VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus for on 2019

F. Y. B.Sc. Chemistry; Semester – I

(Paper : 01 : Inorganic & Physical Chemistry)

Total Hours : 30h

UNIT : 01 : SOLID STATE **10 h**

Definition of space lattice, Unit cell, Difference between crystalline and amorphous state, types of crystals with illustrations, Law of crystallography. Steno's law and laws of symmetry, lattice planes, Miller indices, Bravais indices, type of cubic system, diagrammatic representation of cubic system and d_{100}, d_{110}, d_{111} planes, Bragg's equation (X-ray diffraction), Crystal structure of NaCl, KCl.(Numerical based on Bragg'sequation and Miller indices)

Reference Books :

1. Essentials of physical chemistry by A. S. Bhal and G. D. Tuli, Pub : S. Chand
2. Advance physical chemistry by D. N. Bajpai, Pub : S. Chand
3. Numerical problems by Dogra and Dogra (for numerical)
4. A textbook of physical chemistry by A. S. Negi and S. C. Anand, Pub : New Age International (for numerical)

UNIT : 02

A. ACID – BASE THEORIES **04 h**

Arrhenius theory, Lowry Bronsted theory, Lewis theory, Solvent – Solute concept of acid-base, Soft-Hard acid base and its application.

Reference Books :

1. Essentials of physical chemistry by A. S. Bahl and G. D. Tuli, Pub : S. Chand

B. Atomic Structure **06 h**

Historical perspective of atomic structure; Ruatherford's atomic model, Bohr's theory and its limitation, Spectrum of Hydrogen atom (Lyman, Balmer, Paschen, Brackett &Pfund), Quantum numbers, Auf bau, Hund and Pauli exclusion principles, Penetration and shielding, Effective nuclear charge (Slater rule)

Reference Book :

1. University General Chemistry by C.N.R. Rao, Pub : McMillan
2. Principles of Physical Chemistry by Maron&Pruton, 4th edition, Pub: Oxford & IBH
3. Physical Chemistry by G. M. Barrow
4. Advance inorganic chemistry (Vol. II) by Satya Prakash, G. D. Tuli, S. K. Basu, R. D. Madan; Pub. S. Chand

UNIT : 03 :

A. CHEMICAL KINETICS **06 h**

Chemical kinetics and its scope, rate of reaction, factors affecting rate of reaction : temperature, concentration, pressure, solvent, light and catalyst, Molecularity of reaction, Classification of chemical reaction, Order of reaction with illustration (first order, second

order, third order, zero order, pseudo first order) reaction, : second order (a=b), half life and mean life.

Reference Books :

1. Essentials of physical chemistry by A. S. Bahl and G. D. Tuli, Pub : S. Chand
2. Advance physical chemistry by D. N. Bajpai, Pub : S. Chand
3. Numerical problems by D. V. S. Jain, Pub. McGraw Hill (for numerical)

B. PERIODIC PROPERTIES 04 h

Definition of atomic and ionic radii, ionisation energy, electron affinity and electron negativity, S-Block elements : Comparative study, diagonal relationship, salient features of hydrides.

Reference Books :

1. Modern inorganic chemistry by Gurdeep Raj
2. Principals of inorganic chemistry by Puri, Sharma and Kalia; Pub. Vishal publishing
3. Inorganic Chemistry by J. D. Lee

F. Y. B.Sc. Chemistry Practical syllabus 2019

Semester- I

A) ORGANIC SPOTTING

Primary tests, Ignition test, Detection of Elements, Nature of the substance (solubility test), Functionalgroup tests, C. T., Molecular formula, Structural formula & M. P./ B. P. of the givensubstance.

ACID – Benzoic, Phthalic acid, Succinic acid.

BASE – Aniline, p – Toluidine

PHENOL – Resorcinol, a Naphthol, b Naphthol

NEUTRAL –

CARBOHYDRATE – Glucose , Fructose

KETONE – Acetone, Acetophenone

ESTER – Methyl salicylate, Methylacetate

ALCOHOL – Methanol , Ethanol

HYDROCARBON – Toluene , Naphthalene

NITRO HYDROCARBON – Nitrobenzene, m-di-nitrobenzene

HALOGENATED HYDROCARBON – Carbon tetrachloride, Chlorobenzene,

AMIDE – Urea, Benzamide

ANILIDE – Acetanilide

N. B. Candidate should perform the analysis of at least 08 substances.

B) VOLUMETRIC EXERCISE

H_2SO_4	$NaHCO_3$	HNO_3
$KMnO_4$	$H_2C_2O_4$	KOH
$KMnO_4$	$FeSO_4$	$K_2Cr_2O_7$
$K_2Cr_2O_7$	$Fe\text{-}NH_4\text{-}SO_4$	$KMnO_4$
$H_2C_2O_4$	$KMnO_4$	$FeSO_4$

N. B. Candidate should perform at least 3 volumetric exercises.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Syllabus for on 2019

F. Y. B.Sc. Chemistry; Semester – II

(Paper : 01 : Inorganic & Physical Chemistry)

Total Hours : 30h

UNIT : 01

A. CONDUCTANCE AND IONIC EQUILIBRIUM **06 h**

Electrical conductance, Specific conductance, equivalent conductance, Molar conductance, Effect of dilution on concentration, Cell constant, Determination of Cell constant, Ostwald's dilution law and its limitations, Acid & Basic buffer actions (Henderson-Hasselbach equation), Buffer capacity, Numerical.

B. THERMODYNAMICS **04 h**

Second law of thermodynamics (in detail), Carnot cycle and its efficiency, Entropy concept, Change of entropy for reversible isothermic, isobaric, isochoric and adiabatic processes. Entropy change for ideal gases (T & V as variables, P & T as variables), Numerical.

Reference Book :

1. Physical Chemistry by ArunBahl, B. S. Bahl and G. D. Tuli; Pub. S. Chand
2. Advance physical chemistry by D. N. Bajpai; Pub : S. Chand
3. Text book of physical chemistry by P. L. Soni, O. P. Dharma; Pub. S. Chand

UNIT : 02 : **04 h**

A. BASIC PRINCIPLES OF QUALITATIVE ANALYSIS

[I] Dry Reaction : theory behind borax bead test with equation, Flame test (Theory, structure of non luminous Bunsen flame)

[II] Analysis of Cation : Application of common ion effect, solubility product constant. Complexometric reactions involved in qualitative analysis;

1. For identification [reaction between Cu(II) ion with ammonia, Fe(III) with thiocyanide, NH_4^+ with Nessler Reagent].

2. For masking [Cd^{+2}, Cu^{+2}].

3. Separation of two ions [Ag-Hg, Zn^{+2}, Mn^{+2}]

Reference Books :

1. Qualitative analysis by R. A. Day and A. L. Underwood
2. Vogel's qualitative Inorganic analysis

B. Coordination Chemistry **06 h**

Shape of d-orbitals, CFT – Basic assumption, splitting of d-orbitals in Octahedral, Tetrahedral, Square planer complexes, distribution of d^x electrons in Octahedral and Tertahedral complexes and CFSE.

Reference Book :

1. Inorganic chemistry by Wahid Malik, G. D. Tuli, R. D. Madan; Pub. S. Chand
2. Coordination Chemistry by GurdipChatwal, M. S. Yadav; Pub. Himalaya pub. house

3. Advance inorganic chemistry (Vol. II) by Satya Prakash, G. D. Tuli, S. K. Basu, R. D. Madan; Pub. S. Chand

UNIT : 03 :

[A] CHEMICAL BONDING **05 h**

Definition of chemical bonds (covalent, co-ordinate covalent, ionic, metallic, H-bond, Wan der walls forces of attraction), Polarisability (Fajan's rule), Molecular Orbital theory ; LCAO method, Bonding molecular orbital, non-bonding molecular orbital, anti-bonding molecular orbital, bond order, magnetic properties and molecular orbital energy level diagram of hetero diatomic molecule : CO and NO, VSEPR theory.

Reference Book :

1. Consise Inorganic Chemistry (5^{th} ed.) by J. D. Lee
2. Basic Inorganic Chemistry by Cotton & Wilkinson.
3. Inorganic Chemistry – Principles of structure and reactivity by J. E. Huheey, E. A. Keiter; Pub. Person Education Publishers.

[B] PHYSICAL PROPERTIES AND CHEMICAL CONSTITUTION **05 h**

Classification of physical properties (additive, constitutive, colligative, additive-constitutive), Atomic volume, Molar volume and Chemical constitution, Kopp's law, Surface tension, Drop number method, Parachor, Viscosity, Determination of viscosity by Ostwald viscometer, Define : Refraction, Specific refraction, molar refraction, Numerical.

Reference Book :

1. Principles of Physical chemistry by Puri, Sharma and Madan; Pub. Vishal publishing
2. Essentials of physical chemistry by A. S. Bhal and G. D. Tuli, Pub : S. Chand
3. Advance physical chemistry by D. N. Bajpai, Pub : S. Chand

F. Y. B.Sc. Chemistry Practical syllabus 2019
Semester-II

A. INORGANIC QUALITATIVE ANALYSIS

LIST OF INORGANIC CHEMICALS

CHLORIDES : Cu^{+2}, Fe^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}.

BROMIDES :Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}.

IODIDE :K^{+}

NITRATE :Pb^{+2}, Co^{+2}, Ni^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, $NH4^{+}$.

SULPHIDE : Zn^{+2}, Sb^{+3}.

SULPHATE : Cu^{+2}, Al^{+3}, Fe^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}.

CHROMATE : Na^{+}, K^{+}

CARBONATE : Cu^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+},NH_4^{+}

PHOSPHATE : Cu^{+2}, Al^{+3}, Fe^{+3}, Zn^{+2}, Mn^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+},NH_4^{+}

OXIDE : Sb^{+3}, Zn^{+2}

N. B. Candidate should perform the analysis of at least 8 compounds.

B. PREPARATIO OF STANDARD SOLUTION (BY STUDENTS) OF FOLLOWING.

1. 0.1 N succinic acid against NaOH
2. 0.1 N KHP against NaOH/KOH
3. 0.01 N $Na_2S_2O_3$ against I_2 solution
4. 0.1 N $H_2C_2O_4$ $2H_2O$ against $KMnO_4$ solution
5. 0.1 N $K_2Cr_2O_7$ against $FeSO_4.7H_2O$ Or$FeSO_4,(NH_4)_2SO_4$ $10H_2O$ solution

N. B. Candidate should perform at least 3 volumetric exercises.

Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat (India)
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન રસાયણશાસ્ત્ર વિષય ચલાવતી સ્નાતક કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૦–૨૧ અમલમાં આવનાર S.Y.B.Sc. Semester – III & IV ના સિલેબસ અંગે રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૩૦/૧૨/૨૦૧૯ નાં ઠરાવ ક્રમાંકઃ ૨ અન્વયે નીચે મુજબ ભલામણ કરેલ છે. જે ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલએ તેની તા.૩૦/૬/૨૦૨૦ ની સભાના **ઠરાવ ક્રમાંકઃ૨૮** અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવો.

રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૩૦/૧૨/૨૦૧૯ નાં ઠરાવ ક્રમાંકઃ ૨

:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ–૨૦૨૦–૨૧ થી અમલમાં આવનાર S.Y.B.Sc. Semester–III & IV નો અભ્યાસક્રમ સર્વાનુમતે મંજુર કરી તે મંજુર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૩૦/૦૬/૨૦૨૦ ની સભાનાં ઠરાવ ક્રમાંકઃ ૨૮

:: આથી ઠરાવવામાં આવે છે કે, રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિએ તેની તા.૩૦/૧૨/૨૦૧૯ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે ભલામણ કરેલ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ મંજૂર કરેલ શૈક્ષણિક વર્ષ–૨૦૨૦–૨૧ થી અમલમાં આવનાર S.Y.B.Sc. Semester–III & IV નો અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૫૮૦૬/૨૦૨૦
તા. ૧૫–૦૭–૨૦૨૦

ઈ.ચા. કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન રસાયણશાસ્ત્ર વિષય ચલાવતી સ્નાતક કોલેજોનાં આચાર્યશ્રીઓ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-III

(Effective from 2020-21)

Chemistry Paper-IV [Organic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] Organic Nitrogen compounds: **[6Hrs.]**

(i) Preparation and physical properties and chemical reactions of Nitriles, Isonitriles, Carbamates, Semicarbazides and their application in organic synthesis.

(ii) Structure and nomenclature of amines, Preparation of aryl amines, physical properties and chemical reactions.Gabriel-phthalimide reaction, Bromamide reaction.

[B] Carboxylic acid and its derivatives: **[4Hrs.]**

Structure and nomenclature of acid chloride, ester, amides of monocarboxylic acid; Mehod of formation of monocarboxylic acid derivatives and chemical reactions.

Unit-II

[A] Heterocyclic compounds: **[5Hrs.]**

(i) Classification and nomenclature :

(ii) Synthesis, Chemical properties and reactions of pyridine.

(iii) Skraup's synthesis and Friedlander synthesis of quinoline. Electrophilic substitution reactions, Nucleophilic substitution reactions, Oxidation reaction, Reduction reactions.

(iv) Synthesis, Reactivity and importance of Imidazole and Benzimidazole.

[B] Polycyclic aromatic Hydrocarbons: **[5Hrs.]**

(i) Classification and nomenclature :

(ii) Linear orthofused polycyclic hydrocarbons: Occurance, synthesis of Tetracene, Pentacene and Hexacene.

(iii) Non-linear orthofused polycyclic hydrocarbons: Occurance, synthesis of 1,2-benzanthracene, 1,2,5,6-di benzanthracene.

(iv) Ortho-perifused polycyclic hydrocarbons: Occurance, synthesis of of Pyrene, Perylene and Coronene.

Unit-III

[A] Diazonium salts: **[6Hrs.]**

(i)Mechanism of diazotisation and method of preparation of diazonium salts.

(ii) Nomenclature of diazonium salts.

(iii) Reactions of diazonium salts., Replacement reactions in which nitrogen atom is eliminated and reactions in which nitrogen atoms are retained

Application of diazonium salts. In the synthesis of aromatic compounds.

(iv) Laws of coupling , coupling agents, Definition of diazoamino and aminoazo compounds.

(v) Synthesis and uses of : Methyl orang,Methyl red, congo red and Erichrome Black-T.

[B] Use of reagents: **[4Hrs.]**

Synthesis and applications of following reagents.

(i) Anhydrous aluminium chloride
(ii) N-bromo succinimide
(iii) Selenium dioxide
(iv) Lithium aluminium hydride.

Reference books:

(1) Organic Chemistry by R.T.Morison and R.N. Boyd, Prentice Hall India.
(2) Organic Chemistry vol-I & II by I.L.Finar.
(3) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(4) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.
(5) Organic Chemistry by S.H.Pine
(6) Reaction Mechanism In Organic chemistry by S.M. Mukharji & S.P. Singh.
(7) Organic Chemistry by L.G. Wade Jr. Pretice Hall.

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-IV

(Effective from 2020-21)

Chemistry Paper-IV [Organic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] NAME REACTIONS: **[7Hrs.]**

General nature, Reaction mechanism and applications of the following reactions:

(1) Fridle Craft reaction
(2) Aldol condensation
(3) Dickmann reaction
(4) Michael reaction
(5) Wolf-Kishner reduction
(6) Mannich Reaction
(7) Reimer Tiemann reaction
(8) Wittig reaction

[B] Elimination reaction: **[3Hrs.]**

Introduction, β-elimination, E1-mechanism, E2-mechanism, Stereo chemistry of elimination reactions, Elimination v/s substitution,

α-elimination, Generation of carbenes and Ketenes.

Unit-II

[A] Carbohydrates: **[5Hrs.]**

(a) General introduction:
(b) Disaccharides: Structure elucidation of maltose, lactose and sucrose
(c) Methods of methylating sugar.

[B] Compounds containing reactive methylene group: **[5Hrs.]**

(a) Malonic ester: Preparation from acetic acid and its synthetic applications (n-butyric acid, n-caproic acid, succinic acid, adipic acid, cinnamic acid and barbituric acid)

(b) Acetoacetic ester (Ethyacetoacetate): Preparation and synthetic applications

(butanone, 1,3 and 1,4-diketone, alicyclic compound.)

(c) Keto-enol tautomerism: Factors affecting keto-enol tautomerism and its mechanism.

Unit –III

[A] Organic Sulpher compounds: **[4Hrs.]**

(a) Aliphatic sulphur : Nomenclature, General methods of preparation and reactions of mercaptans, thioethers, sulfinic acid and sulfonic acids

(b) Aromatic Sulfonic acid: Nomenclature, General methods of preparation and uses of sulfonic acids of toluene.

