VEER NARMAD SOUTH GUJARAT UNIVERSITY

F. Y.B.Sc.
(Chemistry)

Paper – I (Physical & Inorganic)

(Effective from July 2002 – Revised in B O S dated 23/10/2002)

42 Marks (External) Total 60 Hrs

18 Marks(Internal) Time 3 Hrs.

(Uni. Exam)

UNIT – I

Topic –1 ;Chemical Kinetics 6 Hrs

Order and molecularity of reactions; Examples of first order and second order reactions

(Only a=b) rate equations for first and second order reactions; determination of order of reactions by graphical fraction and differential methods; disturbing factors in determination of order of reactions namely parallel, consecutive and chain reactions (no mechanism). zero order reaction; numerical problems..

Topic –2: Conductance and Ionic equilibria 6 Hrs

Electrical conductance, specific conductance, equivalent conductance and molar conductance, effect of dilution on conductance, cell constants and its determination. Oswalds dilution law and its limitations; buffer solution, acidic and basic buffer action. Buffer capacity, relation between pH of acidic and basic buffer and concentration of their components; Numerical problems.

UNIT – II

Topic –1: Colloids 5 Hrs

Colloidal state ; classification of colloids based on the state of dispersed phase and dispersion medium affinity of the phase; preparation of colloidal solutions by condensation method (reaction and oxidation and hydrolysis methods) and dispersion method (Electro dispersion, Bredict arc method, peptisation) ; purification of colloidal solution by electrodialysis and ultrafiltration, properties of colloids (Tyndall effect and Brownian movment); Coagulation and Gold Number.

Liquids in liquids (Emulsion): Types of emulsion, preparation. Emulsifier; liquids in solid (gels) classification, preparation and properties inhibition, general applications of colloids.

Topic –2: Physical properties and chemical constitution 3 Hrs

Classification of physical properties; atomic volume, molar volume, surfacetension, parachor specific refraction, molar refraction; dipolemoment and their applications in determining chemical constitutions, Numerical problems.

Topic –3:Thermodynamics 4 Hrs

Statement of second law of thermodynamics; Carnot cycle and its efficiency, concepts of entropy : entropy changes in spontaneous (Reversible – noncyclic) process (Reversible and irreversible) Numerical problems.

UNIT – III

Topic –1: Wave Machanics 3 Hrs

Postulates of wave mechanics (basic). Schrodinger's wave equation (No derivation) Explanation of Ψ-Ψ^2 (non psi) mathematical treatment eigen value and eigen function.

Topic –2: Chemical Bonding 7 Hrs

Valance bond theory overlapping atomic orbitals(s - s and p – p) hybridization of atomic orbitals, structures and bonding in $BeCl_2$, BF_3 , NH_3 , H_2O , PCl_5 and SF_6.

Molecular orbital theory ; LCAO method : bonding , antibonding, non bonding molecular orbitals ; bond order magnetic property and M. O. , energy level diagram of homonuclear diatomic molecules N_2, O_2, B_2, and heterodiatomic Molecules (CO and NO) Multicenter bonding in electrondeficient molecules, bond strength and bond energy, percentage ionic character from dipolmoment and electronegativity difference.

Topic –3: Chemistry of Noble Gases 3 Hrs

Chemical properties of noble gases, chemistry of xenon, structure and bonding in xenon compounds.

UNIT – IV

Topic –1: Periodic properties 5 Hrs

Atomic and Ionic radii, ionization energy, electron affinity and electronegativity definition, methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour.

Topic –2:Halogen 3 Hrs

Prepation of Fluorine by Denis and Whytlaw – Gray's method, Difficulties encountered in this preparation, fluorocabons, Uses of Fluorine compounds,

Methods of prepartion of Iodine from Caliche and Seaweeds. Explanation of iodometry and iodimetry - giving one illustration each.

Topic –3:Silver 4 Hrs

Extraction of Silver from Argentiferrous Ore by cyanide, Pattinson and cupellation process. Purification of silver by Electrolysis, Hypo and zirvogel's procedded, its properties and uses, compounds such as silver nitrate, silver halides , electroplating of silver.

