

**KOLHAN UNIVERSITY, CHAIBASA**  
**JHARKHAND**



**Proposed Syllabus for FYUGP, NEP-2020**  
**(UG – Chemistry 2022, Onward)**

**UNIVERSITY DEPARTMENT OF CHEMISTRY**  
**KOLHAN UNIVERSITY, CHAIBASA**  
**WEST SINGHBHUM, JHARKHAND – 833202**

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20-8-2022  
Head  
University Department of Chemistry  
Kolhan University, Chaibasa

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20/8/22

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20/8/2022

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20/08/2022

Basant Shubhakar  
20-08-2022

**Semester-I**  
**Course Title: Introductory Regular Course-1 (IRC-1)**  
**Credits -03**

<b>FM-100 Marks</b>		<b>Time 3hrs</b>
<b>Unit</b>	<b>Content</b>	<b>Hours</b>
1	<p style="text-align: center;"><b>Group A- Inorganic Chemistry</b></p> <ul style="list-style-type: none"> <li>• <b>Atomic Structure and Periodic Properties:</b> Bohr's Model. Dual nature of matter; de Broglie concept. Heisenberg uncertainty principle; its significance. Atomic orbital's, Quantum numbers, shapes of s, p and d orbitals. Aufbau energy diagram, Pauli's exclusion principle. Hund's rule of maximum multiplicity. Electronic configuration of elements (s block, p block and first series of d-block elements).</li> <li>• <b>Periodic properties</b> The general idea of Modern periodic table, atomic and ionic radii, ionization potential, electron affinity, electro negativity-definition.</li> <li>• General Chemistry of Group IA, IIA, IB, IIB</li> <li>• <b>Ionic Bond:</b> Lattice energy, Born- Haber cycle, factor favoring Ionic bond, Variable valency, properties of Ionic compounds.</li> <li>• <b>Covalent bond</b> Formation of sigma and pi bond, Hybridization and directional bonding (VBT), Structure and shapes of BF<sub>3</sub>, PCl<sub>5</sub>, SF<sub>4</sub>, SnCl<sub>2</sub>, NH<sub>3</sub>, and CH<sub>4</sub>. Properties of covalent compounds</li> </ul>	15
2	<p style="text-align: center;"><b>Group B - Organic Chemistry</b></p> <ul style="list-style-type: none"> <li>• Tetravalency of carbon, Hybridization (sp<sup>3</sup>, sp<sup>2</sup>, sp). Classification &amp; nomenclature of organic compounds.</li> <li>• Detection and estimation of element (N, S, P &amp; Halogen), determination of molecular weight of organic acid and organic bases.</li> <li>• Elementary idea of electron displacement effect (Inductive, electrometric, resonance, mesomeric, Hyperconjugation).</li> <li>• IUPAC nomenclature of branched and unbranched Alkanes, the alkyl group, classification of carbon atoms in Alkanes, Isomerism in Alkanes, sources, methods of formation (with special reference to Wurtz reaction, Kolbe reaction, Corey-House reaction and decarboxylation of carboxylic acids), physical properties and chemical reactions of Alkanes.</li> <li>• <b>Isomerism</b> Structural and stereoisomerism solution of racemem mixtures. Elements of symmetry.</li> <li>• <b>Hydroxy acids</b> Lactic acid, tartaric acid and citric acid – their isolation, synthesis, properties, constitution. Isomerism of lactic acid and tartaric acid.</li> <li>• Cycloalkanes-nomenclature, methods of formation, chemical reaction's Baeyer's strain theory and its limitations. Ring strain in small rings (cyclopropane and cyclobutane).</li> </ul>	15

3	<p style="text-align: center;"><b>Group C-Physical Chemistry</b></p> <ul style="list-style-type: none"> <li>• <b>Gaseous State</b> Postulates of kinetic theory of gases, deviation from ideal behavior, van der Waal's equation of states, relationship between critical constants and van der Waals constants. Molecular velocities: Root mean square, average and most probable velocities, Numerical problems.</li> <li>• <b>Chemical Equilibrium:</b> Law of mass action and its Kinetic derivation, Equilibrium constant, Relation between <math>K_p</math>, <math>K_c</math> and equation. Le Chatelier's principle.</li> <li>• <b>Dilute solution:</b> Colligative properties, Osmosis &amp; Osmotic Pressure, Lowering of Vapour Pressure, Elevation of Boiling Point, Depression of Freezing Point.</li> <li>• <b>Thermo chemistry</b> Hess law, Kirchhoff law, bond energy and their calculation.</li> </ul>	15

**Books Recommended:**

- Principles of Inorganic Chemistry by Puri, Sharma and Kalia
- Organic Chemistry by Bahl and Bahl
- Text Book of Physical Chemistry by Puri Sharma and Pathania
- Text Book of Physical Chemistry by Bhal and Tuli
- Pradeep's Inorganic, Organic, Physical Chemistry, Vol.- I
- Dinesh Inorganic, Organic, Physical Chemistry, Vol.- I