives

Dicarboxylic acids – preparation and properties of oxalic, malonic, succinic, glutaric and adipic acids – malonic and acetoacetic esters – characteristics of active methylene group – synthetic uses of these esters. Tautomerism – definition – keto – enol tautomerism – identification – acid and base catalysed – interconversion mechanism – estimation – amido – imido and nitroacinitro tautomerisms. Naturally occurring lipids – oils – triglycerides – phospholipids – biological role.

UNIT – V

Heterocyclic Compounds

Aromatic characteristics of heterocyclic compounds – preparation properties and uses furan – pyrole, thiophene structure – synthesis and reactions of pyridine and piperidine – comparative basis characters of pyrrole – pyridine and peperidine with amines. Synthesis and reactions of Quinoline – Isoquinoline and indole with special reference to skraup – Bischler Napieralski and fisher indole synthesis.

Reference

1. Organic chemistry – volume II – I.L.Finar
2. Advanced organic chemistry – Bahl & Arun Bahl
3. Organic Chemistry – Jerry March
4. Reagents and reactions – Gurdeep Chatwal
5. R.T. Morrison and RW. Boyd – Organic chemistry

SUBJECT CODE:JSCHI5

PHYSICAL CHEMISTRY – I

UNIT – I

Colligative properties

solutions of gases in liquids. Henry's law. Fugacity and activity of liquids in liquids. Raoult's law. Binary liquid mixtures. Ideal solution. Deviation from ideal behaviour. Thermodynamics of ideal solutions. V.P.Composition, V.P. temperature curves. Azeotropic distillation, review of colligative properties of dilute solutions. One method of determination of mol.wt. calculation. Thermodynamic derivation of elevation of boiling point and depression in freezing point, Van't Hoff factor, abnormal molar mass. Distribution, thermodynamic derivation, applications.

UNIT – II

Phase equlibria

Phase rule (statement only), definition of terms. Application to one component systems – water, sulphur. Thermal analysis and cooling curves. Phase diagram. Two component systems of solid – liquid equilibria simple eutectic – lead – silver. Compound formation with congruent – Zn – Mg and incongruent – Na – K melting points, salt hydrates – $KI.H_2O$, $FeCl_3$, H_2O, freezing mixtures. Partially miscible liquids. CST, effect of impurities of CST. Immiscible liquids.

UNIT – III

Chemical kinetics-I

Methods for determination of rate of the reactions. Derivation of rate constant and characteristics of first, second, third and Zero order reactions. Derivation of time for half change with examples. Methods of determining the order of a reaction. Arrhenius equation, effect of temperature of the rate of a reaction, concept of energy of activation. Collision theory and derivation of rate constant of a bimolecular reaction, failure of the theory. Theory of absolute reaction rates and thermodynamic derivation of the rate constant for a bimolecular reaction.

UNIT – IV

Chemical kinetics-II

Comparison between collision theory and absolute reaction rate theory. Significance of entropy and free energy of activation. Consecutive, parallel and reversible reactions – examples only (no derivation of rate law). Photochemistry : Laws, quantum yield – fluorescence and phosphorescene. Primary and secondary reactions. Decomposition of hydrogen iodide, hydrogen – chlorine reaction hydrogen – bromine reaction. Photosensitization.

UNIT – V

Thermodynamics

Second law of thermodynamics : Need for the law. Different statements of law. Concept of entropy : Entropy as a state function – entropy as a function of P.V and T. Entropy changes in phase changes. Entropy as a criterion of spontaneous and equilibrium processes in isolated system. Gibbs and Helmholtz function : Thermodynamics equation of state. Maxwell's relations. Application of II law of thermodynamics & third law – Partial molar quantities – chemical Potential of component in an ideal mixture – Gibbs Duhem equation – Variation of chemical potential with T.P. Reaction isotherm – van't Hoff's equation – van't Hoff's isochore. Clapeyron equation and Clausius Clapeyron equation – Applications. Need for the law. Nernst heat theorem. III law of thermodynamics – statement and concept of residual entropy. Evaluation of absolute entropy from heat capacity data. Exception to third law.