[B] Electromagnetic spectrum: **[6Hrs.]**

UV and visible spectroscopy, Ultraviolet absopion spectroscopy, absorption laws,(Beer-Lambert law) terminology used in UV and visible spectra,Molar absorptivity, Types of electronic transitions, effect of conjugation, concept of chromophore and Auxochrome and hypsochromic shifts UV spectra of conjugated enes and enones, effect of solvent substitution on electronic transition. Problems based on calculation of λ max for conjugated dienes and unsaturated carbonyl compounds and substituted benzene derivatives using relevant rule.

Reference books:

(1) Organic Chemistry by R.T.Morison and R.N. Boyd, Prentice Hall India.
(2) Organic Chemistry vol-I & II by I.L.Finar.
(3) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(4) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.
(5) Organic Chemistry by S.H.Pine
(6) Reaction Mechanism In Organic chemistry by S.M. Mukharji & S.P. Singh.
(7) Organic Chemistry by L.G. Wade Jr. Pretice Hall.

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc. Semester-III

(Effective from 2020-21)

Chemistry Paper-III [Inorganic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

[A] Chemistry of Elements of first transition elements : **[5 Hrs.]**

Characteristics properties of d-block elements, properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states.

[B] Electronic configuration of atom; L-S coupling: **[5 Hrs.]**

Introduction, L-S coupling, J-J coupling (introduction), Term symbol, Determination of microstate of P^2, P^3 system, Term symbol of C, N, O, Ni, Ni^{2+}, Fe, Fe^{2+}, Fe^{3+}, Cr, Cr^{3+}, Co^{2+} V, V^{3+} and Cl^-.

UNIT-II

[A] Purification of water **[5 Hrs.]**

Classification and composition of water (tap water, mineral water, portable water, distilled water). Different methods of purification of water for potable and industrial purposes, Soft and hard water. Desalination of sea water by reverse osmosis and electro dialysis.

[B] Paper chromatography : **[5 Hrs.]**

Principles of chromatography, Classification of chromatography according to mobile phase and stationary phase. Types of paper chromatography, one dimensional, two dimensional and radial paper chromatography, R_f value, Use of paper chromatography in inorganic analysis (I, IIA, IIIB, IV, and halides).

UNIT-III

Quantum Mechanics **[10Hrs.]**

[A] Derivation of the time independent Schrodinger equation, Wave function and probability function, Well behaved wave function, Particle in one –dimensional box and its importance.

[B] Operators (definition and derivation), Linear operators, Commutator operators, Vector operators, Laplacian operators, Hamiltonian operators, Hermition operators. Derivation of Hamiltonian equation, Hamiltonian operators for H atom H_2^+, He^{2+} and Li.

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
6. Inorganic Chemistry by R. B. Heslop and P. L. Robinson Elsevier Pub. Co. NY.
7. Physical Methods Inorganic Chemistry by R. S. Drago, W.B.S. Saunders Co. London, Reinhold Pub. Co. NY.
8. Basic Concepts of Analytical Chemistry by S. M. Khopkar, Wiely Estern Ltd. New Delhi.
9. Quantitative Analysis Day & Underwood Prentice Hall of India, Pvt. Ltd.
10. Instrumental Method of Analysis B. K. Sharma, Krishna Pub. House, Merrut.
11. Principles of Inorganic Chemistry (Puri, Sharma, Kalia).
12. Enviornmental Chemistry, By S. K. Banerji. Prentice Hall India Pvt. Ltd.
13. Progressive Inorganic Chemistry, Suratkar, Thatte, Pandit, Ideal Book Service, Poona.
14. Advanced Inorganic Chemistry Vol. I & II by Gurudeep Raj, Goel Pub. House, Meerut.
15. Quantum Chemistry Ir. N. Levine, Prentice Hall.
16. Advanced Inorganic Chemistry by Cotton & Wilkinson John Wihn Wiely.
17. Introduction to Chromatography Theory and Practice by V. K. Srivastava and K. K. Srivastava - S. Chand Pub.
18. Environmental Chemistry by. A. K. De.
19. Industrial Chemistry by B. K. Sharma

20. Inorganic chemistry by Gray L. Miessler, Donald A. Tarr, 3rd addition, Pearson publication.

21. General and Inorganic chemistry (part-I & II) by R. Sarkar, Books and Allied (P) ltd.

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc. Semester-IV

(Effective from 2020-21)

Chemistry Paper-III [Inorganic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

[A] Chemistry of Lanthanide and Actinide Elements : **[10Hrs.]**

(a) Lanthanide and Actinide Elements, Electronic configuration, Sources. Occurrence, Extraction by solvent and ion exchange, Properties (Spectral and Magnetic).

(b) Lanthanide contraction, Use of Lanthanide compounds. Industrial use Uranium and Plutonium, Mitch metal.

UNIT-II

[A] Hydrogen Bonding : **[4 Hrs.]**

Theory of hydrogen bonding, classification, importance of hydrogen bonding in ice, Effect of hydrogen bonding in various fields.

[B] Metal Complexes: **[6 Hrs.]**

Introduction, Werner's coordination theory, CFSE, Factors affecting on CFSE, Application of CFT (Magnetic properties, Spectral properties)

Nomenclature of complexes (Nomenclature rules, Examples of Common monodentate and multidentate ligands).

UNIT-III

[A] Ion-exchange chromatography: **[6Hrs.]**

Synthesis and Characterization of ion exchanger, Basic requirements of ion exchange resin. Types of ion-exchange resin. Technique of ion exchange, Application of ion exchange for Separation.

[B] Non aqueous solvents : **[4Hrs.]**

Introduction, classification of solvents, Properties characterising of solvents, protonic non aqueous solvents (liquid ammonia, anhydrous sulphuric acid), aprotic solvents (liquid SO_2).

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
6. Inorganic Chemistry by R. B. Heslop and P. L. Robinson Elsevier Pub. Co. NY.
7. Physical Methods Inorganic Chemistry by R. S. Drago, W.B.S. Saunders Co. London, Reinhold Pub. Co. NY.
8. Basic Concepts of Analytical Chemistry by S. M. Khopkar, Wiely Estern Ltd. New Delhi.
9. Quantitative Analysis Day & Underwood Prentice Hall of India, Pvt. Ltd.
10. Instrumental Method of Analysis B. K. Sharma, Krishna Pub. House, Merrut.
11. Principles of Inorganic Chemistry (Puri, Sharma, Kalia).
12. Enviornmental Chemistry, By S. K. Banerji. Prentice Hall India Pvt. Ltd.
13. Progressive Inorganic Chemistry, Suratkar, Thatte, Pandit, Ideal Book Service, Poona.
14. Advanced Inorganic Chemistry Vol. I & II by Gurudeep Raj, Goel Pub. House, Meerut.
15. Quantum Chemistry Ir. N. Levine, Prentice Hall.
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Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc. Semester-III

(Effective from 2020-21)

Chemistry Paper-V [Physical Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] THEORIES OF REACTION RATE **[4Hrs.]**

Derivation of Arhenius equation. Collision theory of reaction rate, Energy of activation including determination, Effect of catalysis on energy activation.

Numerical problems

[B] PHOTOCHEMISTRY **[6Hrs.]**

Introduction of photochemistry, Basics of electromagnetic radiations, Photons, Thermal and photochemical laws

(a) Grothus Draper's law
(b) Lambert Beer's law
(c) Einstein's law of photochemical equivalence . Quantum yield or efficiency. Experimental determination of Quantum yields. Reasons of low and high quantum yield. Numerical problems
Primary and secondary photochemical reactions. Factors affecting quantum yield. (i.e. temperature, light intensity and inert gases).
Isomeric changes, Polymerisation, Photosensitization, Photo physical process [Fluorescence, Phosphorescence]. Hemilunescene. Factor affecting Fluorescence, Phosphorescence.

Unit-II

ELECTROLYTES OR ELECROCHEMISTRY **[10Hrs.]**

Ions in solution, formation of ion in solution metallic conductance, Electrolytic conductance, Electrolysis migration of ions, Transport number of ions and its determination by moving boundary method.

Kohlraush law of ionic conductance. Application of Kohlraush law to

(a) Determination of degree of dissociation of weak electrolyte.
(b) Determination of equivalent conductivity of weak electrolyte at infinite dilution
(c) Determination of solubility and solubility product of sparingly soluble salts.
(d) Determination of of ionic product of water.

Numerical problems

Unit-III

MOLECULAR SPECTROSCOPY **[10Hrs.]**

Electromagnetic radiation with wave length and energy. Radio frequency, Microwave, IR, UV-visible region,

Pure rotational spectra, Vibrational and Vibrational-Rotational spectra. Raman spectra,

Rotational spectra, calculation of bond length. Vibrational rotational spectra, Hook'slaw, Vibrational energy level.

Numerical Problems.

References:

1. Physical chemistry by Gurdeep Raj.
2. Physical chemistry by K.L.Kapoor vol.-I to IV [Pub. Macmilan]
3. Advanced Physical chemistry by D.N.Bajpai.
4. Text book of Physical chemistry by S.C. Khetepal & Yogeshwar Sharma. [Pub. R.Chand]
5. Physical chemistry by Puri & Sharma[S.Nagin & Co.]
6. A text book of Physical chemistry by A.S.Negi & Anand [New age International]
7. Physical chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical chemistry by B.K.Sharma.
9. Essential of Physical chemistry by Bahl Tuli &Bahl.
10. Elemental Physical chemistry byGlasston & Lewis.
11. Physical chemistry by K.K.Sharma, L.K.Sharma [Vikas Publication House, New Delhi.]

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-IV
(Effective from 2020-21)
Chemistry Paper-V [Physical Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] PARTITION CO-EFFICINT **[4Hrs.]**

Explanation of Nenst distribution law and its conditions for the validity.

Complications arising in distribution law:

(a) Association of solute in one of the phases.
(b) Dissociation of solute in one the phases.
(c) Dissociation of solute in both the phases.

Derivation of distribution law from kinetic consideration

explanation of solvent extraction process.

Numerical Problems

[B] ADSORPTION **[6Hrs.]**

Adsorption and absorption, Heat of adsorption, Characteristics of

adsorption, Physical adsorption and chemical adsorption.

Distinction between physical adsorption and chemical adsorption,

Freundlich's adsorption isotherm, Langmuir's adsorption

isotherm. Catalysis, General features of catalysis.

Heterogeneous catalysis, Adsorption theory of catalysis.

Unit-II

THEMODYNAMICS : **[10Hrs.]**

Free energy or work function[Gibbs free energy(G) and Helmholtz free energy (A). Derivation Gibbs Hemholtz equation.

Derivation of G=G0+RTlnp. Hemholtz equation, Relation of ΔG and equilibrium constant Kp (Vant Hoff isotherm and isochore

Derivation of Clapeyron and Clapeyron-Clauius equation.

Application of Clapeyron-Clausius equation inthe derivation of Molal elevation constant & Molal depression constant. Numerical problem

Unit-III

[A] CONDUCTOMETRIC TITRATIONS: **[5Hrs.]**

Principle, Types of conductometric titrations:

(a) Strong acid v/s strong base
(b) Strong acid v/s weak base
(c) Weak acid v/s strong base
(d) Weak acid v/s weak base
(e) Mixture of Strong acid and weak acid v/s strong base
(f) Precipitation titration of
(i) $BaCl_2$ v/s K_2CrO_4 (ii) NaCl v/s $AgNO_3$

Advantages of conductometric titrations over indicator method

[B] IONIC EQUILIBRIA **[5Hrs.]**

Relation between degree of hydrolysis, Hydrolysis constant and pH of solutions of:

(a) Salts of weak acid v/s strong base
(b) Salts of strong acid v/s weal base
(c) Salts of weak acid v/s weak base

Theories of acid-base indicators. Oswald and Quinonoid theories,

Choice of indicators, Indicator exponent and useful range of pH of an indicator.

Numerical Problems

References:

1. Physical chemistry by Gurdeep Raj.
2. Physical chemistry by K.L.Kapoor vol.-I to IV [Pub. Macmilan]
3. Advanced Physical chemistry by D.N.Bajpai.
4. Text book of Physical chemistry by S.C. Khetepal & Yogeshwar Sharma. [Pub. R.Chand]
5. Physical chemistry by Puri & Sharma[S.Nagin & Co.]
6. A text book of Physical chemistry by A.S.Negi & Anand [New age International]
7. Physical chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical chemistry by B.K.Sharma.
9. Essential of Physical chemistry by Bahl Tuli &Bahl.
10. Elemental Physical chemistry byGlasston & Lewis.
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Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-III

(Effective from 2020-21)

Industrial Chemistry

Generic Elective Course

50 Marks [External] **Total =30 Hrs**

20 Marks [Internal]

Unit-I **[10Hrs.]**

[A] Synthetic fibers with flowsheet diagram:

(1) Tetrafluoroethylene, Teflon (2) Nylon-6,10 (3) DMT, Ethyleneglycol, Terylene

[B] Synthetic rubbers with flow sheet diagram:

(1) Isoprene, Polyisoprene (2) Silicone Rubber (3) Polyurethane rubber

[C] Plastics and Resins with flow sheet diagram:

(1) Urea formaldehyde resin, Bakelite (2) Vinylchloride, PVC (3) Vinylalcohol, Polyvinyl alcohol (4) Melamine and melamine resin (5) Bisphenol-A, Epoxy resin (6) Propylene, Polypropylene

Unit-II **[10Hrs.]**

[A] Detergents:

(1) Propylene tetramer (2) ABS (3) LAS

[B] Explosives:

(1) RDX (2) Nitrocellulose (3) Glyceryl trinitrate (4) Trinitro phenol (5) TNT (6) Ammitol

Unit-III **[10Hrs.]**

[A] Synthetic drugs:

(1) Novacaine (2) Novalgin (3) Paludrine (4) Paracetamol (5) Sulphatiazole (6) Benadryl (Diphenyl hydramine)

[B] Synthetic dyes:

(1) 3-phenyl, 7-methoxy coumarine (2) Blankophore-B (3) Eriochrome Black-T

(4) Eosin (5) Alizarine (6) Indanthrene khaki-GG

[C] Acetylene: (1) Wulff Process (2) Sachsse Process

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-IV

(Effective from 2020-21)

Industrial Chemistry

Generic Elective Course

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I **[10Hrs.]**

[A] Inorganic Chemicals:

(1) Red Phosphorus (2) Sodium hexametaphosphate

(3) PCl_5 (4) Phosphoric acid

[B] Industrial Preparation and uses of:

(1) Potassium permanganate (2) Bleaching powder by Bachmann's method

Unit-II **[10Hrs.]**

[A] Fertilizers:

Definition and classification of fertilizers, Direct and indirect fertilizers, Natural and synthetic fertilizer, Symptoms of deficiency of some elements like N, K, and P.

Industrial Preparation of: Ammonium sulphate

Hazadous effect of used of fertilizers and its preventive measures, Mixed fertilizers, Complex fertilizers, Fertilizers grades, Fertilizers ratio, Fertilizers condition, Fertilizers filter.

Unit-III **[10Hrs.]**

[A] Glasses: Classification, properties and uses of glasses

[B] Non Ferrous alloys : Monel metal, Duralumin,Wood metal, Babit metal, Phosphorus bronze, Brass, German silver

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-III
(Effective from 2020-21)
Chemistry Practicals

60 Marks [External] **Uni.Exam 2 days**

30 Marks [Internal]

Gravimetric Estimation of

(1) Fe^{2+} as Fe_2O_3 (Given solution of $Fe\text{-}NH_4\text{-}SO_4 + H_2SO_4$)
(2) Ba^{2+} as $BaSO_4$ (Given solution of $BaCl_2\ 2H_2O$ +HCl)
(3) Ni^{2+}as Ni (DMG)2 (Given solution of $NiCl_2\ 6H_2O$ +HCl)

VOLUMETRIC EXERCISE (Any three)

(1) To determine the amount of Nickel by EDTA.
(2) To determine the amount of Copper by EDTA.
(3) To determine the amount of Zinc by EDTA.
(4) Determination of total hardness of water by EDTA.

ORGANIC SPOTTING [Minimum 8 organic substances]

ACID : Salicylic acid, Cinnamic acid, Phenyl acetic acid, Sulphanilic acid.

PHENOL: α -Naphthol, β -Naphthol, o-Nitrophenol

BASE: o-Nitroaniline, m-Nitroaniline, p-Nitroaniline, p-Toludine, p-Chloroaniline,

Diphenyl amine, Dimethylaniline, Diethylaniline

NEUTRAL:

ALDEHYDE: Glucose, Benzaldehyde

KETONE: Methylethylketone, Acetophenone

ESTER: Ethylacetate, Butylacetate

ALCOHOL: Ethanol, Butanol

HYDROCARBON: Anthracene, Naphthalene, Diphenyl

NITRO HYDROCARBON: m-Dinitrobenzene, Nitrobenzene

HALOGENATED HYDROCARBON: Chlorobenzene, Bromobenzene, p-Dichlorobenzene

AMIDE: Benzamide, Thiourea

ANILIDE: Acetanilide

PHYSICAL PRACTICALS:

1. pH metry: To determine the normality of weak acid pH-metrically using strong base. [$CH_3COOH \rightarrow NaOH$]

2 Conductometric Titration:

(i) To determine the normality of strong acid condutometrically using strong base [$HCl \rightarrow NaOH$]

3 Conductometric Titration:

To determine the solubility of $PbSO_4$.

