Percentage of Revision of B. Sc (Chemistry)

Syllabus Revised for – (2020 - 2023)

DEPARTMENT OF CHEMISTRY							
S. No	**Course Code**	**Course Title**	**Change Details**	**% of Changes**	**Content Deleted**	**Content Updated**	**Reason for Change**
1	20UCY101	Core Paper – I: Inorganic and Organic chemistry	**UNIT - III**	15	Dehalogenation and HIO_4	Nomenclature of organic compounds - IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds - priorities of functional groups in polyfunctional compounds.	Subject Expert opinion
2	20UCY202	Core Paper – II: Organic and Physical chemistry	**Unit - II**	15	NH_2OH, $H_2NCONHNH_2$, CrO_3, PCC, PDC.	-	Course Teacher opinion
			Unit - III		Wave mechanics: Characteristics of wave motion.	Atomic Structure Rutherford atomic model – Bohr theory of hydrogen atom – Sommerfeld theory - Particle and wave character of electrons	
3	20UCY203	Core Practical -		-	-	-	-

		I: Inorganic Qualitative Analysis					
4	20UCY304	Core Paper – III: Inorganic and Physical Chemistry	**Unit - I**	20	Fertilizers: Important nutrients and their functions. Primary and secondary nutrients**.** Manufacture of urea, ammonium sulphate, super phosphate of lime, triple super phosphate and potassium nitrate.	Extraction and uses of Ti, V and W. Platinum Metals – Metallurgy of Platinum. Platinum black, Platinised asbestos, colloidal platinum - Preparation and uses. Cement: Types of cement, composition, manufacture and setting of cement.	Course Teacher Opinion
			Unit - II		Inorganic Polymers: Silicones - Preparation, properties and applications. Glass: Manufacture, types and coloured glass. Cement: Types of cement, composition, manufacture and setting of cement.	Fertilizers: Important nutrients and their functions. Primary and secondary nutrients**.** Manufacture of urea, ammonium sulphate, super phosphate of lime, triple super phosphate and calcium ammonium nitrate.	

5	20UCY405	Core Paper – IV: Inorganic, Organic and Physical Chemistry			**Unit I:** Extraction and uses of Ti,V,Mo,W and Co. Platinum Metals: Metallurgy of platinum. Platinum black, Platinised asbestos, colloidal platinum - preparation and uses. Group Discussions: (i) Cr, Mo and W (iii) Fe,Co and Ni . Alloy steels. Heat treatment of steel. Iron and steel industry in India. Preparation and uses of the following compounds. TiO_2, $TiCl_4$, CrO_2Cl_2, $ZrOCl_2$, V_2O_5,$FeSO_4$, $(NH)_4MoO_4$, $PtCl_4$.	**Unit V:** **Nuclear Chemistry:** Radioactivity- types of radioactivity- types of radioactive rays -nuclear stability-n/p ratio -magic numbers- nuclear binding energy- mass defect- nuclear shell model – groups displacement law - decay constant – half-life period - radioactive equilibrium- transmutation-artificial transmutation- applications of artificial transmutation-radioactive series. Nuclear reactions types: fission and fusion reactions-principle and working of nuclear reactors. Isotopes: Separation of isotopes- identification of isotopes- isotopes of hydrogen- isotope effect- application of isotopes in chemistry, agriculture	Course Teacher Opinion

						and medicine.	
6	20UCY406	Core Practical - II: Volumetric and Organic Qualitative Analysis	-	-	-	-	-
7	20UCY507	Core Paper – V: Coordination and Bioinorganic Chemistry		80	**Nuclear and Co - ordination Chemistry** **Unit-I** Radio activity. Mass defect, packing fraction. Nuclear binding energy, n/p ratio and stability of the nucleus. Differences between nuclear and chemical reactions. Half- life period. Applications of artificial radioactivity: Age of the earth and C14 dating, medical field applications Isotopes:	**Coordination and Bioinorganic Chemistry** **Unit-I** Double salts- complex compounds- complex ion and coordination number- Ligands and their classification- chelates and their uses- coordination number and stereochemistry of complexes- IUPAC Nomenclature of coordination compounds. Isomerism: ionization, hydrate, ligand, linkage, coordination, position, geometrical and optical isomerisms.	Course Teacher Opinion