Reference

1. "Principles of Physical Chemistry", B R Puri & Sharma
2. "Text Book of Chemistry", P L Soni
3. "Advanced Physical Chemistry", Gurdeep Raj
4. "Essential of Physical Chemistry", B S Bahl, G D Tuli & Arun Bahl, S Chand & co., New Delhi.
5. "Simplified course in Physical Chemistry", R L Madan, G D Tuli, S Chand & Co., New Delhi.
6. B R Puri & L R Sharma, Principles of Physical Chemistry
7. R P Varma & Pradeep Physical Chemistry
8. Dr.S Jain & S P Jankar, Physical Chemistry, Principles & Problems, "Tata McGraw Hill", New Delhi, 1990

SUBJECT CODE:JSCHM6P

ORGANIC AND GRAVIMETRIC ANALYSIS PRACTICAL

ORGANIC ANALYSIS

1. Preparation involving oxidation, reduction, hydrolysis, nitration, sulphonation, halogenatin and diazotization.
2. Characterisation of organic compounds by their functional groups and confirmation by preparation of derivatives.
3. Determination of melting and boiling points of simple organic compounds.

GRAVIMETRIC ANALYSIS

1. Estimation of calcium as calcium oxalate.
2. Estimation of barium as barium sulphate.
3. Estimation of barium as barium chromate.
4. Estimation of lead as lead sulphate.
5. Estimation of lead as lead chromate.
6. Estimation of nickel as nickel dimethylglyoxime complex.
7. Estimation of Mg as oxinate.

SUBJECT CODE:JSCHN6P

PHYSICAL CHEMISTRY PRACTICAL

1. Distribution law
2. Kinetics

   Acid catalyzed hydrolysis of an ester (Methyl acetate or Ethyl acetate)
3. Molecular weight :

   Rast's method : Naphthalene, m-dinitrobenzene and diphenyl as solvents.
4. Heterogeneous equilibrium
    a. Critical solution temperature of phenol-water system-effect of impurity on CST (2% NaCl or 2% succinic acid solutions)
    b. Simple eutectic system : Naphthalene – Biphenyl, Napthalene Diphenylamine
    c. Determination of transition temperature : Sodium acetate, Sodium thiosulphate, $SrCl_2.6H_2O$ & $MnCl_24H_2O$
5. Electro Chemistry
    a. Conductivity
        1. Cell constant
        2. Equivalent conductivity
        3. Conductometric titrations
    b. Potentiometry : potentiometric titrations

SUBJECT CODE:JSBCHEC3

COMPUTER PROGRAMMING (soft skill I)

UNIT – I

Historical introduction – The block diagram of a PC and the functions of the various units of a Computer – Algorithms and flowcharts – High level Programming Languages.

UNIT – II

Introduction to BASIC language – A simple program in BASIC language.

UNIT – III

Features of C language – Question mark operator – control statements – Loops – Recursion.

UNIT – IV

Examples of simple chemistry programs in C language.

1. Conversion of Celsius temperature to Kelvin temperature
2. Application of Beer Lambert Law
3. Molecular weights from atomic weights
4. Use of question mark operator – work of isothermal or adiabatic expansion of ideal gases
5. Calculation of number of resonance structure of conjugated systems – Recursion
6. Linera least squares fit – log k (vs.) I/T plot to get Arrhenius parameters.
7. Calculation of molecular weights of different organic compounds from formulas and data on atomic weights of C, H, N, S, O and halogens.

UNIT V

Chem informatics- Molecular representation by SMILES notation, PDB file-- Protein sequencing – Docking – conformational analysis.

References

1. K V Raman, Computers in chemistry Tata McGraw Hill co., New Delhi (1993)
2. B G Gottfried, BASIC programming McGraw Hill International Ltd., (1980)
3. B G Gottfried, C language programming McGraw Hill International Ltd., (1987)
4. E Balagurusamy, C programming Tata McGraw Hill co., New Delhi (1997)
5. K V Raman Chemistry Education, New Delhi July (1992)

NME 2 - CHEMISTRY IN EVERY DAY LIFE

UNIT-I

Food Chemistry

Carbohydrates – starch changes of carbohydrates on cooking – proteins – oils and fats – rancidity – hydrogenation changes in vegetables on cooking – milk and diary products – food processing – food additives – synthetic flavouring agents – food presentation and food adulteration.