4 Viscosity :

To determine the viscosity of the liquids and the % of unknown mixture 'C'.

5. Chemical kinetics- Ester hydrolysis:

To study the hydrolysis of methyl acetate at two different concentration in 0.5N HCl. [mono molecular reaction]

6 . Partition co-efficient

Minimum 3 experiments should be performed in a semester.

 # At least one electrical instrumental exercise should be performed per Semester.

Veer Narmad South Gujarat University, Surat

Proposed Syllabus for S.Y.B. Sc.; Semester-IV
Chemistry Practicals

60 Marks [External] **Uni.Exam 2 days**

30 Marks [Internal]

INORGANIC QUALITATIVE ANALYSIS: [Minimum 8 inorganic mixtures]

LIST OF INORGANIC CHEMICALS USED FOR INORGANIC QUALITATIVE ANALYSIS:

CHLORIDES: Bi^{+3}, Cu^{+2}, Cd^{+2}, Fe^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

BROMIDES: Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

IODIDES: K^{+}

NITRITES: Na^{+}, K^{+}

NITRATES: Bi^{+3}, Pb^{+2}, Co^{+2}, Ni^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

SULPHITES: Na^{+}

SULPHIDE: Zn^{+2}, Sb^{+3}

SULPHATES: Cu^{+2}, Cd^{+2}, Fe^{+2}, Al^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Zn^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

CARBONATES: Pb^{+2}, Bi^{+3}, Cu^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

PHOSPHATES: , Cu^{+2}, Al^{+3}, Fe^{+3}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

Inorganic qualitative analysis of mixture containing four radicals. The mixture may be soluble in water or dilute hydrochloric acid or concentrated hydrochloric acid excluding Arsenite, Arsenate ,Chromates and Borate.

The following exercises should not be asked in the university examination

1. Calibration of burette 50ml., Pipette 5ml,10ml. & 25 ml., Measuring flasks 100 ml. & 250 ml.

ORGANIC ESTIMATIONS (Any 3 estimations should be done)

1. T o determine the amount of acetamide in the given solution hydrolysis by NaOH.
2. To determine the amount of phenol/ Aniline in the given solution by bromination.
3. To determine the number of -COOH group of given carboxylic acid.
4. Percentage purity of l-ascorbic acid (Vitamin-c)

***Organic Preparation: (Minimum 3 should be done)**

1. Anthraquinone from Anthracene
2. m-Dinitrobenzene from Benzene
3. p-Bromoacetanilide fron Acetanilide
4. Naphthalene picrate from Naphthalene.

N.B. Preparation should be submitted with sample and justification (M.P. & C.T.)

OR

***Type of water insoluble organic solid mixture (Any four type)**

PHYSICAL PRACTICALS:

1. pH metry: To determine the normality of given mix acid in $H\overline{Ac}$ + HCl pH-metrically using strong base.

2 Conductometric Titration:

(i) To determine the normality of given mixture ($H\overline{Ac}$ +HCl) solution by

Condutometric titration with the given 0.1N NaOH solution.

3 Heat of solution

To determine the heat of solution of organic acid (benzoic acid, phthalic

acid) by finding the solubility of the acid at two different temperature

4 Surface Tension:

To determine the parachor of –CH2 group of liquid: (Benzene, Toluene, Xylene)

5. Adsorption:
   To study the adsorption of given organic acid (Acetic acid/ oxalic acid) on animal charcoal..

6. Relative strength:

To study the relative strength of two acids H_2SO_4 and HCl.

7. pH metry: Determination of Ka of weak acid

To determination of ionisation constant of weak acid

Minimum 3 experiments should be performed in a semester.

 # Atleast one electrical instrumental exercise should be performed per semester.

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc. Semester-III

(Effective from 2020-21)

Chemistry Paper-III [Inorganic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

[A] Chemistry of Elements of first transition elements : [5 Hrs.]

Characteristics properties of d-block elements, properties of the elements of the first transition series, their binary compounds and complexes illustrating relative stability of their oxidation states.

[B] Electronic configuration of atom; L-S coupling: [5 Hrs.]

Introduction, L-S coupling, J-J coupling (introduction), Term symbol, Determination of microstate of P^2, P^3 system, Term symbol of C, N, O, Ni, Ni^{2+}, Fe, Fe^{2+}, Fe^{3+}, Cr, Cr^{3+} , Co^{2+} V, V^{3+} and Cl^-.

UNIT-II

[A] Purification of water [5 Hrs.]

Classification and composition of water (tap water, mineral water, portable water, distilled water). Different methods of purification of water for potable and industrial purposes, Soft and hard water. Desalination of sea water by reverse osmosis and electro dialysis.

[B] Paper chromatography : [5 Hrs.]

Principles of chromatography, Classification of chromatography according to mobile phase and stationary phase. Types of paper chromatography, one dimensional, two dimensional and radial paper chromatography, R_f value, Use of paper chromatography in inorganic analysis (I, IIA, IIIB, IV, and halides).

UNIT-III

Quantum Mechanics [10Hrs.]

[A] Derivation of the time independent Schrodinger equation, Wave function and probability function, Well behaved wave function, Particle in one –dimensional box and its importance.

[B] Operators (definition and derivation), Linear operators, Commutator operators, Vector operators, Laplacian operators, Hamiltonian operators, Hermition operators. Derivation of Hamiltonian equation, Hamiltonian operators for H atom H_2^+, He^{2+} and Li.

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
6. Inorganic Chemistry by R. B. Heslop and P. L. Robinson Elsevier Pub. Co. NY.
7. Physical Methods Inorganic Chemistry by R. S. Drago, W.B.S. Saunders Co. London, Reinhold Pub. Co. NY.
8. Basic Concepts of Analytical Chemistry by S. M. Khopkar, Wiely Estern Ltd. New Delhi.
9. Quantitative Analysis Day & Underwood Prentice Hall of India, Pvt. Ltd.
10. Instrumental Method of Analysis B. K. Sharma, Krishna Pub. House, Merrut.
11. Principles of Inorganic Chemistry (Puri, Sharma, Kalia).
12. Enviornmental Chemistry, By S. K. Banerji. Prentice Hall India Pvt. Ltd.
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Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc. Semester-IV

(Effective from 2020-21)

Chemistry Paper-III [Inorganic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

[A] Chemistry of Lanthanide and Actinide Elements : [10Hrs.]

(a) Lanthanide and Actinide Elements, Electronic configuration, Sources. Occurrence, Extraction by solvent and ion exchange, Properties (Spectral and Magnetic).

(b) Lanthanide contraction, Use of Lanthanide compounds. Industrial use Uranium and Plutonium, Mitch metal.

UNIT-II

[A] Hydrogen Bonding : [4 Hrs.]

Theory of hydrogen bonding, classification, importance of hydrogen bonding in ice, Effect of hydrogen bonding in various fields.

[B] Metal Complexes: [6 Hrs.]

Introduction, Werner's coordination theory, CFSE, Factors affecting on CFSE, Application of CFT (Magnetic properties, Spectral properties)

Nomenclature of complexes (Nomenclature rules, Examples of Common monodentate and multidentate ligands).

UNIT-III

[A] Ion-exchange chromatography: [6Hrs.]

Synthesis and Characterization of ion exchanger, Basic requirements of ion exchange resin. Types of ion-exchange resin. Technique of ion exchange, Application of ion exchange for Separation.

[B] Non aqueous solvents : [4Hrs.]

Introduction, classification of solvents, Properties characterising of solvents, protonic non aqueous solvents (liquid ammonia, anhydrous sulphuric acid), aprotic solvents (liquid SO_2).

Reference Books:

1. Introductory Quantum Chemistry by A. K. Chandra, Tata Mc. Graw Hill Delhi.
2. Atomic Structure and Chemical Bond by Manos Chandra, Tata Mc. Graw Hill Pub. Co. Ltd.
3. Theoretical Inorganic Chemistry by M. C. Day & J. Selbin Affiliated, East West Pub. Pvt. Ltd.
4. Coordination Compounds (Studies in Modern Chemistry) S. F. A. Kettle, Nelson.
5. Inorganic Chemistry by (Principles of Structure and Reactivity) James E. Huhely, Harper International (NY).
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Veer Narmad **South Gujarat University, Surat**

Syllabus for S.Y.B. Sc.; Semester-III

(Effective from 2020-21)

Chemistry Paper-IV [Organic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] Organic Nitrogen compounds: **[6Hrs.]**

(i) Preparation and physical properties and chemical reactions of Nitriles, Isonitriles, Carbamates, Semicarbazides and their application in organic synthesis.

(ii) Structure and nomenclature of amines, Preparation of aryl amines, physical properties and chemical reactions.Gabriel-phthalimide reaction, Bromamide reaction.

[B] Carboxylic acid and its derivatives: **[4Hrs.]**

Structure and nomenclature of acid chloride, ester, amides of monocarboxylic acid; Mehod of formation of monocarboxylic acid derivatives and chemical reactions.

Unit-II

[A] Heterocyclic compounds: **[5Hrs.]**

(i) Classification and nomenclature :

(ii) Synthesis, Chemical properties and reactions of pyridine.

(iii) Skraup's synthesis and Friedlander synthesis of quinoline. Electrophilic substitution reactions, Nucleophilic substitution reactions, Oxidation reaction, Reduction reactions.

(iv) Synthesis, Reactivity and importance of Imidazole and Benzimidazole.

[B] Polycyclic aromatic Hydrocarbons: **[5Hrs.]**

(i) Classification and nomenclature :

(ii) Linear orthofused polycyclic hydrocarbons: Occurance, synthesis of Tetracene, Pentacene and Hexacene.

(iii) Non-linear orthofused polycyclic hydrocarbons: Occurance, synthesis of 1,2-benzanthracene, 1,2,5,6-di benzanthracene.

(iv) Ortho-perifused polycyclic hydrocarbons: Occurance, synthesis of of Pyrene, Perylene and Coronene.

Unit-III

[A] Diazonium salts: [6Hrs.]

(i)Mechanism of diazotisation and method of preparation of diazonium salts.

(ii) Nomenclature of diazonium salts.

(iii) Reactions of diazonium salts., Replacement reactions in which nitrogen atom is eliminated and reactions in which nitrogen atoms are retained

Application of diazonium salts. In the synthesis of aromatic compounds.

(iv) Laws of coupling , coupling agents, Definition of diazoamino and aminoazo compounds.

(v) Synthesis and uses of : Methyl orang,Methyl red, congo red and Erichrome Black-T.

[B] Use of reagents: [4Hrs.]

Synthesis and applications of following reagents.

(i) Anhydrous aluminium chloride
(ii) N-bromo succinimide
(iii) Selenium dioxide
(iv) Lithium aluminium hydride.

Reference books:

(1) Organic Chemistry by R.T.Morison and R.N. Boyd, Prentice Hall India.
(2) Organic Chemistry vol-I & II by I.L.Finar.
(3) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(4) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.
(5) Organic Chemistry by S.H.Pine
(6) Reaction Mechanism In Organic chemistry by S.M. Mukharji & S.P. Singh.
(7) Organic Chemistry by L.G. Wade Jr. Pretice Hall.

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc.; Semester-IV

(Effective from 2020-21)

Chemistry Paper-IV [Organic Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] NAME REACTIONS: [7Hrs.]

General nature, Reaction mechanism and applications of the following reactions:

(1) Fridle Craft reaction
(2) Aldol condensation
(3) Dickmann reaction
(4) Michael reaction
(5) Wolf-Kishner reduction
(6) Mannich Reaction
(7) Reimer Tiemann reaction
(8) Wittig reaction

[B] Elimination reaction: [3Hrs.]

Introduction, β-elimination, E1-mechanism, E2-mechanism, Stereo chemistry of elimination reactions, Elimination v/s substitution,

α-elimination, Generation of carbenes and Ketenes.

Unit-II

[A] Carbohydrates: [5Hrs.]

(a) General introduction:
(b) Disaccharides: Structure elucidation of maltose, lactose and sucrose
(c) Methods of methylating sugar.

[B] Compounds containing reactive methylene group: [5Hrs.]

(a) Malonic ester: Preparation from acetic acid and its synthetic applications (n-butyric acid, n-caproic acid, succinic acid, adipic acid, cinnamic acid and barbituric acid)

(b) Acetoacetic ester (Ethyacetoacetate): Preparation and synthetic applications

(butanone, 1,3 and 1,4-diketone, alicyclic compound.)

(c) Keto-enol tautomerism: Factors affecting keto-enol tautomerism and its mechanism.

Unit –III

[A] Organic Sulpher compounds: [4Hrs.]

(a) Aliphatic sulphur : Nomenclature, General methods of preparation and reactions of mercaptans, thioethers, sulfinic acid and sulfonic acids

(b) Aromatic Sulfonic acid: Nomenclature, General methods of preparation and uses of sulfonic acids of toluene.

[B] Electromagnetic spectrum: [6Hrs.]

UV and visible spectroscopy, Ultraviolet absopion spectroscopy, absorption laws,(Beer-Lambert law) terminology used in UV and visible spectra,Molar absorptivity, Types of electronic transitions, effect of conjugation, concept of chromophore and Auxochrome and hypsochromic shifts UV spectra of conjugated enes and enones, effect of solvent substitution on electronic transition. Problems based on calculation of λ max for conjugated dienes and unsaturated carbonyl compounds and substituted benzene derivatives using relevant rule.

Reference books:

(1) Organic Chemistry by R.T.Morison and R.N. Boyd, Prentice Hall India.
(2) Organic Chemistry vol-I & II by I.L.Finar.
(3) Organic Chemistry vol-I & II by B.K.Sharma, Goel pub. House, Merrut
(4) Reaction and reagents In Organic synthesis by O.P.Agrawal Goel pub. House, Merrut.
(5) Organic Chemistry by S.H.Pine
(6) Reaction Mechanism In Organic chemistry by S.M. Mukharji & S.P. Singh.
(7) Organic Chemistry by L.G. Wade Jr. Pretice Hall.

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc. Semester-III

(Effective from 2020-21)

Chemistry Paper-V [Physical Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] THEORIES OF REACTION RATE [**4Hrs.]**

Derivation of Arhenius equation. Collision theory of reaction rate, Energy of activation including determination, Effect of catalysis on energy activation.

Numerical problems

[B] PHOTOCHEMISTRY [**6Hrs.]**

Introduction of photochemistry, Basics of electromagnetic radiations, Photons, Thermal and photochemical laws

(a) Grothus Draper's law
(b) Lambert Beer's law
(c) Einstein's law of photochemical equivalence . Quantum yield or efficiency. Experimental determination of Quantum yields. Reasons of low and high quantum yield. Numerical problems
Primary and secondary photochemical reactions. Factors affecting quantum yield. (i.e. temperature, light intensity and inert gases).
Isomeric changes, Polymerisation, Photosensitization, Photo physical process [Fluorescence, Phosphorescence]. Hemilunescene. Factor affecting Fluorescence, Phosphorescence.

Unit-II

ELECTROLYTES OR ELECROCHEMISTRY [**10Hrs.]**

Ions in solution, formation of ion in solution metallic conductance, Electrolytic conductance, Electrolysis migration of ions, Transport number of ions and its determination by moving boundary method.

Kohlraush law of ionic conductance. Application of Kohlraush law to

(a) Determination of degree of dissociation of weak electrolyte.
(b) Determination of equivalent conductivity of weak electrolyte at infinite dilution
(c) Determination of solubility and solubility product of sparingly soluble salts.
(d) Determination of of ionic product of water.

Numerical problems

Unit-III

MOLECULAR SPECTROSCOPY [**10Hrs.]**

Electromagnetic radiation with wave length and energy. Radio frequency, Microwave, IR, UV-visible region,

Pure rotational spectra, Vibrational and Vibrational-Rotational spectra. Raman spectra,

Rotational spectra, calculation of bond length. Vibrational rotational spectra, Hook'slaw, Vibrational energy level.

Numerical Problems.

References:

1. Physical chemistry by Gurdeep Raj.
2. Physical chemistry by K.L.Kapoor vol.-I to IV [Pub. Macmilan]
3. Advanced Physical chemistry by D.N.Bajpai.
4. Text book of Physical chemistry by S.C. Khetepal & Yogeshwar Sharma. [Pub. R.Chand]
5. Physical chemistry by Puri & Sharma[S.Nagin & Co.]
6. A text book of Physical chemistry by A.S.Negi & Anand [New age International]
7. Physical chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical chemistry by B.K.Sharma.
9. Essential of Physical chemistry by Bahl Tuli &Bahl.
10. Elemental Physical chemistry byGlasston & Lewis.
11. Physical chemistry by K.K.Sharma, L.K.Sharma [Vikas Publication House, New Delhi.]

