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

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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.