UNIT-II

House-hold chemicals

Soaps and detergents : composition and function-- Cleaning agents – soap – detergents – Laundary detergents – brighteners – bleaching agents – disinfectants.

Cosmetics : Tooth paste – shampoo, Hair dyes – skin chemicals – Lipsticks perfumes – colognes – After shave precipitation – Deodorants – Anti persipirants.

UNIT-III

Fibres, Resins and plastics :

Definition – Natural and synthetic fibres – Natural and synthetic resins – bakelite, urea, formaldehyde resins, Teflon, nylons and Dactron.

Rubber : Natural and synthetic rubber – composition of natural rubber – Neoprene rubber, styrene butadiene rubber (SBR).

UNIT-IV

Silicate Industry

Cement, glass and ceramics – raw materials and manufacture of cement, glass and ceramics.

UNIT-V

Fuels

Definition – classification advantages and disadvantages of gaseous fuels producer gas, water gas, Gobar gas LPG and biogas.

References

1. Industrial Chemistry – B.K.Sharma
2. Engineering Chemistry - P.C. Jain & Monika Jain
3. Industrial Chemistry – B. N. Chakarbarty
4. Engineering Chemistry – Kuria Kose **&** Chemical technology - Shukla

SEMESTER – VI

SUBJECT CODE: JSCHJ6

INORGANIC CHEMISTRY – II

UNIT – I

Nuclear Chemistry

Introduction – composition of nucleus and nuclear forces. Nuclear stability – n/p ratio, mass defect, binding energy, packing fraction and magic number, shell and drop models. Isotopes – detection and separation. Isotopic constitution of elements and whole number rule. Deviation of atomic weights from whole numbers. Isobars, isotones and isomers.

UNIT – II

Radioactivity And Nuclear Transformations

Radioactivity – discovery, detection and measurements (Wilson cloud chamber). Radioactive emnations. Disintegration theory – modes of decay – Group displacement law – Rate of disintegration – Half life and average life – Radioactive series.

UNIT – III

Nuclear reactions

Nuclear transformations – use of projectiles – nuclear reactions – fission and fusion. Nuclear reactions. Applications of radio isotopes – carbon dating – ratio active waste disposal. Radiolysis of water and hydrated electrohn.

UNIT – IV

Bioinorganic chemistry

Bioinorganic chemistry – biological aspects of Fe, Zn, Mg, Co and Mo. Role of sodium, potassium, calcium and phosphorus.

UNIT – V

Metallic bonding

Packing of atoms in metal (bcp, ccp, hcp). Theories of metallic bonding – electron gas, Pauling and band theories. Structure of alloys – substitutional and

interstitial solid solutions – Hume Rothery ratios crystal defects. Semi conductors – Extrinsic and intrinsic n-type-composition, structure and uses in electronic industry.

References

1. P.L.Soni, Mohan Katyal, "Text book in inorganic chemistry", 20th revised edn., Sultan Chand, 1992.
2. Esmarch S.Gilreath, 'Fundamental concepts of Inorganic Chemistry', International students edn., Mcgraw – Hill Kogakusha, Ltd., 1958.
3. Gurdeep Chatwal and M.S.Yadu, 'Co-ordination Chemistry', First edn., Himalaya Publishing House, 1992.
4. B.R.Puri and L.R.Sharma, 'Principles of inorganic chemistry', shoban Lal Nagin Chand and Co., 1989.
5. Cotton and Wilkinson, 'Advanced inorganic chemistry', 5th edn.,
6. R.D.Madam, 'Modern inorganic chemistry'.
7. S.Glasstone, 'source book on Atomic Energy', 3rd edn., Affiliated east west press, 1967.