UNIT – V

Topic –1: Metal Comlpexes 6 Hrs

Geometrical isomerism in 4 – covalent complexes of type $[Ma_2b_2]^{n\pm}$, $[Ma_2bc]^{n\pm}$, $[Mabcd]^{n\pm}$, $(Ma_2b_2)^{n\pm}$, $[M(AB)_2]^{n\pm}$: 6 – covalent complexes of type $[Ma_4b_2]^{\pm}$, $(Ma_3b_3)^{n+}$, $(M(AA)_2)a_2{}^{n+}$ $[M(AB_3)]^{n\pm}$

Optical isomerism in 4 – covalent complexes $[M(abcd)]^{n+}$, 6 – covalent complexes of type $(Ma_2b_2c_2)^{n\pm}$, $[M(AA)_3]^{n+}$. $[M(AA)_2a_2]^{n\pm}$. $[M(AB)_3]^{n\pm}$. Uses of complexes in analytical chemistry only, chelation and classification of chelate compounds . e.g. EDTA & DMG.

Topic –2: Vanadium 3 Hrs

Extraction of of vanadium from carnotite and petronite ores, its properties and uses. Preparation and uses of V_2O_5.

Topic –3: Industrial preparation and uses of 3 Hrs

(a) Potassium permanganate
(b) Potassium dichromate
(c) Titanium dioxide
(d) Bleaching power by Bachmann's method
(e) White lead by dutch method
(f) Various types of gases.

Reference Books:

(1) Physical Chemistry by G. M. Barrow , Migraw Hill (Internation Student Edn)
(2) Physical Chemistry by R.A.Alberty, Wiely Est. ltd.
(3) The elements of physical chemistry by P. W. Atkins Oxford.
(4) Uni. Chemistry by B. H. Mohan
(5) Text book of physical chemistry by A. Negi, S. C. Anand Wiely Est. ltd.
(6) Essential of physical chemistry by Bahl Tuli , S. Chand , Delhi
(7) Physical Chemistry by B, K. Sharma, Goel Pbs. Merrut.
(8) Basic inorganic chemistry by F. A. Cotton , G Wilkinson, P. L.Gaus Wiely.
(9) Selected topics in inorganic chemistry by W.U. Malik, G. D. Tuli, R. D. Madan , S. Chand Delhi.
(10) Concise inorganic chemistry by J. D. Lee ELBS
(11) Advance Inorganic Chemistry by Gurdeepraj Vol. I & Vol II Goel Pbs. Merrut.
(12) Inorganic chemistry by D. E. Shriver , P. W. Atkins & C. H. Langford Oxford
(13) Concepts of models of inorganic chemistry , by B. Douglas, D. Mc Paniel & J. Alexander John
Wiely
(14)Inorganic Chemistry by A. G. Sharpe ELBS
(15) Introduction to Quantum chemistry by A. K. Chandra. Tata Mc. Graw Hill
(16) Inorganic chemistry by J. E. Huchey , Haper and Row.
(17) Chemistry of elements , by M. N. Greenwood , A. Earnshow Pergamon.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

First Year B. Sc.

Chemistry

Paper – II (Organic)

(Effective from July 2002 – Revised in B O S dated 23/10/2002)

42 Marks (External) Total 60 Hrs
18 Marks(Internal) Time 3 Hrs.
(Uni. Exam)

UNIT – I

Topic –1: Empirical formula, Molecular formula, and Structural formula 4 Hrs

Determination of empirical formula and its relation with molecular formula, determination of molecular weight of (a)organic acid by titration and silver salt method and (b) organic base by chloroplatinate method and its limitations. Determination of molecular formula of gaseous Hydrocarbons by Explosion method, Numerical example.

Topic –2:Stereochemistry: 8 Hrs

(a) Isomerism:-Optical activity, Chiral and achiral molecules,
(b) Optical isomerism of tartaric acid, Enantiomers , diastereomers, (Threo & Erythro), Meso compounds Resolution of Enantiomers, inversion retention and racemization.
(c) Geometrical Isomerism: Alkene derivative & oximes E & Z system of nomenclature
(d) Relative and absolute configuration, sequence rules, D & L and R & S system of nomenclature
(e) Conformational isomerism: ethane butane and cyclohexane, Newmen projection & Sawhorse formula, Fischer and flying wedge formula. Difference between conformation and configuration.