					Detection of isotope by Aston Mass Spectrograph. Separation of isotopes by Electromagnetic, Thermal diffusion and Electrolytic techniques. Nuclear fission and fusion. Types of nuclear wastes and different methods of disposal of High and low radioactive wastes. **Unit-II** Co-ordination chemistry: Double salt and coordination compounds. Definitions of the terms: Ligands and Co-ordination number. Classification of ligands. Nomenclature of Co-ordination compounds. Theories	**Unit-II** Theories of coordination compounds: Werner's theory- Sidwick's electronic interpretation- EAN concept- valence bond theory outer and inner orbital complexes- Limitations of VBT- crystal field theory- Crystal field splitting in octahedral, tetragonal, square planar and tetrahedral complexes- High spin and Low spin complexes. **<u>Unit-III</u>** Crystal field stablisation energy- calculation and uses- Limitations of crystal field theory. **Applications of coordination compounds:**. Applications of copper and silver complexes in	

					of Coordination compounds: Werner's Theory: Designation of Cobalt (III)-ammine complexes. Sidgwick's Theory: Electronic interpretation of Co-ordination bond - Effective atomic number rule. VB theory: Postulates and its applications in the determination of geometry and magnetic property of the complexes. **Unit-III** Spectrochemical series. Chelates: Definition, classification, stability factors, sequestration and sequestering agents. Detection and structure determination of Complexes: Solubility	qualitative analysis. Applications of Ca-EDTA and Ni-DMG complexes in quantitative analysis. **Unit-IV** **Properties of complexes:** Color of transition metal complexes-visible spectrum of aqueous Ti (III) ion. Stability of complexes-overall and stepwise formation constants. Factors affecting stability-Determination of stability constant by Job's and Bjeruum's method.**]** **Unit-V** **Bioinorganic chemistry:** Metals in biology-bulk and trace metals-Structure and function of Metalloporphyrins-	

					method, change in colour,pH measurements and conductance measurements. **Unit-IV** Isomerism in Co-ordination compounds: Structural isomerism: Ionisation, Hydrate and Linkage isomerism. Stereo isomerism: Geometrical isomerism in 4 and 6 - Co-ordination complexes. Optical isomerism in 4 -and 6- Co-ordination compounds. 56 IV Applications of complexes in quantitative analysis: Estimation of Ni2+ using DMG and Mg2+ using Oxine.	Chlorophyll- Vitamin B12- Structure and Biological role of Myoglobin and hemoglobin. Metallo enzymes- carboxy peptidase and peroxidase-sodium and potassium ion pump. Biological functions and toxicity of chromium, manganese, cobalt, nickel, copper, arsenic, iodine and mercury.	

					Unit-V Semiconductors: Intrinsic and Extrinsic Semi-Conductors - n-type and ptype - Properties and uses. Structures of alloys: Interstitial, substitutional and intermetallic alloys.		
8	20UCY508	Core Paper – VI: Organic Chemistry- I		15	-	**UNIT-III:** Analysis of carbohydrates. **UNIT-II:** Reagents in organic synthesis: Ozone, Osmium tetroxide, Lithium Aluminium hydride, sodium borohydride and Birch reduction.	Course Teacher opinion
9	20UCY509	Core Paper – VII: Electro Chemistry		20	**UNIT- II** Determination of solubility of sparingly soluble salts. **UNIT- III**	**UNIT -III** Determination of Degree of hydrolysis- indirect method and Electrical Conductance method.	Course Teacher opinion

					choice of Indicators **UNIT- IV** Equilibrium constant of a electrochemical reaction, Determination of transport number. **UNIT -V** Cathodic protection, modifying the environment.	**UNIT –IV** Electrochemical instrumentation and techniques: Potentiostatic and galvanostatic Experiments. Cyclic voltammetry, chronoamperometry, chronopotentiometry.	
10	20UCY510	Core Paper-VIII: Dye Chemistry		20	**Unit V:** Types of textile fibres: Natural, Semisynthetic and Synthetic fibres – Cotton, Wool, Silk, Cellulose acetate, Viscose rayon, polyamides, polyacrylonitrile and polyester. Selection of dyes for different fibres, Fastness properties of	**Unit V:** Textile fibres: Classification of fibres - Natural, Synthetic and Semi synthetic fibres). Structure of textile fibres: Cotton, wool, silk, nylon, polyester and polyacrylamide. Natural fibres: Physical, chemical properties and uses of cellulose fibre (cotton), protein fibre	Course Teacher Opinion

					dyes.	(silk and wool). Synthetic fibres: Preparation, properties and Uses of Nylon 6, Nylon (6,6), Polyester, and poly acryl amide. Semi synthetic fibres: Rayon - manufacture of viscose rayon and cuprammonium rayon.	
11	20UCY5E1	Core Elective - I: Analytical Chemistry – I	-	-	-	-	-
12	20UCY5E2	Core Elective Practical - Application Oriented Practical	-	-	-	-	-
13	20UCY611	Core Paper – IX: Physical Methods and Chemical Structure		15	**Unit III:** Application of NMR in the study of simple molecules : xylene	**Unit III:** Peak area and proton counting. Application of NMR in the study of simple molecules :diethyl ether	Course Teacher opinion