SUBJECT CODE:JSCHK6

ORGANIC CHEMISTRY – II

UNIT – I

Phenols and its derivatives

Phenols : Acidic nature of phenols – explanation on the basis of resonance – ring substitution in phenols – orientation of phenolic groups towards electrophilies – esterification – nitration – sulphonation – halogenation – coupling with diazonium compounds – Kolbe's, Reimer – Tieman, Gatterman, Leaderer – Manske, Houben – Hoesh reaction. Cresols – nitro and amino phenols-pi and trihydric phenols – alpha and beta napthols – preparation and properties. Dyes – theory of colour and constitution – classification – according to structure and application – azodyes – methylorange and bismarkbrown. Triphenyl methane dyes – malachite green – Vat dye – indigo – pthalein dyes – phenolphthalein – and flourescein – anthraquinone dye – alizarin.

UNIT – II

Carbohydrates

Carbohydrates : glucose and fructose – reaction and constitution – osazone formation, mutarotation – mechanisms. Cyclic structure – pyrnose and furanose structures – determination of ring forms – chain lengthening and chain shortening of aldoses – interconversation of aldoses and ketoses. Disaccharides – reactions and structure of maltose – lactose and sucrose. Starch and cellulose – a brief study.

UNIT – III

Natural products

Terpenes – gereniol – nerol – menthol and alpha terpenieol alkaloids : general methods of isolation and general methods of structure determination – conine – peperidine and nicotine. Vitamins – pyridoxine and ascorbic acid – occurance – biological importance.

UNIT –IV

Rearrangements

Classification – anionotropic and cationotropic – inter and intra molecular rearrangements. Pinacol – pinacolone rearrangement – mechanism – evidence for

carbocation formation – migratory aptitude of groups. Beckman – Hoffman – Curtuius – benzidine – and benzylic acid mechanism only. Claisen – sigmatroppic rearrangement – evidences for intramolecular and allylic carbon attachment – para Claisen rearrangement - Cope rearrangements - Fries rearrangement –mechanisms.

UNIT –V

Mass spectroscopy

Principles and instrumentation, molecular ion peak, base peak, isotopic peak and metastable peak, determination of molecular formulas. Mass spectroscopy in the identification of simple organic compounds – alcohols, aldehydes and aromatic hydrocarbons.

References

1. Organic Chemistry – Volume I and II – I.L.Finar
2. Advanced Organic Chemistry – Bahl & Bahl
3. Natural products chemistry – Gurdeep Chatwal
4. Pamer and Chawk, Reaction mechanism
5. R.T. Morrison and RW. Boyd – Organic chemistry
6. R Chang “Basic principles of spectroscopy”
7. Dyer “Organic Application of spectroscopy”
8. Y R Sharma, Elementary organic spectroscopy, principles and Applications, S Chand, New Delhi, 1992

SUBJECT CODE:JSCHL6

PHYSICAL CHEMISTRY II

UNIT – I

Electrochemistry

Metallic and electrolytic conduction – specific, equivalent and molar conductance with dilution for strong and weak electrolytes (qualitative) – ionic mobility – transport number – determination by Hittorf and moving boundary methods – relation between ionic mobility and ionic conductance – determination of ionic mobilities – Kohlrausch law – Theory of strong electrolytes – Debye Huckel Onsager theory – Verification of Debye Huckel Onsager equation (no derivation). pH of salt solution – buffer solutions – Henderson equation – solubility – solubility product of sparingly soluble salts. Applications of conductivity measurements in the determination of pH, K_a, and solubility product -- conductometric titrations.

UNIT – II

Electrochemical cells

Galvanic cells – reversible and irreversible cells – emf and its measurement – standard cells. Types of reversible electrodes – electrode reaction. Measurement of electrode potentials using reference electrodes – standard hydrogen electrode calomel electrode. Derivation of Nernst equation for EMF of cells and electrode potentials. Standard electrode potentials – sign conversion. Electrochemical series and its significance. Concentration cells with and without transference – liquid junction potentials. Expressions and their derivation (for emf of concentration cells and liquid junction potential).