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc.; Semester-IV
(Effective from 2020-21)
Chemistry Paper-V [Physical Chemistry]

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I

[A] PARTITION CO-EFFICINT [**4Hrs.]**

Explanation of Nenst distribution law and its conditions for the validity.

Complications arising in distribution law:

(a) Association of solute in one of the phases.
(b) Dissociation of solute in one the phases.
(c) Dissociation of solute in both the phases.

Derivation of distribution law from kinetic consideration

explanation of solvent extraction process.

Numerical Problems

[B] ADSORPTION [**6Hrs.]**

Adsorption and absorption, Heat of adsorption, Characteristics of

adsorption, Physical adsorption and chemical adsorption.

Distinction between physical adsorption and chemical adsorption,

Freundlich's adsorption isotherm, Langmuir's adsorption

isotherm. Catalysis, General features of catalysis.

Heterogeneous catalysis, Adsorption theory of catalysis.

Unit-II

THEMODYNAMICS : [**10Hrs.]**

Free energy or work function[Gibbs free energy(G) and Helmholtz free energy (A). Derivation Gibbs Hemholtz equation.

Derivation of G=G0+RTlnp. Hemholtz equation, Relation of ΔG and equilibrium constant Kp (Vant Hoff isotherm and isochore

Derivation of Clapeyron and Clapeyron-Clauius equation.

Application of Clapeyron-Clausius equation inthe derivation of Molal elevation constant & Molal depression constant. Numerical problem

Unit-III

[A] CONDUCTOMETRIC TITRATIONS: [5Hrs.]

Principle, Types of conductometric titrations:

(a) Strong acid v/s strong base
(b) Strong acid v/s weak base
(c) Weak acid v/s strong base
(d) Weak acid v/s weak base
(e) Mixture of Strong acid and weak acid v/s strong base
(f) Precipitation titration of
(i) $BaCl_2$ v/s K_2CrO_4 (ii) NaCl v/s $AgNO_3$

Advantages of conductometric titrations over indicator method

[B] IONIC EQUILIBRIA [**5Hrs.]**

Relation between degree of hydrolysis, Hydrolysis constant and pH of solutions of:

(a) Salts of weak acid v/s strong base
(b) Salts of strong acid v/s weal base
(c) Salts of weak acid v/s weak base

Theories of acid-base indicators. Oswald and Quinonoid theories,

Choice of indicators, Indicator exponent and useful range of pH of an indicator.

Numerical Problems

References:

1. Physical chemistry by Gurdeep Raj.
2. Physical chemistry by K.L.Kapoor vol.-I to IV [Pub. Macmilan]
3. Advanced Physical chemistry by D.N.Bajpai.
4. Text book of Physical chemistry by S.C. Khetepal & Yogeshwar Sharma. [Pub. R.Chand]
5. Physical chemistry by Puri & Sharma[S.Nagin & Co.]
6. A text book of Physical chemistry by A.S.Negi & Anand [New age International]
7. Physical chemistry by P.L.Soni & O.P.Dharmraj.
8. Physical chemistry by B.K.Sharma.
9. Essential of Physical chemistry by Bahl Tuli &Bahl.
10. Elemental Physical chemistry byGlasston & Lewis.
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Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc.; Semester-III

(Effective from 2020-21)

Industrial Chemistry

Generic Elective Course

50 Marks [External] **Total =30 Hrs**

20 Marks [Internal]

Unit-I **[10Hrs.]**

[A] Synthetic fibers with flowsheet diagram:

(1) Tetrafluoroethylene, Teflon (2) Nylon-6,10 (3) DMT, Ethyleneglycol, Terylene

[B] Synthetic rubbers with flow sheet diagram:

(1) Isoprene, Polyisoprene (2) Silicone Rubber (3) Polyurethane rubber

[C] Plastics and Resins with flow sheet diagram:

(1) Urea formaldehyde resin, Bakelite (2) Vinylchloride, PVC (3) Vinylalcohol, Polyvinyl alcohol (4) Melamine and melamine resin (5) Bisphenol-A, Epoxy resin (6) Propylene, Polypropylene

Unit-II **[10Hrs.]**

[A] Detergents:

(1) Propylene tetramer (2) ABS (3) LAS

[B] Explosives:

(1) RDX (2) Nitrocellulose (3) Glyceryl trinitrate (4) Trinitro phenol (5) TNT (6) Ammitol

Unit-III **[10Hrs.]**

[A] Synthetic drugs:

(1) Novacaine (2) Novalgin (3) Paludrine (4) Paracetamol (5) Sulphatiazole (6) Benadryl (Diphenyl hydramine)

[B] Synthetic dyes:

(1) 3-phenyl, 7-methoxy coumarine (2) Blankophore-B (3) Eriochrome Black-T

(4) Eosin (5) Alizarine (6) Indanthrene khaki-GG

[C] Acetylene: (1) Wulff Process (2) Sachsse Process

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc.; Semester-IV

(Effective from 2020-21)

Industrial Chemistry

Generic Elective Course

50 Marks [External] **Total =30 Hrs.**

20 Marks [Internal]

Unit-I **[10Hrs.]**

[A] Inorganic Chemicals:

(1) Red Phosphorus (2) Sodium hexametaphosphate

(3) PCl_5 (4) Phosphoric acid

[B] Industrial Preparation and uses of:

(1) Potassium permanganate (2) Bleaching powder by Bachmann's method

Unit-II **[10Hrs.]**

[A] Fertilizers:

Definition and classification of fertilizers, Direct and indirect fertilizers, Natural and synthetic fertilizer, Symptoms of deficiency of some elements like N, K, and P.

Industrial Preparation of: Ammonium sulphate

Hazadous effect of used of fertilizers and its preventive measures, Mixed fertilizers, Complex fertilizers, Fertilizers grades, Fertilizers ratio, Fertilizers condition, Fertilizers filter.

Unit-III **[10Hrs.]**

[A] Glasses: Classification, properties and uses of glasses

[B] Non Ferrous alloys : Monel metal, Duralumin,Wood metal, Babit metal, Phosphorus bronze, Brass, German silver

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc.; Semester-III
(Effective from 2020-21)
Chemistry Practicals

60 Marks [External] **Uni.Exam 2 days**

30 Marks [Internal]

Gravimetric Estimation of

(1) Fe^{2+} as Fe_2O_3 (Given solution of $Fe\text{-}NH_4\text{-}SO_4 + H_2SO_4$)
(2) Ba^{2+} as $BaSO_4$ (Given solution of $BaCl_2\ 2H_2O$ +HCl)
(3) Ni^{2+}as Ni (DMG)2 (Given solution of $NiCl_2\ 6H_2O$ +HCl)

VOLUMETRIC EXERCISE (Any three)

(1) To determine the amount of Nickel by EDTA.
(2) To determine the amount of Copper by EDTA.
(3) To determine the amount of Zinc by EDTA.
(4) Determination of total hardness of water by EDTA.

ORGANIC SPOTTING [Minimum 8 organic substances]

ACID : Salicylic acid, Cinnamic acid, Phenyl acetic acid, Sulphanilic acid.

PHENOL: α -Naphthol, β -Naphthol, o-Nitrophenol

BASE: o-Nitroaniline, m-Nitroaniline, p-Nitroaniline, p-Toludine, p-Chloroaniline,

Diphenyl amine, Dimethylaniline, Diethylaniline

NEUTRAL:

ALDEHYDE: Glucose, Benzaldehyde

KETONE: Methylethylketone, Acetophenone

ESTER: Ethylacetate, Butylacetate

ALCOHOL: Ethanol, Butanol

HYDROCARBON: Anthracene, Naphthalene, Diphenyl

NITRO HYDROCARBON: m-Dinitrobenzene, Nitrobenzene

HALOGENATED HYDROCARBON: Chlorobenzene, Bromobenzene, p-Dichlorobenzene

AMIDE: Benzamide, Thiourea

ANILIDE: Acetanilide

PHYSICAL PRACTICALS:

1. pH metry: To determine the normality of weak acid pH-metrically using strong base. [$CH_3COOH \rightarrow NaOH$]

2 Conductometric Titration:

(i) To determine the normality of strong acid condutometrically using

strong base [$HCl \rightarrow NaOH$]

3 Conductometric Titration:

To determine the solubility of $PbSO_4$.

4 Viscosity :

To determine the viscosity of the liquids and the % of unknown mixture 'C'.

5. Chemical kinetics- Ester hydrolysis:

To study the hydrolysis of methyl acetate at two different concentration

in 0.5N HCl. [mono molecular reaction]

6 . Partition co-efficient

Minimum 3 experiments should be performed in a semester.

 # At least one electrical instrumental exercise should be performed per Semester.

Veer Narmad South Gujarat University, Surat

Syllabus for S.Y.B. Sc.; Semester-IV
Chemistry Practicals

60 Marks [External] **Uni.Exam 2 days**

30 Marks [Internal]

INORGANIC QUALITATIVE ANALYSIS: [Minimum 8 inorganic mixtures]

LIST OF INORGANIC CHEMICALS USED FOR INORGANIC QUALITATIVE ANALYSIS:

CHLORIDES: Bi^{+3}, Cu^{+2}, Cd^{+2}, Fe^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

BROMIDES: Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

IODIDES: K^{+}

NITRITES: Na^{+}, K^{+}

NITRATES: Bi^{+3}, Pb^{+2}, Co^{+2}, Ni^{+2}, Ba^{+2}, Sr^{+2}, Na^{+}, K^{+}, NH_4^{+}

SULPHITES: Na^{+}

SULPHIDE: Zn^{+2}, Sb^{+3}

SULPHATES: Cu^{+2}, Cd^{+2}, Fe^{+2}, Al^{+3},Mn^{+2}, Co^{+2}, Ni^{+2}, Zn^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

CARBONATES: Pb^{+2}, Bi^{+3}, Cu^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

PHOSPHATES: , Cu^{+2}, Al^{+3}, Fe^{+3}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+}, K^{+}, NH_4^{+}

Inorganic qualitative analysis of mixture containing four radicals. The mixture may be soluble in water or dilute hydrochloric acid or concentrated hydrochloric acid excluding Arsenite, Arsenate ,Chromates and Borate.

The following exercises should not be asked in the university examination

1. Calibration of burette 50ml., Pipette 5ml,10ml. & 25 ml., Measuring flasks 100 ml. & 250 ml.

ORGANIC ESTIMATIONS (Any 3 estimations should be done)

1. T o determine the amount of acetamide in the given solution hydrolysis by NaOH.
2. To determine the amount of phenol/ Aniline in the given solution by bromination.
3. To determine the number of -COOH group of given carboxylic acid.
4. Percentage purity of l-ascorbic acid (Vitamin-c)

***Organic Preparation: (Minimum 3 should be done)**

1. Anthraquinone from Anthracene
2. m-Dinitrobenzene from Benzene
3. p-Bromoacetanilide fron Acetanilide
4. Naphthalene picrate from Naphthalene.

N.B. Preparation should be submitted with sample and justification (M.P. & C.T.)

OR

***Type of water insoluble organic solid mixture (Any four type)**

PHYSICAL PRACTICALS:

1. pH metry: To determine the normality of given mix acid in $H\overline{Ac}$ + HCl pH-metrically using strong base.

2 Conductometric Titration:

(i) To determine the normality of given mixture ($H\overline{Ac}$ +HCl) solution by

Condutometric titration with the given 0.1N NaOH solution.

3 Heat of solution

To determine the heat of solution of organic acid (benzoic acid, phthalic

acid) by finding the solubility of the acid at two different temperature

4 Surface Tension:

To determine the parachor of –CH2 group of liquid: (Benzene, Toluene, Xylene)

5. Adsorption:
   To study the adsorption of given organic acid (Acetic acid/ oxalic acid) on animal charcoal..

6. Relative strength:

To study the relative strength of two acids H_2SO_4 and HCl.

7. pH metry: Determination of Ka of weak acid

To determination of ionisation constant of weak acid

Minimum 3 experiments should be performed in a semester.

Atleast one electrical instrumental exercise should be performed per semester.

Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની ગણિતશાસ્ત્ર વિષય ચલાવતી સંલગ્ન સ્નાતક આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ : ૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી. વાય. બીએસ.સી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ ના અભ્યાસક્રમ અંગે ચર્ચા કરતા રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૭ અન્વયે મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલે તેની તા.૨૫–૨૬/૦૬/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંકઃ ૧૭ અન્વયે સ્વીકારી મંજૂર કરેલ છે. તેની જાણ સંબંધકર્તા શિક્ષકો અને વિદ્યાર્થીઓને કરવી, તદ્ઉપરાંત તેનો અમલ કરવો.

રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ૨

:: આથી ઠરાવવામાં આવે છે કે, જુન–૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી.વાય. બી.એસસી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ નાં અભ્યાસક્રમને સર્વાનુમતે મંજુર કરી તે મંજુર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૦૬/૨૦૨૧ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૭

:: આથી ઠરાવવામાં આવે છે કે, રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે મંજૂર કરેલ જુન–૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી.વાય. બી.એસસી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ નાં અભ્યાસક્રમ મંજુર કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૨૫–૨૬/૦૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૭

:: આથી ઠરાવવામાં આવે છે કે,રસાયણશાસ્ત્ર વિષયની અભ્યાસસમિતિની તા.૧૧/૬/૨૦૨૧ ની સભાના ઠરાવ ક્રમાંક : ૨ અન્વયે ભલામણ કરેલ અને વિજ્ઞાન વિદ્યાશાખાની તા.૧૭/૬/૨૦૨૧ ની સભાનાં ઠરાવ ક્રમાંક : ૧૭ અન્વયે સ્વીકારેલ જૂન ૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી.વાય. બી.એસસી. રસાયણશાસ્ત્ર સેમેસ્ટર–૫ નો અભ્યાસક્રમ મંજુર કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંક : એકે./પરિપત્ર/૯૨૬૪/૨૧
તા.૦૧–૦૭–૨૦૨૧

ઈ.ચા. કુલસચિવ

પ્રતિ,

૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની રસાયણશાસ્ત્ર વિષય ચલાવતી સંલગ્ન કોલેજોના આચાર્યશ્રીઓ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – VI (Inorganic Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic –1: Quantum Mechanics: 5 Hrs

Postulates of Quantum mechanics, particles in three dimensional box, Schrodinger's wave equation in polar coordinates, its separation in to R, θ and ϕ. Discussion of solution of Schrodinger's equation for the rigid rotator.

Topic –2: Boron Hydride: 5 Hrs

Boron hydride and its classification, Wade's Rule, preparation, properties, structure and bonding in diborane, tetra borane (10), penta borane (9), penta borane (11), hexaborane (10) and dodeca borane (12) anion.

UNIT – II

Topic –1: Thermodynamic and Kinetic Aspects of metal complexes: 5 Hrs

A brief out line of thermodynamic stability of metal complexes and factors affecting stability of metal complexes. Lability and inertness. Factors affecting lability of metal complexes. Labile and inert complexes on the basis of reaction rate, VBT and CFT.

Topic –2: Bonding in Transition Metal Complexes: 5 Hrs

Jahn Teller Theorem , Distortation in octahedral complexes. Ligand Field Theory. Molecular energy level diagram and magnetic properties for $[CoF_6]^{3-}$, $[Co(NH_3)_6]^{3-}$, $[FeF_6]^{3-}$, $[Fe(CN)_6]^{3-}$, π- bonding in octahedral complexes.

UNIT – III

Topic –1: Metal Carbonyls: 5 Hrs

Definition, classification, nature of bonding in metal carbonyls, structure and IR spectra in $Ni(CO)_4$;$Fe(CO)_5$, $Fe_2(CO)_9$,$Mn_2(CO)_{10}$, $Cr(CO)_6$, $Co_2(CO)_8$.

Topic –2: Corrosion and its Protection: 5 Hrs

Definition and importance of corrosion, Types of corrosion: uniform, pitting, inter crystalline and stress cracking corrosion, electro-chemical theory of corrosion. Protection methods: Coating, Inhibitors (Organic, Inorganic, anodic, cathodic), anodic and cathodic protection.

