RANI CHANNAMMA UNIVERSITY, BELGAVI

(GOVERNMENT OF KARNATAKA)

SCHOOL OF BASIC SCIENCES
DEPARTMENT OF CHEMISTRY

REGULATIONS AND SCHEME OF EXAMINATION
FOR

DEPARTMENT OF POST-GRADUATE STUDIES IN CHEMISTRY
(II SEMESTER)

UNDER
CHOICE BASED CREDIT SYSTEM(CBCS)

WITH EFFECT FROM
ACADEMIC YEAR 2017-18 AND ONWARDS

RANI CHANNAMMA UNIVERSITY, BELGAVI
(GOVERNMENT OF KARNATAKA)

M.Sc. Degree Programme in Chemistry(General)
(Effective from the Academic Year 2017-18)
under
Choice Based Credit System

Course Structure and Scheme of Examination

Sl. No.	Papers	Hours of Teaching per week	Hours of Exam	Marks			Credits
				Exam	IA	Total	
FIRST SEMESTER							
1	CHIT 1.1: Inorganic Chemistry-I	4	3	80	20	100	4
2	CHOT-1.2: Organic Chemistry-I	4	3	80	20	100	4
3	CHPT-1.3: Physical Chemistry-I	4	3	80	20	100	4
4	CHGT-1.4: Spectroscopy-I	2	2	40	10	50	2
5	CHES-1.5: Analytical Chemistry	4	3	80	20	100	4
6	CHIPr -1.6: Inorganic Chemistry Practicals-I	4	4	40	10	50	2
7	CHOPr-1.7: Organic Chemistry Practicals-I	4	4	40	10	50	2
8	CHPPr -1.8: Physical Chemistry Practicals-I	4	4	40	10	50	2
		30		480	120	600	24
SECOND SEMESTER							
1	CHIT-2.1 : Inorganic Chemistry –II	4	3	80	20	100	4
2	CHOT-2.2 : Organic Chemistry- II	4	3	80	20	100	4
3	CHPT- 2.3: Physical Chemistry-II	4	3	80	20	100	4
4	CHGT- 2.4: Spectroscopy-II	2	2	40	10	50	2
5	CHEG- 2.5: Open elective	4	3	80	20	100	4
6	CHIPr-2.6 : Inorganic Chemistry Practicals-II	4	4	40	10	50	2
7	CHOPr- 2.7 : Organic Chemistry Practicals-II	4	4	40	10	50	2
8	CHPPr- 2.8 : Physical Chemistry Practicals-II	4	4	40	10	50	2
		30		480	120	600	24

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
SECOND SEMESTER

CHIT-2.1 INORGANIC CHEMISTRY-II
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT–I **16 hours**

SYMMETRY AND GROUP THEORY

Molecular symmetry: Symmetry elements and symmetry operations, rotation axis, rules for orientation of molecules, plane of symmetry, rotation-reflection axis, centre of symmetry and identity element of symmetry, products of symmetry operations, general relations among symmetry elements and symmetry operations.

Group theory: Concept of a group, definition of a point group, procedure for classification of molecules into point groups, subgroups, Schoenflies and Hermann-Maugin symbols for point groups, multiplication tables for the symmetry operations of simple molecules, matrix notation for the symmetry elements and for geometric transformations, class of a group and similarity transformation.

Representation of groups: Reducible and irreducible representations, Great Orthogonality theorem and its consequences, labeling of irreducible representations, group theory and hybrid orbitals to form bonds, character tables (Cs, Ci, C2, C2v and C3v).

Applications of group theory: Applications of group theory to crystal field theory, bonding in octahedral and tetrahedral complexes, symmetry and dipole moments, symmetry and optical activity.

UNIT–II **16 hours**

COORDINATION CHEMISTRY-REACTIONS, KINETICS AND MECHANISMS

Types of mechanisms in substitution reactions-dissociation, interchange and association.

Metal-ligand equilibria step-wise and overall stability/formation constant, factors affecting stability of metal complexes. Determination of stability constant by spectrophotometric (Job's) method.

Reactions and kinetics of substitution in square planar complexes: Trans effect, substitution reactions. Rate law and mechanism of nucleophilic substitution in square planar complexes, thermodynamic and kinetic stability.

