

SARDAR PATEL UNIVERSITY
Programme: B.Sc (Chemistry)
Semester: III
Syllabus with effect from: JUNE 2019
(30 +70 Marks, 4 hrs per week)

Subject Code: US03CCHE21		Total Credit: 4
Title Of Subject: Inorganic Chemistry		
Unit	Description in detail	Weighting (%)
I	<p>ACID-BASE AND NON-AQUEOUS SOLVENT ACIDS AND BASES Arrhenius concept-the water ion system, Lowry-Bronsted theory-the proton donor-acceptor system, Conjugate acid-base pairs, Relative strength of acids and bases, Periodic variations of acidic and basic properties, The leveling effect, leveling and differentiating solvents, Utility and limitation of Bronsted concept, Utility and limitation of Bronsted concept, The Lewis concept-the electron donor concept system, Classification of Lewis acids, Classification of Lewis acids, Classification of Lewis acids and bases in to Hard and Soft Acids and Bases, HSAB principle and stability of the complex A:B, The Usanovich concept-the positive-negative system.</p> <p>NON-AQUEOUS SOLVENT Classification of solvents, General properties of ionizing solvents(physical and chemical), Chemical reactions, Liquid ammonia as non-aqueous solvent, Solubility of substance in liq. NH₃, Advantage and disadvantage of using liq. NH₃ as a solvent, Auto-ionization of liq. NH₃, Chemical reactions occurring in liq. NH₃, Liquid sulphur dioxide as solvent, Chemical reactions occurring in liq. SO₂</p>	25%
2	<p>VALANCE BOND THEORY AND ISOMERISM IN COORDINATION COMPOUNDS Main assumption of VBT, Octahedral complexes- d²sp³ or sp³d²: [Fe(CN)₆]⁴⁻, [Fe(F)₆]³⁻, Tetrahedral complexes- sp³: [Ni(CO)₄], [Ni(Cl)₄]²⁻, Square planar complexes- dsp²: [Ni(CN)₄]²⁻, Limitation VBT Structural Isomerism: Conformation isomerism, Ionization isomerism, Hydrate isomerism, Coordination isomerism, Linkage isomerism, Coordination position isomerism, Ligand isomerism, Polymerization isomerism Stereo isomerism: Geometrical isomerism, Geometrical isomerism in 4-coordinated complex compounds, Geometrical isomerism in 6-coordinated complex compounds, Distinguish between cis and trans isomers, Optical isomerism in 4-coordinated complex compounds, Optical isomerism in 6-coordinated complex compounds</p>	25%
3	<p>LANTHANIDES AND ACTINIDES LANTHANIDES: Definitions, Position of Lanthanides in periodic table, General properties, Electronic configuration, Oxidation state and oxidation potential Chemistry of +2, +3, and +4 state, Atomic and ionic radii: Lanthanide contraction, Cause of Lanthanide contraction, Consequences of Lanthanide contraction, Color and absorption spectra in Ln⁺³ ion, Magnetic properties Complex formation, Extraction of Lanthanide from monazite, Separation of individual rare earth elements by modern methods, Solvent extraction method Uses of Lanthanide compounds ACTINIDES: Definition, Position of Actinides in periodic table, General properties of Actinides and their comparison with Lanthanides, Electronic configuration and nature of bonding in Actinide compounds, Oxidation state and</p>	25%

	oxidation potential, Chemistry of +2, +3, +4, +5, +6, and +7 oxidation state, Atomic and ionic radii: Actinide contraction, Color and absorption spectra of Actinide ions, Magnetic properties, Complex formation, Separation of actinide elements, Solvent extraction method, Ion exchange method.	
4	<p>CHEMISTRY OF METAL CARBONYL AND NITROSYLS</p> <p>METALLIC CARBONYLS: Classification of carbonyls, General methods of preparations, General properties (physical & chemical), Structure and nature of M-CO bonding in carbonyls, Effective atomic number (EAN) rule as applied to metallic carbonyls, 18-electron rule as applied to metallic carbonyls, Some carbonyls (preparation, properties and structure), Nickel tetracarbonyl, Ni(CO)₄, Iron pentacarbonyl, Fe(CO)₅, Chromium hexacarbonyl, Cr(CO)₆, Dimanganese decacarbonyl, Mn₂(CO)₁₀, Dicobalt octacarbonyl, Co₂(CO)₈, Di-iron enneacarbonyl, Fe₂(CO)₉, Tri-iron dodecacarbonyl, Fe₃(CO)₁₂,</p> <p>METALLIC NITROSYLS: Some metallic nitrosyls, Sodium nitroprusside, Na₂[Fe₂(CN)₅(NO⁺)], Nitroso ferrous sulphate, FeSO₄.NO, Effective atomic number (EAN) rule as applied to metallic nitrosyls,</p>	25%