Reference Books:

1) Introduction to quantum chemistry, by A. K. Chandra,Tata Mc.Graw Hill,Delhi.
2) Quantum mechanics in chemistry by M. H. Hanna
3) Theoretical Inorganic chemistry by Day & Selbin , Affiliated East West Publ. Pvt. Ltd.
4) Advanced Inorganic Chemistry by Cotton and Wilkinson, John Wiley.
   Uni. Chemistry by B. H. Mohan
5) Structural Inorganic chemistry by A. F. Wells.
6) Chemical Bonding - an introduction By Rawal, Patel & Patel.
7) Environmental Chemistry by Amritha anand and Sugumar.
8) Basic Inorganic Chemistry by Cotton and Wilkinson
9) A Text book of Inorganic Chemistry by P.L.Soni
10) Introduction to Inorganic Chemistry by Durrant and Durrant
11) Modern Co-ordination Chemistry by R. Lewis and R.G. Wilkinson.
12) Inorganic Chemistry- Principles of structure and reactivity by J.E. Huhhey and E.A. Keiter.
13) Application of Group Theory to Chemistry by P.K.Bhattacharya., Himalaya Publishing House, Mumbai.
14) Quantum Rasayan, University Granth Nirman Board (Gujarat).
15) Environmental Chemistry by A.K. De.
16) The corrosion and oxidation of metals by Evans U.R. (1961), Arnold, London.
17) Corrosion, Causes and Prevention, Speller. F.,Mc Grqw Hill,New york.
18) Dhatvik Ksharan, Part-I & II by M.N. Desai, Uni. Granth Nirman Board (Gujarat).
19) Corrosion and Corrosion Control, Uhlig H., Wiley.
20) Corrosion Engineering by Fontana M.G. and Green N.D., Mc Graw Hi.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – VII (Organic Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

(A) Reaction Mechanism: **7 Hrs**

(a) Different types of mechanism for Esterification and Hydrolysis: B_{AC}^2, A_{AC}^2, A_{AC}^1, A_{AL}^1

(b) Mechanism of formation and hydrolysis of amides.

(c) Pyrolytic elimination : Cope and Chugaev reaction.

(d) Organic Name Reaction: Knoevenagel Reaction, Reformatsky Reaction, Claisen Condensation Reaction.

(B) Aromaticity: **3 Hrs**

Introduction to Aromaticity, Huckel's Rule, Aromatic Character of Arenes, Definition & Examples of Aromatic, Non-Aromatic, Anti-Aromatic Compounds (Benzenoids and Non-Benzenoids).

UNIT – II

(A) Alkaloids: **5 Hrs**

The occurrence, Classification, General methods to determine their structure, Analytical and Synthetic evidence to prove the structure of Nicotine and Papavarine.

(B) Vitamins and Hormons: **5 Hrs**

General Introduction, Classification, Structural determinations and Synthesis of Pyridoxine, Vitamin – C, Thyroxine and Adrenalene.

UNIT – III

(A) Synthetic Drugs: **5 Hrs**

Classification, based on pharmacological action, synthesis and uses of Amylnitrate, **Chloroquine**, Pyrimethamine, **Sulpha Pyrimidine**, Diazepam, Lidocaine, Chlorpropamide, Dapsone, Isoniazide, 5-Fluoro Uracil.

(B) Polypeptides: **5Hrs**

Definition & only Structures of Amino acid (in Tabular form) , Synthesis of peptide by Merry Field Method, End group analysis, N-terminal determination, Sanger's method, Edman method, C-terminal determination by generation of amino alcohol and using digestive enzymes. End group analysis, selective hydrolysis of peptides classical levels of protein structure, Protein denaturation.

Reference Books:

1) Mechanism and Structure in organic chemistry-Goulde. S.
2) Reaction mechanism in organic chemistry by Mukhargy & Singh
3) Principles of reaction mechanism in organic chemistry by Dharmaraha & Chawla
4) Organic reaction mechanism by Bansal Tata Mac. Hill
5) Organic Chemistry (Vol I & II) 6 th Edn, I. L. Finar.
6) Organic Chemistry by Hendrickson, Cram & Hammond
7) Organic Chemistry by Brown R. F.
8) Organic Chemistry by Solomon W. Graham
9) Principles of Organic Synthesis- R. O. C. Norman
10) Basic Principles of Organic chemistry, by R. Y. Caserio, W. A. Benjamin
11) May's Chemistry of synthetic Drugs by Dyson.
12) Chemistry of drugs , Ener and Caldwell
13) Synthetic drugs by Tyagi and Yadav.
14) Synthetic Organic Chemistry by O. P. Agarwal
15) Organic Chemistry by Morrison and Boyd.
16) Chemistry of organic Natural Product Vol. I & II by O. P. Agarwal.
17) Chemistry of synthetic drugs by Trivedi
18) Principles of Medicinal Chemistry Vol. I & II by S. S. Kadam, K. R. Mahadik, K. G. Bothara (Nirali Prakashan)
19) Medicinal Chemsitry By Asuthosh kar 4/e
20) Organic reactions & their mechanism by P. S. Kalsi, New age international publishers
21) **Organic Name Reactions by Gautam Brahmachari, Narosa Publishing House, New Delhi.**
22) **Organic Chemistry, 8th edition by Paula Yurkanis Bruice, University of California, Santa Barbara.**

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – VIII (Physical Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

A - OPEN SYSTEM THERMODYNAMICS 5 Hrs

Partial molal free energy, (chemical potential), Derivation of Gibb's Duhem Equation, chemical potential in case of a system of ideal gases. Concept of fugacity, Fugacity function, Fugacity at low pressures, Physical significance of fugacity, Graphical method for determination of fugacity, Lewis fugacity rule. Activity and activity coefficient (Only concept). Standard state, Standard state of Solid, Liquid and Gas, Numerical problems**.**

B - THE THIRD LAW OF THERMODYNAMICS 5 Hrs

The Nernst Heat Theorem (NHT), limitations of NHT, Statement of The third law of Thermodynamics, Consequence of third law of thermodynamics, Determination of absolute entropy of gases and liquids and solid, Applications of third law of thermodynamics, Concept of residual entropy, Exceptions to the third law of thermodynamics, Numerical problems.

UNIT-II

A - BASICS OF ELECTRODICS 4 Hrs

Concept of Oxidation and Reduction, Electrochemical series (Reduction series), definition of electrode, half-cell and cell, single electrode potential, sign of electrode potential, standard electrode potential (oxidation and reduction potential), Electrochemical process, Galvanic cell with example of Daniel cell, EMF of a cell and its measurements, Standard Weston cell, Different types of reversible electrodes, Determination of single electrode potential, Calculation of standard EMF of cell and Determination of cell reaction, Standard Hydrogen Electrode, Calomel electrode and Ag –AgCl electrode. Numerical problems.

B-CLASIFICATION OF ELECTROCHEMICAL CELL AND THERMODYNAMICS 6 Hrs

Chemical and concentration cell, electrode and electrolyte concentration cell, liquid junction potential (LJP), salt bridge in elimination of LJP, concentration cell with and without transference [with derivation of equation for emf of cell and LJP]

Free energy change and Electrical energy, Prediction of spontaneity of cell reaction, Relation of standard free energy change with equilibrium constant, Temperature coefficient of EMF of a cell, Entropy change and Enthalpy change of cell reaction. Numerical problems.

UNIT – III

NUCLEAR CHEMISTRY **10 Hrs**

Stable and unstable isotopes, separation of isotopes by different methods, gaseous diffusion, thermal diffusion, distillation, chemical exchange methods, Bainbridge velocity focusing mass spectrograph, Dempster's direction focusing mass spectrograph.

Particle accelerators : Linear accelerator, Cyclotron, Discovery of artificial disintegration, Classification of nuclear reaction based on overall energy transformations and - particles used as projectiles, Merits and demerits of different projectiles, Numerical problems

REFERENCE BOOKS:

1) Elements of physical chemistry by Glasstone and Lewis
2) Physical chemistry by G.M. Barrow
3) Physical chemistry by W. Moore
4) Physical chemistry by Atkins
5) Physical chemistry by G.K.Vemulapalli
6) Physical chemistry by B.K.Sharma
7) Physical chemistry by Gurdeep raj
8) Physical chemistry by Puri, Pathania, Sharma
9) Essential of Physical chemistry by Bahl and Bahl
10) Physical chemistry by Negi and Anand
11) Physical chemistry by K.L. KapoorVol 1-5.
12) Physical chemistry by Baliga,Dhavale and ZaveriVol 1-3.
13) Physical chemistry by Dr. S. Pahari
14) Nuclear chemistry by Arnikar
15) Electro chemistry by S. Glasstone
16) Electrochemistry by B.K.Sharma
17) Modern Electrochemistry by J'omBockris and Redd
18) Physical Chemistry by D.N. Bajpai.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – IX (Industrial Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

(A) Manufacture with flowsheet & uses of **6 Hrs**

Acrylonitrile (Sohio Process), Bisphenol-A, Styrene, **Industrial manufacture and uses of Polyolifines: Poly ethylene (HDPE & LDPE) and Polypropylene**.

(B) Fluorocarbons **4 Hrs**

Nomenclature of chloro fluoro derivatives of Methane & Ethane, **General methods of preparation, Properties** and Uses of Fluoro carbons, Manufacture of Freon-12 from fluorspar, Manufacture of Freon-12 from Vinylidine fluoride. Pollution hazards of Fluoro carbons.

UNIT-II

Unit Processes in Organic Chemistry **10 Hrs**

(A)Nitration

Definition, Nitrating agent, Reaction mechanism of Nitration. Nitration of Acetylene, Benzene, **Toluene** and Naphthalene.
Artificial perfumes: Musk xylene, Musk ketone, Musk ambrette.
Explosives: Trinitrophenol, Trinitrotoluene, Trinitro glycerine, Emitol.

(B) Amination

Definition, Amination by reduction: Metal - Acid reduction **(strong and weak)**, Metal - Alkali reduction **(strong and weak)**, Catalytic reduction, Sulphide reduction.
Amination by ammonolysis : Amination of Chlorobenzene, Phenol & Benzene sulphonic acid.
Importance of amination in the manufacture of Bismark Brown G dye from m-phenylene diamine, Synthetic fibre (Nylon 6,6) from HMDA, Methyl Red Indicator from Anthranilic acid, Cyclonite explosive from Hexamethylene tetramine.

(C) Sulphonation - Definition, Sulphonating agents, Mechanism of sulphonation. Sulphonation of Benzene, Toluene and **Anthracene, Preparation of Phenol and Resorcinol from benzene**.
Importance of Sulphonation reaction in industry in the manufacture of Saccharine, Chloramine T and Alizarine Red S.

UNIT-III

Metallurgy of different metals (occurrence, extraction, properties and uses) 10 Hrs

(A) (1) Tungsten (2) Molybdenum (3) Chromium (4) Aluminium

(B) Some small scale preparation of

(1) Safety matches

(2) Naphthalene balls

(3) Wax candles

(4) Shoe polish

(5) Writing/ fountain pen ink

(6) Chalk crayons

(7) Plaster of paris.

Reference books:

1) Shreve Chemical Process Industries 5 ed. George. T. Austin . Mag. Hill. Book Agency
2) Reigel's Industrial Chemistry Ed. By James A. Kent.
3) Unit Process in Organic Synthesis by D. H. Groggins.
4) The Chemical Process Industries by R. Norris Shreve; McGraw-Hill Book Company,Ltd.
5) An Introduction to Industrial Chemistry by Peter Wiseman , Applied Science Pub. Ltd. London.
6) Industrial Chemistry by Clerk Ranken; Andesite Press.
7) Industrial Chemistry by B. K. Sharma Goel Pub.
8) Quantitative Analysis by R.A.Day & A L Underwood, 6th ed. Pub. Prentice Hall of India ltd.
9) Vogel's Text Book Inorganic Quantitative Analysis, 6 th ed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – X (Analytical Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

(A)INTRODUTION TO ANALYTICAL CHEMISTRY: **03Hrs**

Chemical and Instrumental Analysis (advantages and disadvantages) Overview of methods used in Quantitative analysis (classification of classical and instrumental analysis), Factors affecting the choice of analytical methods (in brief), **Step in quantitative analysis (Flow diagram), Analytical methods on the basis of Sample size (in brief), Sampling methods. Sampling in different physical states**

(B)TREATMENT OF ANALYTICAL DATA
Significant figures and rules of computation. **07 Hrs**

Error Definition, Types of errors: Determinates errors, indeterminate errors, constant and proportional errors. Define and explain the following terms – Accuracy and Precision, mean, median, deviation, average deviation, standard deviation, variance, coefficient of variation, relative mean deviation, range, absolute errors, relative errors. Minimization of determinates errors, Normal error curve. Rejection of result from a set of results, 2.5 d rule, 4.0 d rule and Q-test. (Problems based on above topics)

UNIT-II

GRAVIMETRIC ANALYSIS : **10 Hrs**

Factors affecting solubility of precipitates. (1) Common ion (2) Diverse ions (3) pH (4) Hydrolysis (5) Complex formation (With Numerical problems) The precipitation process,. Nucleation growth. Von Weimarn's theory of relative super saturation . Digestion of precipitates Factor affecting quality of precipitate: Co-precipitation and post precipitation Precipitation from homogeneous solution with illustration of Barium and Aluminum. Thermogravimetry, general principle,

General applications of TGA : Determination of purity and thermal stability of primary and secondary standards, determination of correct drying temperature, determination of curie point, automatic determination of mixtures, analysis of alloys, Specific application in analysis of (1) CaC_2O_4, H_2O (2) MgC_2O_4 , $2H_2O$ [No instrumentation].

UNIT-III **10 Hrs**

TITRIMETRIC ANALYSIS :

(A) ACID BASE TITRATION : **05 Hrs**

Different terms for titrant, titrand, analyte, end point and equivalence point. Theory of acid base indicators. Indicator range. Selection of proper indicators Calculation of pH at different stages of titrations of monobasic and dibasic acid with strong base Construction of titration curve, Titration of carbonate mixture and **amino acids.** Problems

(B) COMPLEXOMETRIC TITRATIONS:

05 Hrs

EDTA titration, Absolute and conditional stability constant, Distribution of various species of EDTA as function of pH. Absolute and conditional stability constants. Derivation of factors : α 4 for effect of pH, β4 for the effect of auxiliary complexing agent. Construction of Titration curves: Theory of metallochromic indicators, Masking, Demasking and kinetic masking. Types of EDTA titrations. Problems

Reference Books:

1) Quantitative Analysis by R. A. Day & A. L. Underwood, 6 th ed. Pub. Prentice Hall of India ltd.
2) Vogel's Text Book Inorganic Quantitative Analysis, 6 th ed.
3) Analytical Chemistry (Principles & Technique) by Lary G. Hargis.
4) Fundamental of Analytical Chemistry by Skoog D. A. & West D. M.
5) Holler F.J.Instrumental Methods of Analysis by B. K. Sharma
6) Instrumental analysis by R.D.Braun Mc Graw Hill.
7) Analytical Chemistry by Gary Christian Instrumental methods of chemical analysis Dr.H.Kaur. Pragati prakashan Meerut.
8) College Analytical Chemistry by Mangaonkar, Teckchandani, Sathe, Ghalsasi, Jain (Himalaya Publication House)

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Paper – XI (General Chemistry)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

IR SPECTROSCOPY 10 Hrs.

IR absorption spectroscopy: Terms, Instrumentation, Molecular vibrations, Hook's law, Selection rules, Intensity and position of IR bands. Measurement of IR spectrum, Finger print region, Characteristics absorption of various functional groups. Application of IR spectra. Factors influencing IR vibrational frequency.

UNIT- II

[A] LABORATORY HYGENE AND SAFETY 03 Hrs.

1. Handling of chemicals [Carcinogenic chemical, Toxic and poisonous chemicals], List of Hazardous chemicals.
2. General procedure for avoiding accidents [Apron, Safety goggles, Gloves pipetting process]
3. First aid technique [Organic substance in skin, Acid on clothing, Burns in eyes, Inhalation of toxic vapors etc…]
4. Colour codes and symbols for safety in chemical plants (i) classification of colour codes and symbols (ii) colour codes for gas cylinders and (iii) colour codes for pipelines.

[B] CHEMISTRY OF COSMETICS AND PERFUMES 07 Hrs.

A general study including preparation and uses of the following: Hair dye, hair spray, shampoo, suntan lotions, face powder, lipsticks, talcum powder, nail enamel, creams (cold, vanishing and shaving creams), antiperspirants and artificial flavours. Essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone.

UNIT- III **10 Hrs.**

UNITS OF SOLUTION AND STANDARD SOLUTION

Definitions of terms: Solute, Solvent, and Solution Composition of solution- normal solution, molar solution, molal solution, mole fraction, % solution, saturated, unsaturated and supersaturated solution and solubility. Effect of temp. on various units of concentration. Inter conversion of one unit into another unit. Preparation of solutions of some primary standard substances (e.g. Oxalic acid, succinic acid, KHP, $K_2Cr_2O_7$, As_2O_3)

Standardisation of the following solution using primary standard solutions/ standardised solution.