Reactions and kinetics of substitution in octahedral complexes: Ligand field effects and reaction rates, mechanism of substitution in octahedral complexes, reaction rates influenced by acid and base, mechanism of redox reactions-outer sphere and inner sphere mechanisms. Marcus theory, photochemistry of metal complexes-types of photochemical reactions, photo-substitution and photo-redox reactions and excited state outer sphere electron transfer reactions (solar energy conversion), complimentary and non-complimentary reactions.

UNIT–III **16 hours**

SOLID STATE AND STRUCTURAL CHEMISTRY

Types of solids, close packing of identical solid spheres, tetrahedral and octahedral voids, packing fraction, radius ratio.

Crystallographic systems: Bravias lattices, Miller indices, external features of crystals.

Structures of selected crystals: normal and inverse spinels, hexagonal structures, pervoskites.

Defects in solids: Point defects (stoichiometric and non-stoichiometric), line defects and plane defects, stacking faults and grain boundaries.

Structural transformation of solids

Solid solutions : Hume – Rothery rules, substitutional solid solutions and interstitial solid solutions, solid solution mechanism.

Alloy systems: Phase diagram and their features with respect to alloys - two and three component systems, copper–zinc system, steels with reference to iron-carbon systems.

UNIT–IV **16 hours**

NUCLEAR CHEMISTRY

Radioactivity, nuclear reactions, nuclear power reactors–radioactivity, determination of half life, radioactive decay kinetics, parent-daughter decay-growth relationships, secular and transient equilibria, nuclear reactions, spallation, nuclear fission and fusion, types of nuclear power reactors, basic features and components of a nuclear power reactor, safety measures, an introduction to breeder reactors, applications of radioisotopes-synthesis of various useful radioisotopes, physico-chemical and analytical applications-isotope dilution method, activation analysis, radiometric titration and ^{14}C dating, medical, agricultural and industrial applications of isotopes.

RADIATION CHEMISTRY

Interaction of matter with radiation, radiation dosimetry-units and measurement of chemical dosimeters (Fricke and ceric sulphate dosimeters), radiation chemistry of water, a brief introduction to radiolysis of liquids and solids, industrial applications of radiation chemistry (radiation polymerization, food irradiation and radiation synthesis).

Health and Safety Aspects: Biological effects of radiation, hazards in radiochemical work, radiation protection, decontamination procedures, permissible exposure doses, nuclear waste management including waste storage and disposal procedures.

REFERENCE BOOKS:

01. Symmetry and Spectroscopy of Molecules by K. Veera Reddy.

02. Chemical Applications of Group Theory by F. A. Cotton.

03. Symmetry and Group theory by P. K. Bhattacharya.

04. Inorganic Chemistry: Principles, structure and reactivity, 1997, J. E. Huheey, Keiter and Keiter.

05. Inorganic Chemistry, 3rd edition, C. E. Housecroft and A. G. Sharpe.

06. Inorganic Chemistry by Purcel and Kotz.

07. Inorganic Chemistry by W. W. Porterfield.

08. Concepts and Models of Inorganic chemistry by Douglass, Alexander and Mcdaniel.

09. Inorganic Chemistry by Miessler and Tarr.

10. Introduction to Solids by Azaroff.

11. Solid State Chemistry and its Applications by Anthony R. West.

12. Solid State Chemistry: An Introduction, 3rd edition, Lesley E. Smart and Elaine A. Moore.

13. Fundamental concepts of Inorganic Chemistry by A. K. Das, volume 1 to 7.

14. Essentials of Nuclear Chemistry by H.J. Arnikar, Eastern Wiley (1990).

15. Nuclear Chemistry by U.N. Dash, Sultan Chand and Sons (1991).

16. Nuclear Chemistry by Friedlander and Kennedy, John Wiley and Sons (1987)

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
SECOND SEMESTER

CHIPr-2.6 INORGANIC CHEMISTRY PRACTICAL-II
Laboratory hours per week : 04 Credits : 02
Total hours : 64

Part A. Qualitative analysis:
Qualitative analysis of at least FIVE ternary mixtures containing one rare cation and one interfering anion.