UNIT – III

Electrochemical techniques

Application of emf of measurements. Application of Gibbs Helmholtz equation in the calculation of thermodynamic quantities of galvanic cells. Determination of pH using quinhydrone and glass electrodes. Potentiometric titrations. Applications of concentration cells valency of ions, transport number, K_{sp} and activity coefficients. Polarization and overvoltage – decomposition voltage, corrosion and its prevention, Storage cells – lead acid storage battery – mechanism of charging and discharging – fuel cells.

UNIT – IV

Spectroscopy

Introduction : electromagnetic radiation, regions of the spectrum, basis features of different spectrometers, statement of the Born – Oppenheimer approximation, degrees of freedom. . Electronic spectrum : Concept of potential energy curvey for bonding and antibonding molecular orbitals, qualitative description of selection rules of Frank – condon principle – types of electronic transition, chromospheres, auxochromes, absorption bands and intensity factors affecting maximum and intensity.

Rotational spectrum : Diatomic molecules. Energy levels of a rigid rotor selection rules Vibrational spectrum : Infrared spectrum : energy levels of simple harmonic oscillator, selection rules Raman spectrum : Rayleigh and Raman scattering stokes and antistokes lines, concept of polarizability

UNIT – V

NMR and ESR spectrroscopy

NMR spectroscopy : Principle and instrumentation. Shielding and dishielding, Chemical shift, Spin – Spin Splitting and coupling constants, NMR spectrum of simple organic molecules.

Electron spin resonance spectroscopy : Principle and instrumentation block diagram, zeeman equation (derivation not required)-Nuclear hyperfine coupling of methyl, ethyl free radical and benzyl cation.

References

1. “Principles of Physical Chemistry”, B R Puri & Sharma
2. “Text Book of Chemistry”, P L Soni
3. “Advanced Physical Chemistry”, Gurdeep Raj
4. “Essential of Physical Chemistry” B S Bahl, G D Tuli & Arun Bahl, S Chand & Co., New Delhi
5. “Thermodynamics for Chemists” Samuel Glasstone
6. “Simplified course in Physical Chemistry”, R L Madan, G D Tuli, S Chand & Co., New Delhi
7. “Thermodynamics for students of Chemistry”, Rajaram and Kuriacose
8. B R Puri & L R Sharma, Principels of Physical Chemistry
9. R P Varma & Pradeep, Physical Chemistry
10. C N Banswell, Fundamental molecular spectroscopy. Tata Mcgraw Hill Publications, New Delhi 11th repring 1991

11. William kemp, Organic spectroscopy, ELBS, Second Edn. 1987
12. Dr.S.Jain & S P Jankar, Physical Chemistry, Principles & Problems, "Tata McGraw Hill", New Delhi, 1990
13. B K Sen "Quantum Chemistry", Spectroscopy
14. K V Raman "Spectroscopy and mathematics of Quantum chemistry in print"
15. R Chang "Basic principles of spectroscopy"
16. Dyer "Organic Application of spectroscopy"
17. Y R Sharma, Elementary organic spectroscopy, principles and Applications, S Chand, New Delhi, 1992

SUBJECT CODE:JSCHEC2

MEDICINAL CHEMISTRY (Elective paper II)

UNIT – I

Indian medicinal plants and alkaloids

Medicinal plants in cure of diseases – spices as medicines – medicinal plants and uses—tulasi, keezhanelli, mango, chemparuthi, adathodai, thuthuvalai, vembu, atthi, arugambul, and keerai. General methods of isolation of alkaloids from plant sources—color tests for identification. Extraction, structures, Stucture,activity relationship(SAR) and uses of morphine and quinine.

UNIT – II

Drug design and distribution

Introduction – Analogous and prodrugs – concept of 'LEAD' – Factors governing drug design – Rational approach, Method of variation-- disjunction and conjunction for drug design – 'TAILORING' of drugs. Factors governing ability of drugs to reach active site – Absorption, distribution, excretion and bio-transformation. Routes of drug administration –-Advantages and disadvantages of oral & parental routes.– LD_{50}, ED_{50} and and therapeutic index – encapsulation and naming of drugs.