1. NaOH/KOH
2. I_2 solution
3. $KMnO_4$
4. Acids
5. $Na_2S_2O_3$ solution.

Reference books:

1) Elementary Organic Spectroscopy by Y.L.Sharma.
2) Organic Spectroscopy by K.K.Sharma.
3) Quantitative analysis by R.A. Day and A.L. Underwood.
4) Elements of Analytical Chemistry by R. Gopalan ; P. S. Subramanian and K. Rengarajan.
5) Vogel's qualitative inorganic analysis.
6) Vogel's qualitative organic analysis.
7) Industrial safety management, by L.M. Desmukh, Tata Mc Graw Hill, New Delhi, 2006. **(UNIT-II-[A]-4.)**
8) Industrial safety, Health & Environment management, Sunil S. Rao, R.K. Jain. Khanna Publishers, New Delhi, 2006. **(UNIT-II-[A]-4.)**
9) E. Stocchi: Industrial Chemistry, Vol -I, Ellis Horwood Ltd. UK. **(UNIT-II-[B])**
10) P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi. **(UNIT-II-[B])**
11) Sharma, B.K. & Gaur, H. Industrial Chemistry, Goel Publishing House, Meerut (1996). **(UNIT-II-[B])**

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
General elective subject (Petrochemicals)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic-1: Source of Petrochemicals: **4 Hrs**

(a) Natural gas: Composition, Natural gas as Petrochemical feed stock.

(a) Crude oil: Composition, Distillation and Refining, Utilization of various fractions (oil product)

Topic-2: Classification of Petrochemicals: **6 Hrs**

First, Second and Third generation petrochemicals.

Conversion process: Cracking reforming, Isomerisation, Hydrogenation, Alkylation and Hydrodealkylation, Dehydrocyclisation of petroleum products, Polymerization of gaseous hydrocarbons.

UNIT – II

Topic-1: **5 Hrs**

Petrochemicals obtained from **C1** cut of petroleum manufacture and application of Methanol, Synthesis gas, Ammonia, HCN, Formaldehyde, Hexamethylene tetramine, Chlorinated methanes, Perchloro ethylene.

Topic-2: **5 Hrs**

Synthesis and uses of H-acid, J-acid, Neville Winther's acid, DASDA, **Procion Red, Cellitone Scarlet-B, Indanthrene Khakhi GG, Blankophor B, Sulphamylon, Chloramphenicol**

UNIT – III

Topic-1: **7 Hrs**

Petrochemicals obtained from **C2** cut of petroleum [Ethylene and Acetylene]

Manufacture and industrial applications of chemicals obtained from Ethylene: Ethanol, Acetaldehyde (Wacker-Chemie process), Ethylene Oxide, Ethylene Glycol, Ethanolamines, Acrylonitrile, Styrene, Vinyl acetate. Manufacture and industrial applications of chemicals obtained from Acetylene, Acrylic acid, Acrylonitrile, Vinylchloride, Vinylacetate, Acetaldehyde, Chloroprene, Trichloethylene, Methyl vinyl ether.

Topic-2: **3 Hrs**

Industrial Fuels: Natural fuels, Synthetic fuels, Hydrogen- Fuel of tomorrow, Fuel for rocket (Hydrazine)

Reference Books:

1) Introduction to petrochemicals by Sukumar Maiti oxford and IBH pubs co. New Delhi.
2) A text on petrochemicals by Dr. B. K. Bhaskar Rao, Khanna pubs. New Delhi.
3) Chemicals from petroleum by A. L. Wadams (ELBS and John Murray London)
4) Petrochemicals by S. L. Venkatewarn (Colour pubs. Pvt. Ltd. Bombay)
5) Petrochemicals digest by MGK Manon (Asia Publishing house Bombay)
6) Hand book of industrial chemicals Vol-I by K. M. Shah (Multi tech publishing co. 15 Yogesh, Hingwala lane, Ghatkoper (E) Bombay-400077)
7) Industrial chemistry including chemical engineering by B. K. Sharma, Goel pubs house, Meerut.
8) Hand Book of Synthetic Dyes and Pigments (Vol. II) By K. M. Shah, Multi-tech Publishing Co.
9) Synthetic dyes by G. R. Chatwal, Himalaya Publishers.
10) Synthetic Drugs by G. R. Chatwal, Himalaya Publishers.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
General elective subject (Dyes)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

Topic –1: Dyes intermediates: 4 Hrs

Name and structure of Benzene, naphthalene and anthraquinone intermediates useful in the dyestuff industry, synthesis of 4-amino-2-methoxy toluene, 2,3-diamino anthraquinone, Chromotropic acid, Bromamine acid.

Topic –2: Diazotisation and coupling: (Azo dyes) 6 Hrs

Definition and mechanism of diazotization, common method of diazotization, common and special coupling components, laws of coupling reaction with phenols and amines of benzene and naphthalene series, monoazo dyes, synthesis of Direct Black EW, Orange - II, Orange – IV, Orange – III, Eriochrome Black – A.

UNIT – II

Topic –1: Disperse Dyes: 5 Hrs

Definition, classification of disperse dyes with examples, application of disperse dyes, synthesis of Cellitone Scarlet B, Dispersol Blue, Golden Yellow VIII.

Topic –2: Dyes and pigments: 5 Hrs

Relation between colour and chemical constitution with reference to Witt's theory, definition of dyes & pigments, difference between dyes & pigments.

Classification of dyes based on,

(a) Chemical constitution with illustrative example.

(b) Methods of application to fibres, synthesis of Pigment Yellow G, Benzidine Orange, Pigments Orange VI.

UNIT – III

Vat dyes: 10 Hrs

(a) Definition and general account of vat dyes, Indigo obtained from natural source, Synthesis of Indigo by Heumann process and Sandmeyer process. Halogen derivatives of Indigo (Brilliant Indigo – 4B, Brilliant Indigo-4G, 5,5- dibromoindigo Vat Blue -35) Synthesis of thioindigo by anthranilic acid, halogen derivatives of Thioindigo, Indanthrene Red Violet RRN.

(b) Anthraquinone Vat dyes: Bohn's discovery of Anthraquinone Vat dyes, classification with reference to anthraquinone derivatives synthesis of Caledon Jade Green XBN, Indanthrene Yellow 5GK, Indanthrene Brilliant Scarlet –RK.

Reference books:

1) Synthetic organic chemistry by O.P. Agrawal
2) The chemistry of synthetic dyes and pigments by H. A. Lubes
3) Chemistry of synthetic dyes VOL I to VII by K. Venkatraman
4) An introduction to synthetic dyes by D. W. Ranghekar & P. P. Singh
5) A hand book of synthetic dyes and their application by C. T. Bhastana, V. H.Raichura & Others.
6) Chemistry of dyes & Principles of dyeing Vol II by V. A. Shehai
7) Chemistry of synthetic dyes by I. G. Vashi
8) Chemistry of dyes and pigments by K. M. Shah
9) Synthetic dyes by G. R. Chatwal
10) Synthetic dyes and pigments by E. N. Abrahart.
11) High tech Dyes by Smith.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
General elective subject (Drugs)
Proposed syllabus from June 2021

50 Marks (External) **Total: 30 Hrs**
20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

Topic – 1: Drugs: Classifications-Terminology 05 Hrs

Definition of the term drug. Drugs obtained from plants. Different class of the drugs. Explanation of the following terms: Agonist, Antagonist, Receptors, Pharmacophore, Pro-drug, Soft-drug, CNS depressants, CNS stimulants, Mode of action. Brief accounts of the following agents giving the name and structures of two important drugs in each case (1) Antifungal agents (2) Antiviral agents (3) Anti-cancer or Cytotoxic drugs (4) Non-Steroidal Anti-Inflammatory Drugs (NSAIDS).

Topic – 2: Micro-organism and Diseases 05 Hrs

Brief account of microbes: Bacteria, Fungi, Protozoa, Virus. Classification of the bacteria based on shape, Gram staining and Ziehl–Neelsen staining. Names of at least two diseases in case of each of the following types of infection and also the name of microbes responsible for the same: (1) Respiratory tract infections (2) Gastro intestinal tract infections (3) Urinary tract infections (4) Urethritis and sexually transmitted diseases (5) Skin and soft tissue infections (6) Cardio vascular system infections (7) Central nervous system infections. Name of important drug for each of the following diseases: (1) Typhoid (2) Dysentery (3) Pneumonia (4) Meningitis (5) Gastroenteritis (6) Actinomycosis.

UNIT-II

Topic – 1: Antibiotics 05 Hrs

Definition. History of discovery of penicillin. Structural variations in penicillin. Broad spectrum antibiotics and their therapeutic uses. Sources, Structural formula and Therapeutic uses of Streptomycin, Tetracycline, Doxycycline, Cycloserine, Chloramphenicol and Some recent antibiotics. Synthesis of Ampicillin.

Topic – 2: Sulfa drugs 05 Hrs

History of discovery and development of sulfa drugs. Structural variations among sulfonamides. Mode of action of Sulfonamides. Therapeutics uses and antimicrobials activity of sulfonamides. Synthesis and uses of Sulpfadimidine, Sulfaguanidine, Sulfisoxazole (Sulfafurazole), Sulfacetamide, Succinyl sulfathiazole, Sulfanilamide, Sulfadiazine, Sulfapyridine.

UNIT-III

Topic – 1: Coagulants and Anti coagulants 05 Hrs

Definition, Fibrin-Fibrinogen, thrombin prothrombin role of calcium in blood clotting. Classification and structural variations. Blood coagulants, Vitamin K group as blood coagulants. Synthesis and uses of Warfarin, Dicoumarol, Bromindone.

Topic – 2: Analgesics 05 Hrs

Definition, classification and structural variations. Synthesis and uses of Meperidine (Pethidine), Ibuprofen, Aspirin, Meclofenamate sodium, Oxyphenbutazone, Paracetamol, Novalgin.

Reference Books:

1) May's Chemistry of synthetic Drugs by Dyson.
2) Chemistry of drugs, Ener and Caldwell.
3) Synthetic drugs by Tyagi and Yadav.
4) Synthetic Drugs by G. R. Chatwal, Himalaya Publishers.
5) The Organic Chemistry of Drug Synthesis by Daniel Lednicer & L.A.Mitscher.
6) Drugs by V.K.Ahluwalia Pub. Ane Books Pvt. Ltd.
7) Medicinal Chemistry by Balkishan Razdan, Pub. CBS Publishers.
8) Pharmaceutical Organic Chemistry by S.K.Dewan, Pub. Narosa.
9) Medicinal Chemistry - a Molecular and Biochemical Approach, by Thomas Nogrady & Donald F Weaver.
10) Pharmaceutical Organic Chemistry by Shyam Singh Pub. Himalaya Publishers.
11) Medicinal Chemistry by G Patrick. Pub. Viva Books.
12) Burger's Medicinal Chemistry & Drug Discovery. Ed. by D. J. Abraham.

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B. Sc. Semester -V
Chemistry Practical
Proposed syllabus from June 2021

120 Marks (External) **Total: 30 Hrs**
60 Marks (Internal) **Time: 7 Hrs. (Uni. Exam) Two days**

1. INORGANIC QUALITATIVE ANALYSIS

LIST OF INORGANIC CHEMICALS USED FOR INORGANIC QUALITATIVE ANALYSIS

CHLORIDES- Cu^{+2}, Cd^{+2}, Fe^{+3}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}.
BROMIDES- Sr^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
IODIDE – K^{+1}
NITRITE – Na^{+1}, K^{+1}
NITRATE – Co^{+2}, Ni^{+2}, Ba^{+2}, Sr^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
SULPHITE – Na^{+1}
SULPHIDE – Zn^{+2}, Sb^{+3}
SULPHATE – Cu^{+2}, Cd^{+2}, Al^{+3}, Fe^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Mg^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
CARBONATE –Cu^{+2}, Cd^{+2}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+1},K^{+1}, NH_4^{+1}
PHOSPHATE - Cu^{+2}, Al^{+3}, Fe^{+3}, Zn^{+2}, Mn^{+2}, Co^{+2}, Ni^{+2}, Ca^{+2}, Ba^{+2}, Sr^{+2}, Mg^{+2}, Na^{+1}, K^{+1}, NH_4^{+1}
BORATE- Boric Acid

Inorganic qualitative analysis of a mixture containing six radicals. The mixture may be soluble in water or dilute hydrochloric acid or concentrated hydrochloric acid including Chromate and Borate.
N. B. Candidate should perform the analysis of at least 08 mixtures.

2.ORGANIC ESTIMATIONS (Any Four)

1. Determination of amount of ketone (Acetone)
2. Determination of saponification value of an oil.
3. Determination of percentage purity of Aspirin
4. Determination of amount of Formaldehyde in given solution
5. Determination of amount of Ethyl acetate in the given solution
6. Determination of amount of Glycine in the given solution
   (Instead of sample weighing, solutions to be given)

3.CHROMATOGRAPHY

Chromatographic separation of amino acid mixture by ascending paper chromatography
1. Glycine + Methionine
2. Alanine + Methionine
3. Alanine + Valine

4. PHYSICAL EXERCISE

1. To investigate rate of reaction between $K_2S_2O_8$ and KI, $a = b$, $a \neq b$.
2. To investigate rate of reaction between H_2O_2 and KI, $a = b$.
3. Polarimetry: Determination of angle of rotation of given substance using three different dilutions and determination of concentration of unknown solution. Sugar, Glucose, Tartaric acid.
4. pH metry: To measure pH of different buffer solution and to study the buffer capacity.
5. pH metry: To determine the dissociation constant of weak acid (CH_3COOH) and weak base (NH_4OH) by different dilutions.
6. Conductometry: To determine the amount of $BaCl_2$ in the given solution using K_2CrO_4 solution.
7. Conductometry: To determine the amount of NaCl in the given solution using $AgNO_3$ solution.
8. Potentiometry: To determine the normality of given HCl solution using 0.5N NaOH.
9. Potentiometry: To determine the solubility and solubility product of sparingly soluble salt AgCl by the titration of $AgNO_3$ and NaCl.

   (Any SIX including one kinetic experiment should be performed.)

5. Viva Based on Above Practicals :

Day	Time	Group A	Group B
1st Day	10:00 A.M. to 1:30 P.M.	Inorganic Qualitative	Physical Exercise
	2.00 P.M. to 5.30 P.M.	Organic Estimation	Paper Chromatography & Viva-Voce
2nd Day	10.30 P.M to1.30 P.M.	Physical Exercise	Inorganic Qualitative
	2.00 P.M. to 5.30 P.M.	Paper Chromatography & Viva-Voce	Organic Estimation

No.	Exercise	Marks
1.	Inorganic Qualitative Analysis	35
2.	Organic Estimation	30
3.	Physical Exercise	35
4.	Paper Chromatography	10
5.	Viva-Voce	10
	Total Marks	120

Re-Accredited by NAAC with 'A' Grade
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Fax : +91 - 261 - 2227312
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન રસાયણશાસ્ત્ર વિષયની તમામ કોલેજોનાં આચાર્યશ્રીઓ જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી. વાય. બીએસ. સી. રસાયણશાસ્ત્ર સેમેસ્ટર–૬ ના અભ્યાસક્રમ અંગે રસાયણશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૧/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે નીચે મુજબ ભલામણ કરેલ જે વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલ તા.૨૫/૨/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંકઃ૦૭ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

<u>રસાયણશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૧/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંકઃ૨</u>

:: આથી ઠરાવવામાં આવે છે કે, જુન–૨૦૨૧–૨૨ થી અમલમાં આવનાર ટી.વાય.બી.એસ.સી. રસાયણશાસ્ત્ર સેમેસ્ટર–૬ ના અભ્યાસક્રમને સર્વાનુમતે મંજુર કરવામાં આવ્યો અને તે અભ્યાસક્રમને મંજુર કરવા વિજ્ઞાન વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

<u>એકેડેમિક કાઉન્સિલની તા.૨૫/૦૨/૨૦૨૨ની ઠરાવ ક્રમાંકઃ ૦૭</u>

:: આથી ઠરાવવામાં આવે છે કે, રસાયણશાસ્ત્ર વિષયની અભ્યાસ સમિતિની તા.૨૪/૦૧/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંકઃ૨ અન્વયે કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી મંજૂર કરેલ શૈક્ષણિક વર્ષ ૨૦૨૧–૨૨થી અમલમાં આવનાર ટી.વાય.બી.એસ.સી. રસાયણશાસ્ત્ર સેમેસ્ટર–૬ ના અભ્યાસક્રમ મંજુર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./રસાયણશાસ્ત્ર/પરિપત્ર/૪૧૧૦/૨૦૨૨
તા.૨૮–૦૨–૨૦૨૨

ઈ.ચા. કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન રસાયણશાસ્ત્ર વિષયની તમામ કોલેજોનાં આચાર્યશ્રીઓ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારૂ.

