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| Semester | **4** |
| Course | **Minor** |
| Paper Code | B2CH230412T/ B2CH230412P |
| Paper Title | General Chemistry 4 |
| No. of Credits | Theory: 3 + Practical: 1 |
| Theory / Practical / Composite | Composite |
| Minimum No. of preparatory hours per week a student has to devote | 7 |
| Number of Modules | 3 |
| Syllabus | **Group A:**<br>**Module I: Introduction to Biomolecules: Carbohydrates, Amino acids, Protein and Peptides 12 L**<br>Classification of carbohydrates, reactions of carbohydrates, mutarotation, osazone formation, Kiliyani-Fischer and Ruff's degradation.<br>Synthesis of amino acids, concept of isoelectric point, peptides: N-terminal and C-terminal amino acid determination, primary, secondary, tertiary and quaternary structures of proteins.<br>**Group B:**<br>**Module II: Covalent Bonding 12 L**<br>Covalent bond: Polarizing power and polarizability, ionic potential, Fazan's rules. Lewis structures, formal charge. Valence Bond Theory. The hydrogen molecule (Heitler-London approach), directional character of covalent bonds, hybridizations, equivalent and non-equivalent hybrid orbitals, Bent's rule, Dipole moments, VSEPR theory, shapes of molecules and ions containing lone pairs and bond pairs (examples from main groups chemistry) and multiple bonding (σ and π bond approach).<br>Molecular orbital concept of bonding (The approximations of the theory, Linear combination of atomic orbitals (LCAO)) (elementary pictorial approach): sigma and pi-bonds and delta interaction, multiple bonding. Orbital designations: gerade, ungerade, HOMO, LUMO. Orbital mixing, MO diagrams of H2, Li2, Be2, B2, C2, N2, O2, F2, and their ions wherever possible. Bond properties: bond orders, bond lengths.<br>**Module III: Coordination Chemistry 12 L**<br>Double and complex salts. Werner's theory of coordination complexes, Classification of ligands, Ambidentate ligands, chelates, Coordination numbers, IUPAC nomenclature of coordination complexes (up to two metal centers), Isomerism in coordination compounds, constitutional and stereo isomerism, |

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| | Geometrical and optical isomerism in square planar and octahedral complexes<br>**Practical**<br>**Identification of Pure Organic Compound**<br>Solid compounds: oxalic acid, tartaric acid, citric acid, succinic acid, resorcinol, urea, glucose, cane sugar, benzoic acid and salicylic acid.<br>Liquid compounds: Aniline, N,N-dimethylaniline, ethanol, methanol, acetone, benzaldehyde etc.<br>Detection of melting and boiling points of the compounds. | |
| Learning Outcomes | Theory:<br>1. The students are introduced to various methods of synthesis, reactions and structural determinations of several biomolecules.<br>2. To have a grasp of the MOT of simple hetero and homo-nuclear diatomic (nonmathematical approach.<br>3. To realize the nature of ligands and the coordination complexes, their IUPAC names and isomeric forms.<br>Practical:<br>Identification of pure solid and liquid organic compounds and determination of boiling point of solid and melting point of liquid organic compounds | |
| Reading/Reference Lists | 1. 4. Loudon, G. M. *Organic Chemistry*, Fourth edition, Oxford University Press, 2008.<br>2. 5. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).<br>3. 6. Finar, I. L. *Organic Chemistry (Volume 1 & Volume 2)* Pearson Education.<br>4. 7. Graham Solomons, T.W., Fryhle, C. B. *Organic Chemistry*, John Wiley & Sons, Inc.<br>5. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. Inorganic Chemistry, Principles of Structure and Reactivity 4th Ed., Harper Collins 1993, Pearson.<br>6. Mingos, D.M.P., Essential trends in inorganic chemistry. Oxford University Press.<br>7. Winter, M. J., The Orbitron, http://winter.group.shef.ac.uk/orbitron/. An illustrated gallery of atomic and molecular orbitals.<br>8. General and Inorganic Chemistry, Volume 1, R. P. Sarkar, New Central Book Agency; 3rd Revised edition.<br>Practical:<br>1. University Hand Book of Undergraduate Chemistry Experiments, edited by Mukherjee, G. N., University of Calcutta<br>2. Nad, Mahapatra, Ghosal-Practical Chemistry | |
| Evaluation | Theory: 60<br>Internal: 15 (CIA: 10; Other form of Assessment: 2; Attendance: 3)<br>Semester Exam:45 (Gr. A: 15; Gr. B:30) | Practical: 40<br>CA:38; Attendance: 2 |

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| Paper Structure for<br>Theory Semester Exam | Gr. A: Attempt ONE out of TWO questions of 15 Marks each<br>Gr. B: Attempt TWO out of THREE questions of 15 marks each |