UNIT – III

Sulphonamides and antimalarials

Sulphonamides : Definition – mechanism and action of sulpha drugs –synthesis and uses of sulphadiazine sulphathiazole, sulphapyridine and sulpha furazole.

Antimalarials-- Introduction—classification. Synthesis and uses of quinoline analogues – chloroquinine phosphate, amodiaquine, paraquinine and mepacrine hydrochloride.

UNIT – IV

Anti biotics and analgesics

Microbial synthesis, assay, structure and uses of different penicilins and chloramphenical, SAR—penicillin intolerance—detection of penicilin allergy.

Analgesics—definition, classification—norcotic and non norcotic. Pharmacological action and uses of pethidine, methadone, heroin and codeine.

Antipyretic analgesics—salicylic acid derivatives – methyl salicylate, aspirin, para amino phenol derivatives – para acetamol, phenacetin and ibuprofen.

UNIT –V

Anesthetics and First Aid

Anesthetics—definition – classification--local and general. Volatile—nirous oxide, ether, chloroform, cyclo propane. Non volatile – intravenous – thio pental sodium, metho hexatone. Local anesthetics – cocaine and benzo caine.

Anti anaemic drugs – iron, vitamin B_{12} and folic acid – mode of action.

AIDS – causes, prevention and control.

First Aid – definition—cause and symptoms of food poisoning, botulism and mushroom poisoning—first aid to poisoning bleeding and maintain breathing.

References

1. Pharmaceutical chemistry by S.Lakshmi, Sultan chand & sons
2. Medicinal chemistry by Ashutoshkar, New Age International
3. A Text book of pharmaceutical chemistry by Jayashree Ghosh, Sultan Chand & sons

SUBJECT CODE:JSCHEC3

INDUSTRIAL CHEMISTRY (Elective paper III)

UNIT – I

Sugar : Cane sugar manufacture, recovery of sugar from molasses, sugar estimation. Paints & Varnishes : Primary constituents of paints. Dispersion medium (solvent) binder, pigments, oil bases paints, latex paints (alkyd resins) formulation of paints and varnishes.

UNIT – II

Cement : Manufacture – Wet Process and Dry Process. Setting of cement, Cement industries in India. Fertilizers : Fertilizer industries in India, Manufacture of ammonia, urea, super phosphate, triple super phosphate.

UNIT – III

Petroleum : Origin, refining, Cracking, reforming knocking and octane number, LPG, synthetic gas, synthetic petrol. Fuel Gases : Large scale production, storage, hazards and uses of coal gas, water gas, producer gas and oil gas.

UNIT – IV

Electrochemical industries : Production of materials like chlorine, caustic soda. Sodium chlorate, potassium permanganate, hydrogen peroxide. hydroxyl amine, Electro synthesis of aniline, p-aminophenol.

UNIT – V

Chemical Explosives : Origin of explosive, preparation and chemistry of nitrocellulose, TNT, gunpowder, Water in Industry : Pollution of water by fertilizers, detergents, pesticides, and industrial wastes, BOD and COD.

References

1. B.N. Chakrabarty, Industrial Chemistry, Oxford & IBH Publishing Co., New Delhi, 1981.
2. B.K.Sharma, Industrial Chemistry, Geol Publishing House, Meerut.
3. P.P.Singh, T.M.Joseph, R.G.Dhavale, College Industrial Chemistry, Himalaya Publishing House, Bombay, 4th edn., 1983.

SUBJECT CODE:JSGS

Gender Studies

Objectives

1. To make boys and girls aware of each others strength and weakness.
2. To develop sensitivity towards both genders in order to lead an ethically enriched life.
3. To promote attitudinal change towards a gender balanced ambience and Women empowerment

Unit I

Concept of Gender: sex – gender – biological determinism – patriarchy – ferminism – gender discrimination – gender division of labour – gender stereotyping – gender sensitivity - gender equity – equality – gender mainstreaming – empowerment.

Unit II

Women's studies Vs gender studies: UGC'S guidelines – VII to XI Plans – gender studies: Beijing conference and CEDAW – exclusiveness and inclusiveness.