UNIT – II

Topic –1: Reaction mechanism: 9 Hrs

(a) Homolytic and Heterolytic fission free radicals carbonium ions(carbocations) and carbanions reactive intermediates carbenes , arynes and nitrenes.
(b) Types of reagents, electrophiles, nucleophiles.
(c) Electromeric, inductive, conjugative effect.
(d) Types of reactions: Addition , substitution, electrophilic, nucleophilic, elimination, rearrangments
(e) Mechanism of (i) addition reaction to alkenes and dienes (ii) substitution in benzene ring –nitration, sulfonation, alkylation, acylation, halogenation., cyanohydrin formation and acetal formation.
(f) Mechanism of Perkin reaction and Cannizero's reaction.

Topic –2:IUPAC nomenlature of organic compounds 3 Hrs

UNIT – III

Topic –1:Alkanes and Cycloalkanes : 6 Hrs

(a) Alkanes: nomenclature, sources, methods of formation with special reference to Wurtz reaction, Kolbe reaction and decarboxylation of carboxylic acids. Physical properties and chemical reactions.
(b) Cycloalkanes: nomenclature, methods of formation chemical reactions, Baeyer's strain theory and its limitations , Theory of strainless ring.

Topic –2:Heterocyclic compunds : 3 Hrs

Nomenclature, aromaticity, and synthesis, properties, uses and canonical structures of Pyridine, Pyrrol, Furan, Thiophane,

Topic –3:Polynuclear hydrocarbons: 3 Hrs

Classification aromaticity and synthesis or industrial preparation, properties, uses and canonical structures of Napthalene, Anthracene and Phenanthrene.

UNIT – IV

Topic –1:Alkanes, dienes and alkynes : 7 Hrs

(a) Alkanes: mechanism of dehydration of alcohols and dehydrohalogenation of alkyl halies, Saytzeff's rule, physical properties and chemical reactions , Morkwonikoff's rule, industrial preparation chemical reaction and applications of ethene and propene, polymerization.
(b) Dienes: nomenclature, classification of dienes, methods of formation of Butadiene, chemical reactions, 1,2 and 1,4 additions, Diel's-Alder reaction.
(c) Alkynes: nomenclature, methods of formation, chemical reactions, electrophilic and nucleophilic addition reactions.

Topic –2: Oils and fats: 2 Hrs

Natural fats , edible and industrial oils of vegetable origin , common fatty acids , synthetic detergents , alkyl and aryl sulfonates. Glycerides saponification determination of saponification value , acid value and iodine value of an oil.

Topic –3: Carbohydrates : 3 Hrs

Definition and classification structure of D-glucose and D-fructose. Conversion of glucose to fructose and fructose to glucose.

UNIT – V

Topic –1:Arenes : 3 Hrs

Nomenclature of benzene derivative, aromaticity, Huckel's rule. Method of preparation of benzene, toluene, xylene and chemical reaction (refer Topic –1 in Unit –I reaction mechanism) activating and deactivating substituents , orientaion , ortho/para ratio , method of formation and chemical reactions of styrene.

Topic –2:Alkyl and aryl halides : 3 Hrs

Nomenclature and classification of alkylhalides , mechanism of nucleophilic substitution reactions of alkylhalides –SN_1 and SN_2 reactions methods of preparation and chemical reactions and applications of chloroform, method of formation of aryl halides, nuclear and side chain reactions, synthesis and uses of BHC and DDT.

Topic –3:Methode of preparation, chemical reactions and Application of following: 4 Hrs

Ethanol elycerol, cresols, resorcinol, diethyl ether, formaldehyde, acetone, acetic acid, citric acid cinnamic acid, anthranilic acid, acetyl chloride, acetamide , acetic anhydride, aniline.

Topic –4: Problem based on different reactions: 2 Hrs

Reference Books:

(1)Deductive organic chemistry –A short course , Kenneth Conrow & R. N. Mcdonald, Edison Wesely pub. Co.
(2) Organic chemistry by R. T. Morrison , Boyd . R. N. Prentice Hall India.
(3) Basic principles of organic chemistry by J. D. Roberts & M. C. Caserio
(4) Organic chemistry Vol I & Vol II by I. L. Finear (Longman group)
(5) A Guide book to mechanism in organic chemistry, Peter Sykes, Orient Longman.
(6) Organic chemistry by M. K. Jain , Shobham lal naginchand.
(7) Organic chemistry by Bahl & Bhal.
(8) Fundamentals of organic chemistry by Soloman , John Wiely
(9) Organic Chemistry by F. A. Carey Mc. Graw Hill
(10) Organic chemistry Vol I & Vol II & Vol III by S. M. Mukharji , S. P. Singh, R. P. Kapoor, New age In.