Part B. Preparation of complexes:
01. $K_3[Al(C_2O_4)_3]$ $3H_2O$ & $[Cu(thiourea)_3]_2$ SO_4. H_2O
02. Estimation of Copper in tristhiourea copper (I) sulphate by Iodometric method

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
II SEMESTER

CHOT-2.2 : ORGANIC CHEMISTRY-II
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT-I **16 hours**

NAMED REACTIONS

C-C bond forming reactions: Aldol condensation, Dickmann condensation, Stobbe condensation, Micheal addition, Perkin reaction, Reimer-Tiemann reaction, Reformtsky reaction, Wittig reaction, Mannich reaction, Shapario reaction.

C-N bond forming reactions: Chichibabin reaction, Barton reaction, Hofmann-Loffler-Freytag reaction, Stork enamine reaction.

C-O bond forming reactions: Sharpless asymmetric epoxidation, Bayer-Villeger reaction.

C-Cl bond forming reaction: Hell-Volhard-Zelinski reaction.

UNIT-II **16 hours**

OXIDATION AND REDUCTION REACTIONS

Oxidation reactions: Introduction, Oxidation reactions examples and applications of chromium series- $K_2Cr_2O_7$, PDC, PCC, Sorret and Jones reagents. Manganese compounds-$KMnO_4$, MnO_2.

Oxidation reactions involving ozone, peracids, lead tetraacetatate, periodic acid, osmanium tetroxide, selenium dioxide, Oppenauer oxidation.

Reduction reactions: Introduction, Catalytic hydrogenation-both heterogeneous (examples Nickel and palladium) and homogeneous, metal hydride reductions (NaBH4 and LiAlH4), reduction with dissolved metal, diimide reduction, Clemmensen, Wolf Kishner, Meerwin-Varley-Ponndorf reduction, Leukart reaction and reductions with diborane.

UNIT –III **16 hours**

REARRANGEMENT REACTIONS

Classification and general mechanistic treatment of nucleophilic, electrophilic and free radical rearrangements.

Rearrangement reactions involving migration to electron deficient carbon: Wolf, Wagner-Meerwein, Pinacol-pinacolone and Benzil-benzilic acid rearrangement.

Rearrangement reactions involving migration to electron rich carbon: Favorskii, Sommlet-Houser, Naber and Steven rearrangement.

Rearrangement reactions involving migration to electron deficient nitrogen: Hoffmann, Lossen, Curtius, Schmidt, Beckmann rearrangement.

Rearrangement reactions involving migration to electron deficient oxygen: Dakin, Bayer- Villiger and Hydroperoxide rearrangement.

UNIT-IV **16 hours**

HETEROCYCLIC COMPOUNDS

Nomenclature of heterocyclic compounds-Hantz-Wiedamann system.

Synthesis and reactions of

3-Membered heterocyclic compounds – aziridines, azirines, oxiranes, oxirenes and thiiranes.

4-Membered heterocyclic compounds with one and two hetero atoms – azitidines, oxetanes and thietanes

6-Membered heterocyclic compounds with one and two hetero atoms – pyridine, pyrimidine, quinoline.

7-Membered heterocyclic compounds – azepines, oxepines, thiepines.

REFERENCE BOOKS:

01. Understanding organic reaction mechanisms, A. Jacob, Cambridge Univ. Press, 1997.
02. Introduction to organic chemistry A. Streitweiser, Jr and C. H. Heathcock, Macmillan, 1985.
03. Physical and mechanistic organic chemistry, R.A.Y. Jones, 1st Edn. Cambridge Univ. Press, 1979.
04. Mechanisms of molecular migrations, Vols I and II, B. S. Thiagarajan, 1st Edn. Pergamon Press, Oxford, 1979.
05. P. J. Garratt in Comprehensive organic chemistry, D. Barton and W. D. Ollis, 1st Edn. Pergamon Press, Oxford, 1979.
06. Radicals in organic synthesis, B. Giese, Pergamon Press, 1986.
07. Stereoelectronic effects in organic chemistry, P. Deslongchamps, 1st Edn. Pergamon Press, 1983.
08. Organic photochemistry, J. M. Coxon and B. Halton, 1st Edn, Cambridge Univ. Press, London, 1974.
09. Molecular reactions and photochemistry, C. H. Deputy and D. S. Chapman, 1st Edn. Prentice-hall India, New Delhi, 1972.
10. Stereochemistry of carbon compounds, E. L. Eliel, S. H. Wilen and L. N. Mander, John Wiley & Sons, 1994.
11. Stereochemistry, Potapov, MIR, Moscow, 1984.
12. Stereochemistry, Nasipuri, D, New Age, 1999.
13. Advanced organic chemistry, J. March, 4th Edn. John Wiley, 2008.
14. Organic Chemistry, R. E. Ireland Prentice-Hall India, New Delhi, 1975.
15. Some modern methods of Organic Synthesis, W. Caruthers, Cambridge Uni. Press London, 2nd Edn. 1998.
16. Stereochemistry of organic compounds- Principle and applications, D. Nasipuri, 2nd Edn., New Age International Publishers, 2001.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
SECOND SEMESTER

CHOPr-2.7 ORGANIC CHEMISTRY PRACTICAL-II
Laboratory hours per week : 04 Credits : 02
Total hours : 64

PART-A
ANALYSIS OF BINARY ORGANIC MIXTURE
Systematic qualitative analysis of binary mixture (solid+solid, solid+ liquid)
Chemical equations to be discussed for all tests.

PART-B
Fractional crystallization: Separation of mixture of naphthalene and biphenyl.
Fractional distillation: Separation of Mixture of benzene and toluene.
Thin layer chromatography: Separation of plant pigments.
Column chromatography: Separation of mixture of O & P-nitroanilines.

NOTE: Only experiments in PART-A are to be given in Practical Examination.

REFERENCES

01. Vogel's Text Book of Practical Organic Chemistry — Furniss, Hannaford, Smith and Tatchell, ELBS Longmann
02. Advanced Practical Organic Chemistry — N.K. Vishnoi, Vikas, Publishing House
03. Handbook of Practical Organic Chemistry — Clark
04. Practical Organic Chemistry — O.P. Agrawal

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
SECOND SEMESTER

CHPT-2.3 : PHYSICAL CHEMISTRY-II
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT-I **16 hours**

THERMODYNAMICS-II

Statistical thermodynamics: Introduction to statistical thermodynamics, energy states, quantum mechanical and statistical aspects, unit cells, microscopic state and macroscopic state, phase space, system, assembly and ensemble, use of ensemble, microcononical ensemble, canonical ensemble, probability, thermodynamic probability, molecular basis of residual entropy.

Classical statistics, Sterling's approximation, Maxwell Boltzmann distribution law and its applications. Bose-Einstein statistics, Fermi-direc statistics and their comparisons. Derive the relationship between entropy and thermodynamic probability, partition function, thermodynamic functions in terms of partition function (energy, heat capacity, entropy, Gibb's free energy, enthalpy Helmholtz free energy). Evaluation of different types of partition function. i) Translational partition function. Ii) Rotational partition function for diatomic molecule iii) vibrational partition function for diatomic molecule ,electronic partition function iv) nuclear partition function, separation of partition function, residual entropy (problems to be solved).

UNIT-II **16 hours**

QUANTUM CHEMISTRY-II

One dimensional simple harmonic oscillator in classical mechanics and quantum mechanics, wave functions of the harmonic oscillators, the applications of Schrödinger's equations to the H atom derivation (separation of R, θ, φ equations and their solutions). Quantum number and their characteristics. Approximate methods in quantum mechanics, variations method, linear and non linear variation functions, application to the He atom, ant symmetric and asymmetric exclusion principle, Slater's determination wave functions, terms symbols and spectroscopic status. Hydrogen like wave functions, angular and radial wave functions and its application to hydrogen atom, general equation and general determination, application of variation method to hydrogen molecule, ion and normal and degenerate states, Orbital diagram need for variation methods. Perturbation theory, first and second order perturbation theory and its application to linear harmonic oscillator.

