

Percentage of Revision of B.Sc., Chemistry Syllabus under Regulation 2020

| DEPARTMENT OF CHEMISTRY |             |   |                |              |  |   |  |
|-------------------------|-------------|---|----------------|--------------|--|---|--|
| S. No                   | Course Code | Course Title  | Change Details | % of Changes | Content Deleted  | Content Updated   | Reason for Change (Subject Expert / Course Teacher / Alumni Opinion) |
| 1                       | 20UCY101    | Core Paper – I :<br>Inorganic and Organic Chemistry | Unit 1 - 5     | 5%           | Dehalogenation, HIO <sub>4</sub>   | Nomenclature of organic compounds - IUPAC naming of simple and substituted aliphatic, aromatic and alicyclic compounds - priorities of functional groups in polyfunctional compounds. | Subject Expert   |
| 2                       | 20UCY202    | Core Paper – II :<br>Organic and Physical Chemistry | Unit 1 - 5     | 5%           | UNIT –II<br>NH <sub>2</sub> OH,<br>H <sub>2</sub> NCONHNH <sub>2</sub> ,<br>CrO <sub>3</sub> , PCC,<br>PDC.<br>UNIT -III<br>Wave | UNIT -III<br>Atomic Structure<br>Rutherford atomic model – Bohr theory of hydrogen atom – Sommerfeld theory - Particle and wave   | Subject Expert   |

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|    |          |  |            |     | mechanics:<br>Characteristics of<br>wave motion.   | character of electrons  |   |
| 3  | 20UCY203 | Core Practical – I<br>: Inorganic<br>Qualitative<br>Analysis | Unit 1 - 5 | 0%  | -  | -   | - |
| 4. | 20UCY304 | Core - III :<br>Inorganic and<br>Physical<br>Chemistry       | Unit 1 - 5 | 10% | <p><b>Unit II:</b><br/>Inorganic<br/>Polymers:<br/>Silicones -<br/>Preparation,<br/>properties and<br/>applications.<br/>Glass:<br/>Manufacture,<br/>types and<br/>coloured glass.<br/>Cement: Types<br/>of cement,<br/>composition,<br/>manufacture<br/>and setting of<br/>cement.</p> <p><b>Unit 1 :</b><br/>Fertilizers:<br/>Important<br/>nutrients and<br/>their functions.<br/>Primary and<br/>secondary<br/>nutrients.<br/>Manufacture of</p> | <p><b>Unit 1:</b><br/>Extraction and uses of Ti, V and V<br/><b>Platinised asbestos, colloidal pla</b><br/>Cement: Types of cement, compo</p> <p><b>Unit 2:</b> Subject<br/>Fertilizers: Important nutrients and<br/>Expert<br/>urea, ammonium sulphate, super p<br/>nitrate.</p> <p>5.</p> |   |

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|   |          |   |            |     | urea, ammonium sulphate, super phosphate of lime, triple super phosphate and potassium nitrate.  |  |                |
| 5 | 20UCY3N1 | Non Major Elective - I : Food Science and Technology    | Unit 1 - 5 | 0%  | -  | -  | -              |
| 6 | 20UCY3N2 | Non Major Elective - I : Chemistry of Consumer Products | Unit 1 - 5 | 0%  | -  | -  | -              |
| 7 | 20UCY405 | Core - IV : Inorganic, Organic and Physical Chemistry   | Unit 1 - 5 | 10% | <b>Unit I:</b><br>Extraction and uses of Ti, V, Mo, W and Co. Platinum Metallurgy of platinum. Platinum black, Platinised asbestos, colloidal platinum - preparation and uses. Group | <b>Unit V: Nuclear Chemistry:</b><br>Radioactivity- types of radioactivity- types of radioactive rays - nuclear stability-n/p ratio -magic numbers- nuclear binding energy- mass defect- nuclear | Course Teacher |