Academic Council Dt.19-02-2022
Item No. 7 Encl. 6

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B.Sc. Semester -VI (Chemistry)

Paper-VI (Inorganic Chemistry)

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT - I

Topic-1: Molecular Symmetry **10Hrs.**

Introduction and importance of symmetry, Symmetry elements and Symmetry operations, Classification of molecules in to point groups. Point group of simple molecules like CO_2, HCl, H_2O, NH_3, BF_3, $[PtCl_4]^{-2}$, PF_5, C_6H_6, $C_5H_5^-$, CH_4, SF_6,Bromo benzene(C_6H_5Br), Cyclobutane, Boric acid (H_3BO_3), Cis and Trans Dichoro ethylene ($C_2H_2Cl_2$), Staggered and Eclipsed Ethane (C_2H_6). Law of multiplications, Construction of multiplication table for C_{2v}, C_{3v},C_{2h}.

UNIT – II

Topic-1: Metal Complexes (Inorganic Reaction Mechanism) **6 Hrs.**

Reaction mechanisms of ligand substitution in octahedral complexes (i) SN_1(ii) SN_2,Acid hydrolysis & Base Hydrolysis-Redox (Single Electron Transfer) reactions,Substitution reaction without breaking M-L bond.

Topic-2: Hybridization **4 Hrs.**

Introduction, Rules for hybridization, Bond angles, bond strength, and co-efficient in sp, sp^2 and sp^3 hybrid orbital using wave function (fully mathematical calculations).

UNIT-III

Topic-1: Organo-metallic compounds **5 Hrs.**

Definition, classification, Structure and bonding in ferrocene, dibenzene chromium, Zeise ion andgaseous dimethyl beryllium,Tetramethyl lead.

Topic-2: Water Pollution **5 Hrs.**

Types of water pollutants, Trace elements in water and their effects; Determination of BOD, COD, DO, Total hardness, Total dissolved solids, Ozonetreatment process for wastewater.

Reference Books:

(1) Introduction to quantum chemistry, by A. K. Chandra, Tata Mc. Graw Hill, Delhi,

(2) Quantum mechanics in chemistry by M. H. Hanna

(3) Theoretical Inorganic chemistry by Day &Selbin, Affiliated East West

(4) Advanced Inorganic Chemistry by Cotton and Wilkinson, John Wiley

(5) Uni. Chemistry by B. H. Mahan

(6) Structural Inorganic chemistry by A. F. Wells.

(7) Chemical Bonding- an introduction By Rawal, Patel & Patel.Sugumar.

(8) Environmental Chemistry by AmrithaAnand

(9) Basic Inorganic Chemistry by Cotton and Wilkinson

(10) A Text book of Inorganic Chemistry by P.L.Soni

(11) Introduction to Inorganic Chemistry by Durrant and Durrant

(12) Modern Co-ordination Chemistry by R. Lewis and R.G. Wilkinson.

(13) Inorganic Chemistry- Principles of structure and reactivity by J.E. Huhhey and E.A. Keiter.

(14) Application of Group Theory to Chemistry by P.K.Bhattacharya., Himalaya Pub. House, Mumbai.

(15) Quantum Rasayan, University Granth Nirman Board (Gujarat).

(16) Environmental Chemistry by A.K. De. U.R. (1961), Amold, London.

(17) The corrosion and oxidation of metals by Evans

(18) Corrosion, Causes and Prevention, Speller. F., Mc Graw Hill, New York.

(19) DhatvikKsharan, Part-I & II by M.N. Desai, Uni, Granth Nirman Board (Gujarat).

(20) Corrosion and Corrosion Control, Uhlig H. Wiley.

(21) Corrosion Engineering by Fontana M.G. and Green N.D., Mc Graw Hill.
Publ. Pvt. Ltd.

(22) Wiley online library.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Paper-VII (Organic Chemistry)

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT - I

Topic : 1 : Molecular Rearrangements **6Hrs.**

Mechanism of rearrangements involving C to C migrations as illustrated by Wagner-Meerwein and Pinocol-Pinacolone rearrangements.

Mechanism of rearrangements involving C to N migrations as illustrated by Hoffmann, Curtius, and Beckmann rearrangements.

Topic : 2 : Catalysis and Green Chemistry **4Hrs.**

Catalysis in organic reaction, nucleophilic catalysis, Metal-ion catalysis, Intermolecular catalysis, Phase transfer catalysis. Green Chemistry: Fundamental Principle of Green Chemistry.

Green synthesis of (i) Ibuprofen (ii) Paracetamol.

UNIT-II

Topic: 1 : Terpenoids (Isoprenoids) **5 Hrs.**

Their occurrence, classification, isoprene and special isoprene rule, general methods to determine their structure, analytical and synthetic evidences for the structure of Camphor & Citral.

Topic : 2 : Polymers **5 Hrs.**

1. Synthetic Polymer:-Basic concepts, Degree of polymerization, Classification of polymerization reaction.Mechanism of Additionorchain growth polymerization,free radical vinyl polymerization and Ionic vinyl polymerization, Ziegler-Natta Polymerization and Vinyl polymers, Condensation or step growth Polymerization, Polyesters, Polyamides.
2. Biodegradable polymers- Introduction, classification and application, Polylactic acid and polyglycolic acid.

UNIT-III

Topic : 1 Plant pigments **5 Hrs.**

a) Classification

b) General introduction of Carotenoids. Analytical and synthetic evidence of B-carotene

c) General introduction of anthocynines and anthocyanidines. Analytical and Synthetic evidences of cyanidine chloride

d) Introduction of flavones and flavonols. General method of determining. Structure of flavones. Synthesis of flavones. Analytical and synthetic evidences of quercetin

Topic : 2 Synthetic dyes: (Colour and constitution electronic concepts) **5 Hrs.**

Definition and difference between dyes and pigments, classification of dyes, color and constitution-Witt's theory, synthesis and uses ofCrystal violet, Indigo, Alizarine,Phenolphthalein, Tetrazine, Acriflavine, Procoin Brilliant Red M-2B.

Reference Books:

(1) Mechanism and Structure in organic chemistry-GouldeS.

(2) Reaction mechanism in organic chemistry by Mukhejee &Singh

(3) Principles of reaction mechanism in organic chemistry by Dharmaraha &Chawla

(4) Organic reaction mechanism by Bansal Tata Mac.Hill

(5) Organic Chemistry by Hendrickson, Cram &Hammond

(6) Organic Chemistry by Brown R.F.

(7) Organic Chemistry by Solomon W.Graham

(8) Principles of Organic Synthesis- R. O. C.Norman

(9) Basic Principles of Organic chemistry, by R. Y. Caserio, W. A.Benjamin

(10) May's Chemistry of synthetic Drugs byDyson

(11) Chemistry of drugs, Ener and Caldwell

(12) Synthetic drugs by TyagiandYadav

(13) Chemistry of synthetic Dyes Vol. I & II byVenkatraman

(14) Synthetic Organic Chemistry by O. P.Agarwal

(15) Synthetic Dyes by Chatwal &Anand

(16) Chemistry of synthetic Dyes by I. G.Vashi

(17) Organic Chemistry by Morrison andBoyd

(18) Chemistry of organic Natural Product Vol. I & II by O. P.Agarwal

(19) Chemistry of synthetic drugs byTrivedi

(20) Green Chemistry, Environmentally Vergin Reactions by V. K. Ahuwalia pub. by Anebooks India.

(21) Principles of Medicinal Chemistry Vol.I &II by S.S.Kadam,K.R.Mahadik,K.G.Bothara (Nirali Prakashan)

(22) Medicinal Chemistry by Asuthoshkar

(23) Organic reactions & their mechanism by P. S. Kalsi, New age internationalpublishers

(24) Polymer Science Gowariker

(25) Handbook of biodegradable polymer, isolation, synthetic characterization and application by Andras, Lendiein and adamsissom.

(26) Stereochemistry Conformation and Mechanism, 10^{th} Ed. by P. S. Kalsi, New age internationalpublishers

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Paper-VIII (Physical Chemistry)

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic:1: Phase Equilibria Statement and meaning of the terms phase, component, degree of freedom, phase rule, phase equilibria, of one component system-water, CO_2,Sulphur system, phase equilibria of two component system-simple eutectic, Pb-Ag systems, desilverisation of lead, KI- Water system, freezing mixtures. Solid solutions: compounds with congruent and incongruent melting point (Only definition and example), Three component solid-liquid systems p.no 690-691* **6Hrs.**

Topic : 2 : Binary Liquid Mixtures **4Hrs.**

Liquid-liquid mixtures, ideal liquid mixtures, Raoult's law, non-ideal orreal solutions, positive and negative deviations from Raoult's law, temperature composition curves for ideal and non-ideal binary solutions of miscible liquids, azeotropes, partially miscible liquids: Phenol-water systems, immiscible liquids, steam distillation, Chemical Potential of Ideal and non-idealsolutions, p.no 756-757*, **Numerical problems.**

57^{th} edition, Principal of physical Chemistry, By Puri, Sharma, Pathania Vishal Publishing co.

UNIT-II

Topic:1:Application of Electromotive Force **10 Hrs.**

Application of measurements of EMF in the determination of

(1) Solubility product and solubility of sparingly solublesalts

(2) Ionic product of water by galvaniccell

(3) Transport number of ions

(4) Equilibrium constant

(5) pH by Hydrogen, Glass and Quinhydroneelectrodes

(6) Energy sources Ni-Cd Cell and Li- ion Cell,Lithium - Polymer Cell,

Numerical problems.

UNIT-III

Topic:1:Applications of Nuclear Chemistry **10 Hrs.**

Application of radio isotopes as tracers in medicines, agriculture, in studying reaction mechanism in photosynthesis and age determination by Carbon-Dating method, Geiger Muller Counter, Q-value of nuclear reactions, Chemical and physical atomic weight scale, Mass defect and Binding energy, Packing fraction and its relation with the stability of the nucleus, Nuclear fission, Atom bomb, Nuclear reactor for power generation and Critical mass,Nuclear fusion,Stellar energy and Hydrogen bomb, Hazards of nuclear radiation. **Numerical problems** on Q-value, binding energy, packing fraction, and energy released during nuclear reactions.

Reference Books:

(1) Elements of physical chemistry by Glasstone andLewis

(2) Physical chemistry by G.M.Barrow

(3) Physical chemistry by W.Moore

(4) Physical chemistry byAtkins

(5) Physical chemistry byG.K.Vemulapalli

(6) Physical chemistry byB.K.Sharma

(7) Physical chemistry by Gurdeepraj

(8) Physical chemistry by Puri, Pathania,Sharma

(9) Essential of Physical chemistry by BahlandBahl

(10) Physical chemistry by NegiandAnand

(11) Physical chemistry by K.L. KapoorVol-5.

(12) Physical chemistry by Baliga,Dhavale and ZaveriVol1-3.

(13) Physical chemistry by Dr. S.Pahari

(14) Nuclear chemistry byArnikar

(15) Electro chemistry by S.Glasstone

(16) Electrochemistry by B.K.Sharma

(17) Modern Electrochemistry by J'omBockrisandRedd

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Paper-IX (Industrial Chemistry)

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic:1 :Fermentation Industry **6 Hrs.**

Definition, condition favorable for fermentation process (pH, temperature, presence of other substances, absence of preservatives, concentration),manufacture of ethanol, citric acid, acetone and butanol, acetic acid, lactic acid from molasses, manufacture of penicillin-G.

Topic: 2: Pulp and Paper industry **4 Hrs.**

Type of pulp, Manufacture of chemical pulp by sulphate pulp process, sulphite pulp process, manufacture ofpaper (conversion of pulp into paper, beating process, importance of fillings, sizing, colouring materials in manufacture of paper and calendaring).

UNIT-II

Topic:1: Insecticides and Fungicides **5 Hrs.**

Introduction, inorganic insecticides, natural and synthetic insecticides, organic insecticides, Eldrin,Dieldrin, BHC, Tetra ethyl pyrophosphate (TEPP), introduction of Fungicides like Bordeaux mixture, Dithio carbamates, Baygon ,Termik, Zineb.

Topic : 2 : Detergents

Introduction, Principles detergency, classification of surface active agents, Anionic detergents, Cationic detergents, Nonionic detergents,Amphoteric detergents, Suds regulators, Builders and Additives.

UNIT-III

Topic : 1 : SugarIndustry **5 Hrs.**

Introduction, Manufactureofsugarfromsugarcane,

Extraction of juice, Purification of juice, Concentration &crystallization of purified juice, Refining of sugar.

Topic : 2 : Industrial manufacturing process with flow diagram & their uses 5 Hrs.

(1) Preparationofmethanolfromsynthesisgas

(2) PreparationofIsopropanolfrompropylene

(3) Preparationofacetonefrom Isopropanol

(4) Preparationofformaldehydefrommethanolbyoxidationdehydrationprocess

(5) Acetylenefromnaturalgas

Reference Books:

(1) Shreve Chemical Process Industries, 5ed., George.T. Austin. MacGraw Hill, Book Agency

(2) Reigel's Industrial Chemistry, Ed. By James A. Kent

(3) Unit Process in Organic Synthesis by D.H. Groggins

(4) An Introduction to Industrial Chemistry, by Peter Wiseman, Applied Science Pub. Ltd. London.

(5) Industrial Chemistry by B.K.Sharma, Goel Pub.

(6) Quantitative Analysis by R.A.Day&ALUnderwood, 6^{th} ed. Pub. Prentice Hall of India ltd.

(7) Vogel's Text Book Inorganic Quantitative Analysis, 6^{th} ed.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Paper-X (Analytical Chemistry)

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Spectroscopy 10 Hrs.

Types of spectrum, Process involved in interaction with matter (Fluorescence, Phosphorescence), Components of Spectrophotometer-Sources, Grating and Prism as dispersing device, Sample handling, Detectors- Photo tube, Photomultiplier tube. Block diagram and working of single beam and double beam spectrophotometer. Terms involved in Beer's law (no derivation). Causes of deviation from Beer's law. Analysis of unknown by calibration curves method, standard addition method, and ratio method.

Determination of Cu^{+2}, Fe^{+3}, NO_2^{-1}, using spectrophotometer. (Only principles - no detailed method), Problems based on quantitative analysis.

UNIT-II

Separation Technique **6 Hrs.**

Topic : 1 : Gas Chromatography

Classification of chromatography, Principles of GC separation. Components of GC, Sample introduction system, Columns: Packed column Capillary Column (WCOT, SCOT), Carrier gas and its selection-stationary phases: Solid adsorbents, Inert supports (Selection criteria, Diatomaceous earths) and liquid stationary phases, Detectors: FID, TCD, Qualitative and quantitative analysis using GC.

Topoic : 2 : Liquid Chromatography **4 Hrs.**

Limitation of conventional liquid chromatography (no detail method), technique of HPLC, elementary idea about technique and layout diagrams of instrument, components of instrument of HPLC technique, Elementary idea of TLC.

UNIT-III

Topic : 1 : Precipitation Titrations **5 Hrs.**

Titrations involving silver salts, Detection of end points by Mohr's method, Volhard's method, Adsorption indicators.Construction of titration curves, Problems.

Topic : 2 : Redox Titrations **5 Hrs.**

Formal Potential, Redox reaction: $FeSO_4$-$KMnO_4$, Fe^{+2}-Ce^{+4}, Principle of redox indicators, Structural chemistry of indicators (Diphenyl amine, Ferroin),
Construction of titration curves for titration of Fe^{2+} with Ce^{4+}.
Calculation of equilibrium constants for redox system, Types of indicators, Theory of true Redox indicators **(Numerical).**
Oxidants- KMnO4, $K_2Cr_2O_7$. Reductants-Sodium thiosulphate , Sodium arsenite.

Reference Books:

(1) Quantitative Analysis by R. A. Day & A. L. Underwood, 6th ed. Pub. Prentice Hall of India ltd.

(2) Vogel's Text Book Inorganic Quantitative Analysis, 6th ed.

(3) Analytical Chemistry (Principles & Technique) by Lary G. Hargis

(4) Fundamental of Analytical Chemistry by Skoog D. A. & West D. M.

(5) Instrumental Methods of Analysis by B. K. Sharma

(6) Instrumental analysis by R.D.Braun Mc Graw Hill

(7) Analytical Chemistry by Gary Christian

(8) Analytical Chemistry by Day and Underwood

(9) Modern Analytical Chemistry by David Harvey, McGraw Hill Higher Education

(10) College Analytical Chemistry, Mangaonkar, Teckchandani, Sathe, Ghalsasi, Jain, Himalaya Publishing House

(11) Analytical Chemistry by Alka L. Gupta, PragatiPrakashan

(12) Instrumental Methods of Chemical Analysis by H. Kaur, PragatiPrakashan

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Paper-XI (General Chemistry)

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT-I

Topic:1 :ChemistryinConsumerProtection10 Hrs

DefineAdulteration;ReasonsofAdulteration,Types of Adulterants,Discussion,

Methods for detection of different adulterants in some common food items:

(1) Milk

(2) Milk products: Sweet curd, Rabdi, Khoa& its product, Chhana or Paneer, Ghee,

Cottage cheese, condensedmilk, Khoa,Ghee,Butter

(3) Oiland Fats, Mustardoil, Edibleoil, Coconutoil

(4) Sweetening agents :Sugar, Pithisugar, Honey, Jaggery,Burasugar

(5) Food grain and their product:(Wheat, Rice, Maize,Jowar,Bajra,Chhana and Barleyetc.),

Maida, Wheatflour, Besan, Suji (Rawa) Dal Whole and Spilt,pulses

(6) Spices: Whole spices, Black Pepper,Cloves,Mustard seed and Powdered spices

(7) Turmeric whole and Turmeric powder

(8) Chili powder, Asafoetida,

(9) Miscellaneous Product: Common salt, Tea, Coffee powder

UNIT-II

Topic: 1: Nanoparticles **4 Hrs**

Introduction of nano particles, properties of nano particles, Semiconductors, Ceramic nano particles, Catalytic aspects of nano particles, Carbon nano tubes, Applications of nano particles.