UNIT-III **16 hours**

CHEMICAL DYNAMICS

Chemical kinetics in solution, influence of salt and solvents on reaction rates. , primary salt effect, secondary salt effect (Bronsted-Bjerrum equation), diffusion controlled reactions in solutions (Debye Slomuchowski equation), Study of fast reactions. I) NMR ii) relaxation methods iii) pulse method (flash photolysis, flash radiolysis) iv) shock tubes v) stopper flow method, reactions in molecular beams (scattering as a probe of reaction dynamics), potential energy surfaces, absolute rate theory applied to reactions. Molecular momentum of rate of slow reactions. Linear free energy relationship. Thermodynamic simplications of linear free relationship. Hammett's relationship. Derivations of Hammett equation. Taft equation, solvent effects on rates.

UNIT-IV **16 hours**

PHOTOCHEMISTRY AND PHOTODEGRADATION

PHOTOCHEMISTRY: Electronic transitions in molecules, The Franck-Condon principle, electronically excited molecules - singlet and triplet states. Life times of excited states of atoms and molecules. Quantum yield and its determination. Actinometry – ferrioxalate, uranyl oxalate, MGL and Reinekke's salt actinometers.

A review of laws of photochemistry –Grottus-Draper law, Beer-Lambert law, Stark-Einstein law.Photo physical processes – kinetics of unimolecular reactions, experiments in photochemistry, photo properties - fluorescence, phosphorescence, chemiluminescence. Delayed fluorescence – E-type and P-type. State diagrams, Stern-Volmer equation (to be derived), lasers in photochemical kinetic studies, photo electrochemistry, solar energy conversion and storage.

Photochemical processes – types of photochemical reactions – electron transfer, photodissociation, oxidation and isomerization reactions with examples. Photosensitization. Flash photolysis.

PHOTODEGRADATION: Photocatalyst – ZnO, TiO_2, principle, application of ZnO/TiO_2 in the photo degradation of dyes (IC), pesticides (DDT) and in industrial effluents. Effect of photo degradation on COD value.

REFERENCE BOOKS:

01. Statistical themodynamics by B.C. Meclelland, Chapman and Hall, London (1973).
02. Text book of Physical Chemistry by Samuel Glasstone, MacMillan Indian Ltd., 2 nd edition, (1974).
03. Thermodynamics –Rajaram and Kunakose,East West, Nagin Cx,Dehli,1986.
04. An introduction to Chemical Thermodynamics–R.P.Rastogi and S.S.Misra,Vikash,Delhi,1978.
05. Introductory Quantum Mechanics – Atkins ,Claredon,Oxford
06. Quantum chemistry-Kauzman,Academic Press,1957.
07. Quantum chemistry-R.K.Prasad ,II.Ed,New Age Int-2000.
08. Physical chemistry-Atkins,ELRS,1982.
09. Physical chemistry –Moore,Orient Longman,1972.
10. Quantum Chemistry – Eyring, Walter and Kimball. John Wiley and Sons, Inc., New York.
11. Theoretical Chemistry – S. Glasstone. East West Press, New Delhi, (1973).
12. Quantum Chemistry – R.K. Prasad, New Age International Publishers, (1996).

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
SECOND SEMESTER

CHPPr-2.8 PHYSICAL CHEMISTRY PRACTICAL-II
Laboratory hours per week : 04 Credits : 02
Total hours : 64

01. To study the phase equilibrium between benzene, ethane and water ternary system
02. Determination of dissociation constant of benzoic acid in organic solvent by distribution method
03. Kinetics of acid catalyzed of hydrolysis of methyl acetyl and determination of energy activation
04. To determine the concentration of H_2SO_4, CH_3COOH and $CuSO_4$ in a given solution by conductometry
05. To construct the calibration curve Fe^{2+}-KCNS and Cu^{2+}-NH_3 systems and estimate the amount of respective salt present in a given solution by colarimetrically
06. To determine the step wise heat of neutralization of polybasic acid using thermoflask
07. To compare the strength of the weak acid by conductance method (CH_3COOH and HCOOH)
08. To determination of enthalpy of solution of KNO_3 by solubility method
09. To determine the effect of an added univalent in the viscosity of reaction between $K_2S_2O_8$ and KI solution
10. Determine the concentration of Cu(II) and Fe(II) solution by photometric titration with EDTA
11. Coulometric titrations - NaOH vs HCl.
12. Determination of energy gap for semiconductor (Ge) and effect of temperature on semiconductor by four probe method.
13. Study of salt effect on solubility and determination of activity coefficient.
14. Determination of pK value of an indicator (bromophenol blue).