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|  |  |  |  | <p>Discussions: (i) Cr, Mo and W (iii) Fe, Co and Ni . Alloy steels. Heat treatment of steel. Iron and steel industry in India.</p> <p>Preparation and uses of the following compounds. <math>TiO_2</math>, <math>TiCl_4</math>, <math>CrO_2Cl_2</math>, <math>ZrOCl_2</math>, <math>V_2O_5</math>, <math>FeSO_4</math>, <math>(NH)_4 MoO_4</math>, <math>PtCl_4</math>.</p> | <p>shell model - groupsdisplacementlaw - 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</p> |
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|    |                                    |   |            |     |   | isotopes in chemistry, agriculture and medicine.   |                |
| 8  | 20UCY406                           | Core Practical II :<br>Volumetric and Organic Qualitative Analysis        | Unit 1 - 5 | 0%  | -   | -  | -              |
| 9  | 20UCY4N3                           | Non Major Elective - II :<br>Water and Water Treatment Processes          | Unit 1 - 5 | 0%  | -   |  |                |
| 10 | 20UCY4N4                           | Non Major Elective - II :<br>Diagnostic Chemistry                         | Unit 1 - 5 | 0%  | -   | -  | -              |
| 11 | 20UPS3A3/<br>20UBY3A4<br>/20UZY3A4 | Allied Chemistry Paper - I :<br>Inorganic, Organic and Physical Chemistry | Unit 1 - 5 | 10% | UNIT-III<br>Covalent bond:Orbital overlap hybridization, geometry of organic molecules – CH <sub>4</sub> , C <sub>2</sub> H <sub>4</sub> , C <sub>2</sub> H <sub>2</sub> , C <sub>6</sub> H <sub>6</sub> . Inductive, Electrometric, Mesomeric, Hyperconjugative and Steric effects. Effect in properties of compounds. | UNIT-III<br>Heterocyclic compounds - Huckel's rule – Aromaticity of heterocyclic compounds - Nomenclature of heterocyclic compounds- synthesis and reactions of furan- pyrrole- thiophene and pyridine.<br>UNIT-V<br>Applications of | Expert Subject |

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|    |                                    |  |            |     |  | UNIT-V<br>Ostwald's dilution law. Determination of molar conductance of an electrolyte   | conductance measurements – determination of degree of dissociation of weak electrolyte. Ionic product of water and conductometric titrations. |
| 12 | 20UPS4A4/<br>20UBY4A5<br>/20UZY4A5 | Allied Chemistry Paper – II :<br>Inorganic, Organic and Physical Chemistry | Unit 1 - 5 | 5%  | UNIT-I<br>Silicones: Preparation, properties and uses.<br>UNIT-V<br>Emulsions and gels: Preparation, properties and applications.    | UNIT-I<br>Cement: Manufacturing – Wet Process and Dry process- types- setting of cement<br>UNIT-V<br>Phase rule- Definition of terms involved. phase diagram of H <sub>2</sub> O, Pb-Ag. |   |
| 13 | 20UPS4A5/<br>20UBY4A6<br>/20UZY4A6 | Allied Chemistry Practical   | Unit 1 - 5 | 0%  | -  | -  |   |
| 14 | 20UCY507                           | Core Paper – V :<br>Nuclear and Co-ordination Chemistry                    | Unit 1 - 5 | 25% | Nuclear and Co-ordination Chemistry<br>Unit-I<br>Radio activity, Mass defect, packing fraction.<br>Nuclear binding energy, n/p ratio | Coordination and Bioinorganic Chemistry<br>Unit-I<br>Double salts- complex compounds- complex ion and coordination   | Course Teacher  |