Topic: 2: Environmental pollution: **6 Hrs**

Introduction, types of Pollutions(1) Gaseous pollution in air, Acid rain, Green house Effect and ozone depletion(2) Radiation pollution cause, effect and control,(3) Noise Pollution and their effect and control (4) Oil pollution and their control.

UNIT-III

Topic : 1 : NMRspectroscopy **10 Hrs**

Nuclear Magnetic Resonance Spectroscopy-Proton Magnetic Resonance(^{1}HNMR) Spectroscopy-Nuclear Shielding and Deshielding-Chemical Shift and Molecule Structure, Spin-Spinsplitting and Coupling constants-Intensities of signals-Interpretation of NMR Spectraof simple organicmolecule such as Ethyl bromide, Acetaldehyde, 1,1,2-tribromoethane, Ethylacetate, Toluene,Acetophenone,Nitrobenzene,Cyclopropane,IsomersofPentane, Hexane and Dibromo propane.

Reference Books:

(1) QuantitativeanalysisbyR.A.DayandA.L.Underwood

(2) ElementsofAnalyticalChemistrybyR.Gopalan;P.S.SubramanianandK.Rengarajan

(3) ElementaryOrganicSpectroscopybyY.L.Sharma

(4) OrganicSpectroscopyby B.K.Sharma

(5) EnvironmentalChemistryby H.Kaur

(6) .http://www.fssi.gov.in/Portals/0/pdf/Final-test-manual-part-II

(7) Vogel'squalitativeInorganicanalysis

(8) Vogel'squalitative Organicanalysis

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Chemistry-Generic elective subject-Petrochemicals

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic:1 : Petrochemicals obtained from C3-cut of petroleum. **6 Hrs.**

Manufacture and industrial applications of chemicals obtained from Propylene: Isopropyl alcohol, Acetone (Wacker-Chemieprocess), Propyleneoxide (Halcon process), Acrylonitrile, Glycerol and Isoprene, Propylene tetramer, Acrylic acid, N-Butyraldehyde (Oxoprocess), Methyl isobutyl ketone, Methylmethacrylate.

Topic : 2 : **4 Hrs.**

General account of petrochemicals used as monomers in the manufactureof polyester fibers, manufacture of DMT, Terphthalic acid, Phthalic anhydride, Maleic anhydride, 1:4 Butane diol and other monomers like Penta erithritol and Di-isocyanates.

UNIT-II

Topic : 1 : The method for the large scale production with flow diagram and uses of: **5 Hrs.**

(i)Acetoacetanilide (ii) Anthraquinone (iii) β-naphthol from naphthalene (iv) Bon acid (v) Aspirin (vi) Chloramphenicol (vii) Paracetamol (viii) p-Aminophenol.

Topic : 2 : Miscellaneous petrochemicals **5 Hrs.**

Definition of synthetic detergents, hard and soft detergents, Synthesis of DDBS, Synthesis of Fluoresein, Malachite Green, Chrysoidine and Indigo, Definition of Explosive, list of basicraw materials for explosives and list of explosives derives from these raw materials, Synthesis of Tetryl, PETN and Dynamite, Definition insecticides, classification of insecticides on basis of mode of action. Synthesis of Methoxychlor, Captan, Parathion, Malathion.

UNIT-III

Topoic : 1 : Chemicals obtained from C4 & C5 cut of petroleum **4 Hrs.**

Manufacture and industrial applications of Butadiene, Butylalcohols, Methylterbutyl ether (MTBE), Cyclopentadiene, Sulpholane.

Topic : 2 : BTX aromatic **6 Hrs.**

Recovery process of BTX, manufacture and industrial applications of benzene, toluene, xylene, naphthalene, phenol, styrene.

Reference Books:

(1) Introduction to petrochemicals by SukumarMaiti, Oxford and IBH Pubs Co. New Delhi

(2) A text on petrochemicals by Dr.B.K. Bhaskar Rao, Khanna Pubs. New Delhi

(3) Chemicals from petroleum by A.L.Wadams (ELBS and John Murray London)

(4) Petrochemicals by S.L.Venkatewarn (Colour Pubs. Pvt. Ltd. Bombay)

(5) PetrochemicalsdigestbyMGKManon(AsiaPublishinghouseBombay)

(6) Hand book of industrial chemicals Vol-I by K. M. Shah (Multi tech publishing co. 15 yogesh,hingwala lane, ghatkoper (E) Bombay-400077)

(7) Industrial chemistry including chemical engineering by B.K.Sharma, Goel Pubs. House, Meerut.

(8) Hand Book of Synthetic Dyes and Pigments (Vol.II) By K.M.Shah, Multi-tech Publishing Co.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. Semester -VI (Chemistry)

Chemistry-Generic elective subject-Drugs

Syllabus from July 2021

50 Marks (External) **Total: 30 Hrs.**

20 Marks (Internal) **Time: 2 Hrs. (Uni. Exam)**

UNIT – I

Topic – 1: Sedatives, Hypnotics and Anticonvulsant drugs **5 Hrs.**

Definition; Introduction; Classification and Structural variations of Sedatives, Hypnotics and Anticonvulsant drugs; Synthesis and Therapeutic Uses of Luminal (Phenobarbital), Diazepam, Meprobamate, Imipramine, Veronal.

Topic – 2: Anaesthetics **5 Hrs.**

Definition; Introduction of General and Local Anaesthetics, Name and Structures of different General Anaesthetics, Classification and Structural Variation among Local Anaesthetics; Synthesis and Therapeutic Uses of Alpha-Eucaine, Benzocaine, Orthocaine, Lidocaine, Halothane.

UNIT-II

Topic-1: Antihistamines (Anti-allergic drugs) **4 Hrs.**

Definition; Introduction; General account of Histamine and Anti-allergic drugs; Classification and Structural Variations among Antihistamines; Synthesis and Therapeutic Uses of Antergan, Benadryl (Diphenhydramine), Promethazine (Phenergan), Pyribenzamine, Chlorpheniramine.

Topic-2: Antidiabetic Drugs (Hypoglycemic agents) **3 Hrs.**

Definition; Introduction; Hypoglycemia; Role of insulin in diabetes; OralHypoglycemic agents; Structural Variations among Biguanide and Sulfonylurea derivatives showing Hypoglycemic activity; Synthesis and Therapeutic Uses of Tolbutamide, Metformin.

Topic-3: Antitubercular and Antileproticdrugs **3 Hrs.**

Definition; Introduction; General account of Tuberculosis and Leprosy; Structural Variations among Antitubercular and Antileprotic Drugs; Synthesis and Therapeutic Uses of Isoniazid, Ethambutol, Dapsone (DDS).

UNIT-III

Topic-1: Antimalarial drugs **4 Hrs.**

Definition; Introduction; Name and modes of transition of Plasmodium Parasites responsible for Malaria in Human; GeneralClassification of Antimalarial Drugs; Synthesis and Therapeutic Uses of Chloroquine, Mafloquine, Amodiaquine (Camoquine), Primaquine.

Topic-2: Antiseptics and Disinfectants **3 Hrs.**

Definition; Introduction; Classification and Structural variations among Antiseptics and Disinfectants; Synthesis and Therapeutic Uses of Mercurochrome (Merbromin), *n*-Hexylresorcinol, Halazone, Dichloramine-T.

Topic-3: Diuretics **3 Hrs.**

Definition; Introduction; Classification and Structural Variations of Diuretics; Mercurial Diuretics and Non-Mercurial Diuretics; Synthesis and Therapeutic Uses of Sorbitol**,** Acetazolamide, Hydroflumethiazide.

Reference Books:

(1) May's Chemistry of synthetic Drugs by Dyson.

(2) Chemistry of drugs, Ener and Caldwell.

(3) Synthetic drugs by Tyagi and Yadav.

(4) Synthetic Drugs by G. R. Chatwal, Himalaya Publishers.

(5) The Organic Chemistry of Drug Synthesis by Daniel Lednicer&L.A.Mitscher.

(6) Medicinal Chemistry by V.K.Ahluwalia Pub. Ane Books Pvt. Ltd.

(7) Medicinal Chemistry by AshutoshKar, New Age International Publisher.

(8) Medicinal Chemistry by BalkishanRazdan, Pub. CBS Publishers.

(9) Pharmaceutical Organic Chemistry by S.K.Dewan, Pub. Narosa.

(10) Medicinal Chemistry - a Molecular and Biochemical Approach, by Thomas Nogrady&Donald F Weaver

(11) Pharmaceutical Organic Chemistry by Shyam Singh Pub. Himalaya Publishers.

(12) Medicinal Chemistry by G Patrick. Pub. Viva Books.

(13) Burger's Medicinal Chemistry & Drug Discovery. Ed. by D. J. Abraham.

VEER NARMAD SOUTH GUJARAT UNIVERSITY

Third Year B. Sc. (SEM –VI)(Chemistry)

Chemistry - Generic elective subject-DYES

Syllabus from July-2021

50 Marks (External) Total: 30 Hrs.

20 Marks (Internal) Time: 2 Hrs. (Uni. Exam)

UNIT-I

Topic-1: Fluorescent brightening agents 7 Hrs.

General account, classification of FBA base on chemical constitution with examples, Stillbene and Coumarin derivatives of FBA, synthesis of Tinopal BV, Blankophor-B, Blankophor-G , 3-Phenyl-7-methoxy coumarin, 4 Methyl-3 phenyl-7-amino coumarin, Brilliant Yellow,3-Phenyl 7-Acetylamino coumarin, 4-Acetylamino-N-butyl Naphthalimide.

Topic-2: Sulphur dyes 3 Hrs.

General account of Sulphur dyes(a) Sulphur Black (b) Sulphur Brown (c) Sulphur Red (d) Sulphur Blue.

UNIT-II

Topic-1: Reactive dyes 5 Hrs.

Definition, general account of reactive dyes based on monochlorotriazinyl, dichlorotriazinyl and vinyl sulphone system. Application of reactive dyes, Synthesis of Procion Brilliant red H-3B,Procion Brilliant Yellow M-6G, Remazole Black B, Procion Brilliant-Blue M-R, Reactive Red-B.

Topic-2: Mordant dyes 5 Hrs.

(i) Definition, classification of mordant dyes with examples, application of mordant dyes synthesis of alizarin and Mordant yellow-2G

(ii) Heterocyclic Dyes: Introduction Azine dyes, Thiazine dyes, and Cyanine dyes, Synthesis of Safranine-T, Methylene blue, Astrazone pink-FG.

UNIT-III

Topic-1: Azoic dyes **4 Hrs.**

Definition, general account of azoic dyes, fast bases, fast salts, rapid fast colors, rapidogens and rapidazole, synthesis of naphthol AS, Fast blue B base (Dianisidine), Fast Orange GGD, Naphthol ASRL, Fast Orange LG- Base.

Topic-2: Non-textile application of dyes **6 Hrs.**

Food colors, Cosmetic dyes, Dyes for paper and printing inks, Dyes for paints, Dyes for leather and polishes, synthesis of Amaranth, LitholRubine, Lithol Red, Crystal violet, Bismark brown G, Eosin, Orange-I, Prontosil, Pyridium**,** Neutral Red, Mercurochrome. General account of medicinal dyes.

Reference books:

(1) Synthetic organic chemistry by O.P. Agrawal
(2) The chemistry of synthetic dyes and pigments by H. A. Lubes
(3) Chemistry of synthetic dyes VOL I to VII by K. Venkatraman
(4) An introduction to synthetic dyes by D. W. Ranghekar& P. P. Singh
(5) A hand book of synthetic dyes and their application by C. T. Bhastana & V. H. Raichura& others
(6) Chemistry of dyes & Principles of dyeing Vol II by V. A. Shehai
(7) Chemistry of synthetic dyes by I. G. Vashi
(8) Chemistry of dyes and pigments by K. M. Shah
(9) Synthetic dyes by G. R. Chatwal
(10) Synthetic dyes and pigments by E. N. Abrahart

VEER NARMAD SOUTH GUJARAT UNIVERSITY
Third Year B.Sc. Semester -VI
Chemistry Practical
syllabus from July 2021
120 Marks (External) Total: 30 Hrs.
60 Marks (Internal) Time: 6 Hrs. (Uni. Exam) Two Days

1. ORGANIC SEPARATION

Separation of binary mixture, identification of the components and its crystallization & preparation of onederivative and its purification:

ACID : Benzoic acid, Salicylic acid,Phthalic acid,Cinnamicacid, Phenyl aceticacid

BASE : *o*–Nitroaniline, *m*–Nitroaniline, *p*–Nitroaniline, Aniline, *p*–Toluidine,*p*–Chloroaniline, Dimethylaniline, Diethylaniline, Diphenylamine (Notwith Neutral)

PHENOL : Phenol, Alpha naphthol, Beta naphthol, O- Nitro Phenol

NEUTRAL

Aldehyde	:	Benzaldehyde
Ketone	:	Acetone, Methyl Ethyl ketone, Acetophenone
Ester	:	Methyl acetate, Ethylacetate,
Alcohol	:	Methanol, Ethanol
Hydrocarbon	:	*p*-Xylene, Toluene, Anthracene, Naphthalene, Diphenyl
Nitro hydrocarbon	:	Nitro benzene, *m*–Dinitro benzene
Halogenated hydrocarbon	:	Chloroform,Carbontetrachloride,Chlorobenzene, Bromobenzene, *p*– Dichlorobenzene
Amide	:	Benzamide
Anilide	:	Acetanilide

NOTE: CANDIDATE SHOULD PERFORM THE ANALYSIS OF AT LEAST 08 MIXTURES

2. GRAVIMETRIC ESTIMATION OF (ANY TWO)

1. Fe^{+2} as Fe_2O_3 from Fe-NH_4-SO_4+ $CuSO_4$

2. Ba^{+2} as $BaSO_4$ from $BaCl_2$ + $FeCl_3$

3. Al^{+3} as Al_2O_3 from $Al_2(SO_4)_3$ + $CuSO_4$

ESTIMATION OF ALLOY (ANY ONE)

1. Brass - Zinc as $Zn_2P_2O_7$ gravimetrically & Copper by iodometrically(volumetric)

2. German silver - Nickel as Ni $(DMG)_2$ gravimetrically & Copper by iodometrically (volumetric)

3.VOLUMETRIC EXERCISE(ANY FOUR)

1. To determine the percentage purity of potassium acid phthalate.
2. To determine the amount of Ammonium sulphate in the given solution.
3. To determine the amount of Bismuth by EDTA.
4. To determine the amount of Ferric by EDTA.
5. To determine the amount of Chromium by EDTA.
6. To determine the amount of Nickel with Magnesium by EDTA.
7. To determine the amount of Chloride by Mohr's method OR Absorption indicator.
8. To determine the amount of Bromide by Vohlard's method OR Absorption indicator.
9. To determine the percentage purity of $NaNO_2$ / KNO_2.

4. PHYSICAL EXERCISE

1. To investigate rate of reaction between $KBrO_3$ and KI, a = b
2. To investigate rate of reaction between $KBrO_3$ and KI, a ≠ b

(ANY FOUR EXPERIMENT FROM NO. 3 TO 9)

3. Surface Tension: To compare the cleansing power of two detergents by measuring surface tension of their solutions.
4. pH metry: To determine the dissociation constant of weak acid by titration of weak acid and strong base.
5. Conductometry: To determine the amount of vanillin in the given vanilla solution.
6. Conductometry: To determine the amount of HCl and CH_3COOH in given mixture by std.NaOH/NH_4OH solution.
7. Colourimetry: To determine the indicator constant of Phenolphthalein.
8. Colourimetry: To verify Lambert-Beer's law for $KMnO_4$ solution.
9. Refractometry:To determine the specific refractivities of the given liquids A,B and their mixtures containing 20%, 40% and 60% and unknown liquid by volume.

No.	Exercise	Marks
1.	Gravimetric Exercise	30
2.	Volumetric Exercise	25
3.	Physical Exercise	30
4.	Organic Separation	35
	Total	**120**