Any other practicals can be added depending upon facilities.

REFERENCE BOOKS:

01. Selected Experiments in Physical Chemistry – Latham.
02. Experiments in Physical Chemistry – James and Prichard.
03. Experiments in Physical Chemistry – Shoemaker.
04. Advanced Physico-Chemical Experiments –J. Rose
05. Experimental Inorganic/Physical Chemistry- Mounir A. Malati.
06. Quantitative Chemical Analysis – Daniel C. Harris, (2006) 7th edition.
07. Spectrophotometric determination of elements – Z. Marczenko

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
II SEMESTER

CHGT-2.4 SPECTROSCOPY-II
Teaching hours per week : 02 Credits : 02
Total hours : 32

UNIT–I **16 hours**

NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

Magnetic properties of nuclei (magnetic moment, g factor, nuclear spin), effect of external magnetic field on spinning nuclei, Larmor precessional frequency, resonance conditions, population of nuclear magnetic energy levels, relaxation processes, relaxation time, line width and other factors affecting line width.

Chemical shift, reference standards employed in NMR, factors influencing chemical shift-electronegativity(shielding and deshielding), anisotropic effect, vander Walls deshielding, effect of restricted rotation, H-bonding.

Nature of protons bonded to carbon and other nuclei, Proon integrals, spin-spin coupling-coupling constant, types of coupling, Karplus equations-variation of coupling constants with dihedral angle.

Instrumentation-Frequency sweep instruments, field sweep instruments and pulsed FT-NMR instruments, Chemical equivalence and magnetic equivalence, proton exchange reactions.

First order spectra, non first order spectra, simplification of complex spectra- increasing magnetic field strength, double resonance, deuterium exchange reactions, and lanthanide shift reagents. Nuclear Overhauser Effect (NOE), variable temperature probe.

^{13}C-NMR Spectroscopy: Comparison of ^{1}H-NMR and ^{13}C-NMR, proton decoupling or noise decoupling or broad band decoupling, chemical shift positions of carbon atoms in organic molecules.

Two dimensional NMR Spectroscopy: COSY, NOESY, DEPT Spectra and MRI.

UNIT–II **16 hours**

MASS SPECTROMETRY

Introduction, basic theory, instrumentation-single focusing, double focusing, quadrupole mass filter, TOF instruments. Methods of generation of positively charged ions-electron impact ionization, chemical ionization, fast atom bombardment(FAB), matrix assisted laser desorption ionization.

Resolving power, base peak, molecular ion peak, meta stable peak, isotopic peaks- calculation of percentage intensity of (m+1) and (m+2) peaks. Exact molecular mass, molecular formula, hydrogen deficiency index, preliminary analysis of structure.

Modes of fragmentation- fragmentation rules, McLafferty rearrangement, retro Diels-Alder reaction, ortho effect, fragmentation of following class of organic compounds – alkanes, alkenes, alcohols, aldehydes, ketones, carboxylic acids, amino compounds.

Combined applications of spectroscopic techniques

Combined applications of IR, UV-Visible, ^{1}H NMR, ^{13}C NMR and Mass spectrometry in the structural elucidation of organic compounds.

01. Structure analysis when spectral data of the organic compound is given
02. Structure analysis when spectra of organic compound are given

REFERENCE BOOKS:

01. Fundamentals of Molecular Spectroscopy, C. N. Banwell and E. M. McCash. 4th edition, Tata McGraw-Hill, New Delhi.

02. Introduction to Molecular Spectroscopy, G. M. Barrow, McGraw-Hill, New York.

03. Introduction to Spectroscopy. Pavia, Lampman and Kriz, 3rd edition, Thomson.

04. Spectroscopy, B. P. Straughan and S. Walker, John Wiley & Sons Inc., New York, Vol. 1 & 2, 1976.

05. Vibration Spectroscopy Theory and Applications, D. N. Satyanarayana, New age International, New Delhi.

06. Organic Spectroscopy, William Kemp, 3rd edition, Palgrava, 1991.

07. Optical Method of Analysis, E. D. Olsen, McGraw Hill Inc, 1975.

08. Spectroscopy of organic compounds – P. S. Kalasi, Wiley Eastern Ltd, India 1993.

09. Introduction to instrumental analysis – R. D. Braun, McGraw Hill Book company 1982.

10. Physical methods in inorganic chemistry – R. Drago, East West Pvt. Ltd, 1968.

11. Instrumental methods of chemical analysis – Gurdeep Chatwal and Anand.

12. Organic Spectroscopy, 2nd edition– Jag Mohan, Narosa Publishing House New Delhi.

13. Applications of IR and Raman spectroscopy to coordination and organometallic compounds, K. Nakamoto.

RANI CHANNAMMA UNIVERSITY, BELGAVI
SCHOOL OF BASIC SCIENCES : CHEMISTRY

M.Sc. CHEMISTRY
SECOND SEMESTER

CHEG-2.5 OPEN ELECTIVE : CHEMISTRY FOR EVERY DAY LIFE
Teaching hours per week : 04 Credits : 04
Total hours : 64

UNIT-I **16 hours**

POLLUTION

Air pollution: Air pollutants, prevention and control, green house gases and acid rain, ozone hole and CFC's, photochemical smog and PAN, catalytic converters for mobile sources, Bhopal gas tragedy.

Hydrologic cycle, sources, criteria and standards of water quality-safe drinking water, public health significance and measurement of water quality parameters-(colour, turbidity, total solids, acidity, alkalinity, hardness, sulphate, fluoride, phosphate, nitrite, nitrate, BOD and COD), water purification for drinking and industrial purposes.

Toxic chemicals in the environment.

Detergents- pollution aspects, eutrophication. Pesticides and insecticides- pollution aspects, heavy metal pollution, solid pollutants -treatment and disposal, treatment of industrial liquid wastes. Sewage and industrial effluent treatment.

Oils and fats: Composition of edible oils, detection of purity, rancidity of fats and oil, estimation of rancidity, tests for common edible oils Tests for adulterants like aregemone oil and mineral oils.

UNIT-II **16 hours**

INDUSTRIAL CHEMISTRY

Composition of soil - inorganic and organic components in soil- micro and macro nutrients.

Fertilizers: Classification of Fertilizers- straight fertilizers, compound/complex fertilizers, fertilizer mixtures, manufacture and general properties of fertilizer products-Urea and DAP.

Ceramics: general properties, porous and non-porous wares, Manufacturing process, extrusion, turning, drying, decoration, Porcelain and china.

Cement: Types, manufacture, additives, setting, properties & testing of cement.

Glass: Manufacture, properties, shaping of sheets & plate glasses. Annealing, finishing. special glasses.

Paints and Pigments: White pigments (white lead, ZnO, lithopone, titanium dioxide), blue, red, yellow and green pigments. paints and distempers, requirements of a good paint, emulsion, latex, luminescent paints, fire retardant paints, varnishes, enamels, lacquers, solvents and thinners.

UNIT-III **16 hours**

BIOORGANIC COMPOUNDS

Carbohydrates: Chemistry of important derivatives of monosaccharides - ethers, esters, acetals, ketals, deoxysugars and aminosugars.

Vitamins: Classification and Nomenclature. Source and deficiency diseases, biological functions of Vitamins- Vitamin A_2, Vitamin B, Vitamin C, Vitamin D & Vitamin K.

Food Analysis: Dairy products- composition of milk and milk products, analysis of fat content, minerals in milk and butter, Estimation of added water in milk.

Beverages: Analysis of caffeine in coffee and tea, detection of chicory in coffee, chloral hydrate in toddy, estimation of methyl alcohol in alcoholic beverages.

Food additives, adulterants and contaminants- Food preservatives like benzoates, propionates, sorbates, bisulphites, artificial sweeteners like saccharin, dulcin and sodium cyclamate.

Flavours: vanillin, esters (fruit flavours) and monosodium glutamate. Artificial food colourants - coal tar dyes and non-permitted colours and metallic salts. Pesticide residues in food.