						Unit IV: **Mass Spectra:** Theory, basic principle, isotope abundance, base peak, molecular ion peak, Determination of molecular ion peak, meta stable ion, McLafferty rearrangement and Nitrogen rule.	Alumini opinion
14	20UCY612	Core Paper – X: Organic Chemistry-II		20	-	**Unit-II** Terminal residual Analysis: N-Terminal end by Sanger's method. C-Terminal end by reduction method. **Unit-IV** Constitution and Synthesis of the following: Vitamin A1(retinol), Vitamin B1, Pyridoxine and Ascorbic acid	Course Teacher Opinion
15	20UCY613	Core Paper – XI: Chemical		20	**Chemical kinetics and photochemistry**	**Chemical kinetics and Quantum mechanics**	Course Teacher

		Kinetics and Quantum Mechanics			**Unit-V** **Colloids:** Classification, preparation and application of colloids Properties of colloids: Optical and kinetic properties: Tyndall effect and Brownian movement Electrical properties: Charge on colloidal particle, Electrical double layer and Zetapotential. Electrokinetic properties: Electroosmosis and Electrophoresis. Emulsions: Preparation, Properties and Applications. Gels: Properties and Applications.	**Unit-V** The need for quantum mechanics. **Functions**: Real, complex, odd, even, orthogonal and normalized functions. **Operators**: linear and non-linear, differential, Hermitian, Hamiltonian, momentum (linear and angular) commutator (Theorems) and non-commutators, Eigen functions and eigen values. Postulates of quantum mechanics (statements only).	Opinion
16	20UCY614	Core Paper – XII: Polymer Chemistry		20	**UNIT-I** Biodegradable Polymers:	**UNIT –II** Miscellaneous Polymerization reactions-	Course Teacher opinion

					Preparation, Properties and application of PolyLactic Acid. **UNIT-V** Injection moulding, blow moulding	Electrochemical Polymerization. **UNIT-III** Hydrolytic method **UNIT –IV** End group Analysis **UNIT -V** Recent Advances in Polymers: Polymer and environmental effect-introduction- disposal of polymer waste - recycling system-importance of biopolymers.	
17	20UCY615	Core Lab - III: Gravimetric Analysis and Physical Chemistry Experiments		-	-	-	-
18	20UCY6S3	Skill Based Elective - II:		-	-	-	-

		Green Chemistry					
19	20UPS3A3/ 20UBY3A4/ 20UZY3A4	Allied Chemistry Paper – I: Inorganic, Organic And Physical Chemistry		20	**UNIT-III** Covalent bond: Orbital overlap, hybridization, geometry of organic molecules – CH_4, C_2H_4, C_2H_2, C_6H_6. Inductive, Electrometric, Mesomeric, Hyperconjugative and Steric effects. Effect in properities of compounds. **UNIT-V** Ostwald's dilution law. Determination of molar conductance of an electrolyte,	**UNIT-III** Heterocyclic compounds - Huckel's rule – Aromaticity of Heterocyclic compounds - Nomenclature of heterocyclic compounds- synthesis and reactions of furan-pyrrole- thiophene and pyridine. **UNIT-V** Applications of conductance measurements – determination of degree of dissociation of weak electrolyte. Ionic product of water and conductometric titrations.	Subject Expert opinion
20	20UPS4A4/ 20UBY4A5/	Allied Chemistry Paper		20	**UNIT-I** Silicones: Preparation,	**UNIT-I** Cement: Manufacturing	Course teacher

	20UZY4A5	– II: Inorganic, Organic And Physical Chemistry			properties and uses. **UNIT-V** Emulsions and gels: Preparation, properties and applications.	– Wet Process and Dry process- types- setting of cement **UNIT-V** Phase rule- Definition of terms involved. Phase diagram of H_2O, Pb-Ag.	opinion
21	20UPS4A5/ 20UBY4A6/ 20UZY4A6	Allied Chemistry Practical	-	-	-	-	-

BoS Chairman