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|  |  |  |  | stability of the nucleus.<br>Differences between nuclear and chemical reactions. Half-life period.<br>Applications of artificial radioactivity:<br>Age of the earth and C14 dating, medical field applications<br>Isotopes: Detection of isotope by Aston Mass Spectrograph.<br>Separation of isotopes by Electromagnetic, Thermal diffusion and Electrolytic techniques.<br>Nuclear fission and fusion.<br>Types of nuclear wastes | number-<br>Ligands and their classification- chelates and their uses- coordination number and stereochemistry of complexes- IUPAC Nomenclature of coordination compounds.<br>Isomerism: ionization, hydrate, ligand, linkage, coordination, position, geometrical and optical isomerisms.<br><b>Unit-II</b><br>Theories of coordination compounds: Werner's theory- Sidwick's electronic interpretation- EAN concept- |
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|  |  |  |  | <p>and different valence bond methods of theory outer disposal of and inner High and low orbital radioactive complexes-wastes. Limitations of Unit-II VBT- crystal Co-ordination field theory-chemistry: Crystal field Double salt and splitting in coordination octahedral, compounds. tetragonal, Definitions of square planar the terms: and tetrahedral Ligands and complexes- Co-ordination High spin and number. Low spin Classification of ligands. complexes. Unit-III Nomenclature Crystal field of Co- stabilisation ordination energy- compounds. calculation and Theories of uses- Coordination Limitations of compounds: crystal field Werner's theory. Theory: Applications of Designation of coordination Cobalt (III)- compounds:. ammine Applications of complexes. copper and Sidgwick's silver</p> |
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| <p>Theory:<br/>Electronic interpretation of Co-ordination bond - Effective atomic number rule. VB theory:<br/>Postulates and its applications in the determination of geometry and magnetic property of the complexes.</p> <p>Unit-III<br/>Spectrochemical series. Chelates: Definition, classification, stability factors, sequestration and sequestering agents. Detection and structure determination of Complexes: Solubility method, change</p> | <p>complexes in qualitative analysis. Applications of Ca-EDTA and Ni-DMG complexes in quantitative analysis.</p> <p>Unit-IV<br/>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.]</p> |
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|  |  |  |  | <p>in colour, pH measurements and conductance measurements.</p> <p><b>Unit-IV</b></p> <p>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</p> <p>IV Applications of complexes in quantitative analysis: Estimation of <math>Ni^{2+}</math> using</p> | <p><b>Unit-V</b></p> <p><b>Bioinorganic chemistry:</b></p> <p>Metals in biology-bulk and trace metals- Structure and function of Metalloporphyrins- Chlorophyll- Vitamin B12- Structure and Biological role of Myoglobin and hemoglobin.</p> <p>Metallo enzymes- carboxy peptidase and peroxidase- sodium and potassium ion pump. Biological functions and toxicity of chromium, manganese, cobalt, nickel, copper, arsenic, iodine and</p> |
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|    |          |  |            |    | DMG and mercury.<br>Mg <sup>2+</sup> using<br>Oxine.<br>Unit-V<br>Semiconductors<br>: Intrinsic and<br>Extrinsic Semi<br>Conductors - n-<br>type and ptype -<br>Properties and<br>uses.<br>Structures of<br>alloys:<br>Interstitial,<br>substitutional<br>and<br>intermetallic<br>alloys. |   |                   |
| 15 | 20UCY508 | Core Paper – VI :<br>Organic<br>Chemistry- I | Unit 1 - 5 | 5% | -   | UNIT-III:<br>Analysis of<br>carbohydrates.<br>UNIT-II:<br>Reagents in<br>organic<br>synthesis:Ozon<br>e, Osmium<br>tetroxide,Lithiu<br>mAluminium<br>hydride,<br>sodium<br>borohydride<br>and Birch<br>reduction. | Course<br>Teacher |

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| 16 | 20UCY509 | Core Paper – VII<br>: Electro<br>Chemistry | Unit 1 - 5 | 5%  | <p><b>UNIT- II</b><br/>Determination of solubility of sparingly soluble salts.</p> <p><b>UNIT- III</b><br/>choice of Indicators</p> <p><b>UNIT- IV</b><br/>Equilibrium constant of a electrochemical reaction, Determination of transport number.</p> <p><b>UNIT -V</b><br/>Cathodic protection, modifying the environment.</p> | <p><b>UNIT -III</b><br/>Determination of Degree of hydrolysis- indirect method and Electrical Conductance method.</p> <p><b>UNIT –IV</b><br/>Electrochemical instrumentation and techniques: Potentiostatic and galvanostatic Experiments. Cyclic voltammetry, chronoamperometry, chronopotentiometry.</p> | Course<br>Teacher |
| 17 | 20UCY510 | Core Paper- VIII :<br>Dye Chemistry        | Unit 1 - 5 | 10% | <p><b>Unit V:</b><br/>Types of textile fibres: Natural, Semisynthetic and Synthetic fibres – Cotton, Wool, Silk, Cellulose acetate, Viscose rayon,</p>  | <p><b>Unit V:</b><br/>Textile fibres: Classification of fibres - Natural, Synthetic and Semi synthetic fibres). Structure of textile fibres:</p>   | Course<br>Teacher |

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|    |          |  |            |    |   | polyamides, polyacrylonitril and polyester. Selection of dyes for different fibres, Fastness properties of dyes. | Cotton, wool, silk, nylon, polyester and polyacrylamide. Natural fibres: Physical, chemical properties and uses of cellulose fibre (cotton), protein fibre (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. |  |
| 18 | 20UCY5E1 | Core Elective I : Analytical Chemistry | Unit 1 - 5 | 0% | - | -  | -  |  |
| 19 | 20UCY5S1 | Skill Based                            | Unit 1 - 5 | 0% | - | -  | -  |  |