Drugs: Classification and nomenclature. Analgesics - aspirin, paracetamol; Anthelmentics – mebendazole, Antiallergics - chloropheneramine malleate.
Antibiotics: Pencillin, chloromycetin and streptomycin.

UNIT-IV **16 hours**

INDUSTRIAL ORGANIC CHEMISTRY

Chemical energy systems and limitations, principles and applications of primary and secondary batteries and fuel cells, Basics of solar energy, Energy storage devices, Polymers in everyday life: from buckets to rockets: types and classification of polymers, source and general characteristics of natural and synthetic polymers, typical examples of polymers used as commodity plastics, textiles, electronic and automobile components, medical and aerospace materials, problems of plastic waste management, strategies for development of environmental friendly polymers.
Dyes: Colour and constitution (electronic concept). Classification of dyes, methods of applying dyes to the fabrics. A general study of Azo dyes, Orange –II, Mordant brown, Congo red and methyl orange.
Corrosion: Types and prevention, corrosion failure and analysis.

REFERENCE BOOKS:

01. B.K. Sharma: introduction to Industrial Chemistry, Goel Publishing, Meerut(1998).
02. Medicinal Chemistry by Asthoush Kar.
03. Drugs and Pharmaceutical Sciences Series, Marcel Dekker, Vol.II, INC, New York.
04. Analysis of Foods – H.E. Cox; 13. Chemical Analysis of Foods- H.E. Cox and Pearson.
05. Foods – Facts and Principles. N. Shakuntala Many and S. Swamy, 4th ed. New Age Internatl (1998).
06. Physical Chemistry – P. Atkins and J. de Paula -7 th Ed. 2002, Oxford University Press
07. Handbook on Fertilizer Technology by Swaminathan and Goswamy, 6 th ed. 2001, FAI.
08. Organic Chemistry by I. L. Finar, Vol. 1 & 2
09. Polymer Science and Technology, J. R. Fried (Prentice Hall)

RANI CHANNAMMA UNIVERSITY, BELGAVI

DEPARTMENT OF POST-GRADUATE STUDIES IN CHEMISTRY
(I TO II SEMESTERS)
SCHOOL OF BASIC SCIENCES

UNDER
CHOICE BASED CREDIT SYSTEM(CBCS)

WITH EFFECT FROM
ACADEMIC YEAR 2017-18 AND ONWARDS

QUESTION PAPER PATTERN

HARD CORE CHEMISTRY
(Regular AND Repeater)

Duration: 03 Hours **Maximum Marks: 80**

Instructions:
01) Answer all questions.
02) Figures to the right indicate marks.

01. Answer any EIGHT of the following questions. (08x02=16)
a.
b.
c.
d.
e.
f.
g.
h.
i.
j.

02. a) **05 Marks**
b) **05 Marks**
c) **06 Marks**
OR
d) **06 Marks**

03. a) **05 Marks**
b) **05 Marks**
c) **06 Marks**
OR

d) **06 Marks**

04. a) **05 Marks**
b) **05 Marks**
c) **06 Marks**
OR
d) **06 Marks**

05. a) **05 Marks**
b) **05 Marks**
c) **06 Marks**
OR
d) **06 Marks**

RANI CHANNAMMA UNIVERSITY, BELGAVI

DEPARTMENT OF POST-GRADUATE STUDIES IN CHEMISTRY
(I TO II SEMESTERS)
SCHOOL OF BASIC SCIENCES

UNDER
CHOICE BASED CREDIT SYSTEM(CBCS)

WITH EFFECT FROM
ACADEMIC YEAR 2017-18 AND ONWARDS

QUESTION PAPER PATTERN

SOFT CORE CHEMISTRY:Spectroscopy
(Regular AND Repeater)

Duration: 02 Hours **Maximum Marks: 40**

Instructions:
01) Answer all questions.
02) Figures to the right indicate marks.

01. Answer any FOUR of the following questions. (04x02=08)
a.
b.
c.
d.
e.
f.

02. a) **05 Marks**
b) **05 Marks**
c) **06 Marks**
OR
d) **06 Marks**

03. a) **05 Marks**
b) **05 Marks**
c) **06 Marks**
OR
d) **06 Marks**