Reference Books:-

1. Selected Topic in Inorganic Chemistry, 8th-edition, By Wahid U. Malik, G. D. Tuli And R. D. Madan
2. Advance Inorganic Chemistry (Volume –II) By: Satya Prakash, G. D. Tuli, . S.K. Basu, R. D. Madan

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Subject Code: US03CCHE22		Total Credit: 4
Title Of Subject : Physical Chemistry		
Unit	Description in Detail	Weighting (%)
I	<p>STATES OF MATTER</p> <p>Gaseous state The Gas Laws, Kinetic Molecular Theory of Gases, Deviation of Real Gases From Ideal Behavior, Effect of Temperature and Explanation for the deviation, Vander Waals Equation of State, Discussion Of VanderWaal's Equation, Critical Constants Of Gas, Determination Of Critical Pressure, Temperature And Volume, Relation Between VanderWaal's Constant And Critical Constants, Numerical</p> <p>Liquid state Vapour Pressure and Its Experimental Determination, Surface Tension and Its Experimental Determination, Viscosity And Its Experimental Determination, Numerical.</p>	25%
2	<p>CHEMICAL THERMODYNAMICS</p> <p>Introduction, Terminology of Thermodynamics, state function, thermal equilibrium, zeroth law of thermodynamics, Thermodynamic process, First law of thermodynamics, Enthalpy, work, Thermochemistry, Molar heat at constant volume and constant pressure, Kirchoff's equation, Criteria for spontaneous process, Reversible and Irreversible process, Relation between q_{rev} and q_{irr}, Numerical</p>	25%
3	<p>COLLIGATIVE PROPERTIES OF DILUTE SOLUTIONS</p> <p>Colligative Properties, Vapour Pressure Lowering, Determination of Molar Mass of Solute, Measurement of Vapour Pressure Lowering Osmosis and Osmotic Pressure, Derivation of Equation for calculating Osmotic Pressure, Determination of Molar Mass, Measurement of Osmotic Pressure, The Boiling Point Elevation, Derivation of Equation and Measurement of Boiling Point Elevation The Freezing Point Depression, Derivation of Equation For Molar Mass, Measurement Of Freezing Point Depression, Numerical</p>	25%
4	<p>ELECTROLYTES IN SOLUTION</p> <p>Specific Conductance, Molar Conductance, Conductance and Electrolytic Dissociation, Colligative Properties And Electrolytic Dissociation, Electrolysis Transference Numbers, Ionic Mobilities, Applications, Ionic Strength, Dissociation Of Weak Electrolytes.</p>	25%

Reference book:

1. Principles of Physical Chemistry by Puri, Sharma and Pathania. 38thed.
2. Essential of physical chemistry by Bahl, Bahl and Tuli. 25th edition.
3. Physical Chemistry by G.M.Barrow, 5thed.
4. Textbook of physical chemistry by P.L. Soni, O.P. Dharmarha, U. N. Dash
5. University chemistry by Bruce H Mahan
6. Principles of Physical chemistry, S H Marron, Karl F prutton
7. Physical Chemistry, Ira Levine

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Paper Code: US03CCHE23	Total Credit: 2
Title Of Paper: Chemistry Practical	

	Description in detail	
1	Inorganic Mixture: Four radicals. It may include two positive Radicals and two negative radicals. (At least Ten) Cd^{+2} , Cu^{+2} , Bi^{+3} , Fe^{+2} , Zn^{+2} , Al^{+3} , Ni^{+2} , Mn^{+2} , Ba^{+2} , Sr^{+2} , Ca^{+2} , Mg^{+2} , NH_4^+ , K^+ , Cl^- , Br^- , I^- , NO_3^- , CO_3^{-2} , S^{-2} , PO_4^{-3} , BO_3^{-3} , SO_4^{-2} , CrO_4^{-2} , $Cr_2O_7^{-2}$ etc.	
2	Viva	

Basic Text & Reference Books :-

- Vogel's Testbook Of Qualitative Inorganic Analysis By G.Svehla
- Practical Chemistry By O.P.Pandey, D.N.Bajpai & S.Giri
- An Advanced Course In Practical Chemistry By Ghoshal, Mahapatra & Nad

Paper Code:	Total Credit: 2
Title Of Paper: Chemistry Practical	

	Description in detail	
1	Volumetric Titration (By self preparation of solution of titrant): Estimation of copper by iodometric method. Determination of total hardness of water sample. Determination of nickel by back titration. Determination of nitrite by back titration. Estimation of Amide Estimation of Aniline Determine the Unsaturation	
2	Preparation of standard solutions.	
3	Paper chromatography.	
4	Viva	

- Vogel's Testbook of Quantitative Chemical Analysis, 5th Edition By G.H.Jeffery, J.Basset, J.Mendham, R.C.Denney.
- Practical Chemistry By O.P.Pandey, D.N.Bajpai & S.Giri
- An Advanced Course In Practical Chemistry By Ghoshal, Mahapatra & Nad