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|    |          | Elective -I :<br>Network and<br>Information<br>security            |            |    |   |   |                   |
| 20 | 20UCY5S2 | Skill Based<br>Elective -I :<br>Cyber Security-<br>Ethical Hacking | Unit 1 - 5 | 0% | -   | -   | -                 |
| 21 | 20UCY611 | Core Paper – IX :<br>Physical Methods<br>and Chemical<br>Structure | Unit 1 - 5 | 5% | Unit III:<br>Application of<br>NMR in the<br>study of simple<br>molecules :<br>xylene | Unit III:<br>Peak area and<br>proton<br>counting.<br>Application of<br>NMR in the<br>study of simple<br>molecules<br>:diethyl ether<br>Unit IV:<br>Mass Spectra:<br>Theory, basic<br>principle,<br>isotope<br>abundance,<br>base peak,<br>molecular ion<br>peak,<br>Determination<br>of molecular<br>ion peak, meta<br>stable ion,<br>McLafferty<br>rearrangement<br>and Nitrogen | Course<br>Teacher |

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| 22 | 20UCY612 | Core Paper – X :<br>Organic<br>Chemistry-II                           | Unit 1 - 5 | 0% | -  | <b>Unit-II</b><br>Terminal<br>residual<br>Analysis: N-<br>Terminal end<br>by Sanger's<br>method. C-<br>Terminal end<br>by reduction<br><b>Unit-IV</b><br>Constitution<br>and Synthesis<br>of the<br>following:<br>Vitamin<br>A1(retinol),<br>Vitamin B1,<br>Pyridoxine and<br>Ascorbic acid | Course<br>Teacher |
| 23 | 20UCY613 | Core Paper – XI :<br>Chemical<br>Kinetics and<br>Quantum<br>Mechanics | Unit 1 - 5 | 5% | <b>Chemical<br/>kinetics and<br/>photochemistr<br/>y</b><br><b>Unit-V</b><br><b>Colloids:</b><br>Classification,<br>preparation and<br>application of<br>colloids<br>Properties of<br>colloids:<br>Optical and | <b>Chemical<br/>kinetics and<br/>Quantum<br/>mechanics</b><br><b>Unit-V</b><br>The need for<br>quantum<br>mechanics.<br><b>Functions:</b><br>Real, complex,<br>odd, even,<br>orthogonal and<br>normalized   | Course<br>Teacher |

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|    |          |   |            |    | kinetic properties: Tyndall effect and Brownian movement<br>Electrical properties: Charge on colloidal particle, Electrical double layer and Zetapotential.<br>Electrokinetic properties: Electroosmosis and Electrophoresis.<br>Emulsions: Preparation, Properties and Applications.<br>Gels: Properties and Applications. | functions.<br><b>Operators:</b> linear and non-linear, differential, Hermitian, Hamiltonian, momentum (linear and angular) commutator (Theorems) and non-commutators, Eigen functions and eigen values.<br>Postulates of quantum mechanics (statements only). |                |
| 24 | 20UCY614 | Core Paper - XII :<br>Polymer Chemistry | Unit 1 - 5 | 5% | <b>UNIT-I</b><br>Biodegradable Polymers: Preparation, Properties and application of PolyLactic  | <b>UNIT -II</b><br>Miscellaneous Polymerization reactions- Electrochemical Polymerization.  | Subject Expert |



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|    |          |   |            |    | Acid.<br>UNIT-V<br>Injection<br>moulding, blow<br>moulding | UNIT-III<br>Hydrolytic<br>method<br>UNIT -IV<br>End group<br>Analysis<br>UNIT -V<br>Recent<br>Advances in<br>Polymers :<br>Polymer and<br>environmental<br>effect-<br>introduction-<br>disposal of<br>polymer waste -<br>recycling<br>system-<br>importance of<br>biopolymers. |   |
| 25 | 20UCY6E2 | Core Elective II-<br>Analytical<br>Chemistry – II                           | Unit 1 - 5 | 0% | -  | -  | - |
| 26 | 20UCY615 | Core Practical III:<br>Gravimetric<br>Analysis and<br>Physical<br>Chemistry | Unit 1 - 5 | 0% | -  | -  | - |
| 27 | 20UCY6S3 | Skill Based<br>Elective –II :<br>Green chemistry                            | Unit 1 - 5 | 0% | -  | -  | - |

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| 28 | 20UCY6S4 | Skill Based<br>Elective -II :<br>Theory behind<br>Practical<br>chemistry | Unit 1 - 5 | 0% | - | - | - |
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