Unit III

Areas of gender discrimination: Family – sex ratio – literacy – health – governance religion – work Vs employment – market – media – polities – law domestic violence – sexual harassment – state policies and planning

Unit IV

Women development and gender empowerment: Initiative – International Women empowerment year 2001 – mainstreaming global policies.

Unit V

Women movement and safeguarding mechanism: In India national / state commission for women (NCW) – all Women Police station - Family court – domestic violence act – prevention of sexual harassment at work place supreme court guidelines – maternity benefit act – PNDT Act – hindu succession act 2005 – eve teasing prevention act – self help groups- 73rd and 74th amendment for PRIS

References

1. Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women unlimited,2014
2. Rajadurai.S.V, Geetha.V, Themsed in caste gender and Religion, Tiruchirapalli, Bhrathidasan University.

SUBJECT CODE:JSCHY4

ALLIED CHEMISTRY

UNIT – I

Atomic orbitals

Shapes of atomic orbitals – overlapping of atomic orbitals – sigma- and pi-bonds. Hybridisation – sp, sp^2 and sp^3 explanation with suitable examples – VSEPR theory.

UNIT – II

Electron displacements

Electron displacement effects : Inductive, mesomeric, hyper conjugative and Steric effects. Mechanism of aromatic electrophilic substitution, Nitration, Sulphonation, Halogenation and Friedel craft's reaction.

UNIT – III

Heterocyclics, proteins and aminoacids

Preparation and properties of Furan, Thiophen, Pyrrole and Pyridine. Nucleic acids : Types – DNA & RNA composition of polynucleotide chain and biological function. Amino acids and proteins : classification, structure and stereochemistry of amino acid, preparation and reaction of α- amino acids. Classification of proteins. End group analysis – denaturation of proteins..

UNIT – IV

Thermodynamics

Second Law of Thermodynamics need for second law, various statements of II Law-- Entropy and its significance. Free energy change. Criterion for spontaneous and reversible process.

Phase rule : Definition of terms, phase diagram of water system and Pb – Ag system

UNIT – V

Electrocbemistry

Reference electrodes – SHE and calomel electrode single electrode potential and standard electrode potential. Daniel cell – cell reaction and cell E.M.F. Determination of pH by E.M.F. method – Conductometric Titrations.

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References

1. P.L. Soni & Mohankatyal, Text book of Inorganic Chemistry 20th revised Edn. Sultan chand 1992.
2. R.B. Puri & L.R. Sharma, "Principles of Inorganic chemistry", Sultan chand, 1989.
3. P.L.Soni & H.M. Chawla "Text book of Organic Chemistry", Sultan chand & sons 1994 Delhi.
4. K S Tewari, S N Mehrotra and N K Vishonoi, "A text book of organic chemistry".
5. M K Jain, "Organic Chemistry" Shoban Lal Nagin chand and co.,
6. B R Puri & L R Sharma and Madan S Pathania, "Principles of physical chemistry" Shoban Lal Nagin Chand and co., Delhi.
7. R D Madan, "Modern Inorganic Chemistry" 1987, S Chand and co.,
8. P L Soni, "Text book of Organic chemistry", Sultan chand & co.,
9. V S Parmer & H M Chawla – "Principles of reactions mechanism in organic chemistry"

SUBJECT CODE:JSCHYD4P

ALLIED CHEMISTRY PRACTICALS

Titrimetry

1. Estimation of Sodium hydroxide using standard sodium carbonate
2. Estimation of hydrochloride acid – Standard Oxalic acid
3. Estimation of Oxalic acid – Standard sulphuric acid
4. Estimation of Ferrous sulphate – Standard Mohr's Salt solution
5. Estimation of Oxalic acid – Standard ferrous sulphate
6. Estimation of Potassium Permanganate – Standard Sodium hydroxide
7. Estimation of copper – Standard potassium dichromate.

Organic Analysis

Reactions of Phenols, acids (mono and di), aromatic primary amine, aldehydes (aliphatric and aromatic), di-amide, dextrose, systematic analysis of organic compounds containing one functional group and characterization by confirmatory methods, tests for derivative.