**DEPARTMENT OF CHEMISTRY (UG & PG), JHARGRAM RAJ COLLEGE**
**LESSON PLAN (SESSION: 2022-2023)**

**TEACHER: DR. ANSUMAN BEJ (ORGANIC CHEMISTRY)**

**UG SEMESTER-I**

**PAPER: CC1T (ORGANIC CHEMISTRY)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| October 2022 | Valence Bond Theory |
| November 2022 | Electronic displacementsin covalent bond. |
| December 2022 | *MO theory* and $\pi$-MO of alkene, conjugated diene and triene system. |
| January 2022 | University question practice and Class test |

**PAPER: DSC1A (FOR GFENERAL COURSE]**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| November 2022 | Physical Effects, Electronic Displacements |
| December 2022 | Aliphatic Hydrocarbons alkanes and alkenes. |
| January 2023 | Practice sessions |

**UG SEMESTER-II**

**PAPER: CC4T (ORGANIC CHEMISTRY)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| March 2023 | Reaction thermodynamics: free energy and equilibrium, enthalpy and entropy factor, calculation of enthalpy change via BDE, intermolecular & intramolecular reactions. |
| April 2023 | Concept of organic acids and bases: effect of structure, substituent and solvent on acidity and basicity; proton sponge; gas-phase acidity and basicity; comparison between nucleophlicity and basicity. |
| May 2023 | Tautomerism: prototropy (keto-enol, nitro - aci-nitro, nitroso-oximino, diazo-amino and enamine-imine systems); valence tautomerism and ring-chain tautomerism; composition of the equilibrium in different systems. |

**PAPER: CC4P (ORGANIC CHEMISTRY LAB-I)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| March 2023 | PREPARATION OF ORGANIC COMPOUND, NITRATION OF AROMATIC COMPOUNDS, CONDENSATION REACTIONS, ACETYLATION OF PHENOLS/AROMATIC AMINES. |
| April 2023 | ACETYLATION OF PHENOLS/AROMATIC AMINES, SELECTIVE REDUCTION OF *M*-DINITROBENZENE TO *M*-NITROANILINE. |
| May 2023 | BROMINATION OF ANILIDES USING GREEN APPROACH (BROMATE-BROMIDE METHOD) |

**UG SEMESTER-III**

**PAPER: CC-7T (ORGANIC CHEMISTRY-II), CARBONYL CHEMISTRY (20 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| August2022 | Addition to C=O: structure, reactivity and preparation of carbonyl compounds; mechanism (with evidence), reactivity, equilibrium and kinetic control; Burgi-Dunitz trajectory in nucleophilic additions; formation of hydrates, cyano hydrins and bisulphite. |
| September2022 | Nucleophilic addition-elimination reactions with alcohols, thiols and nitrogen- |

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| | based nucleophiles; reactions: benzoin condensation. |
| October2022 | Cannizzaro and Tischenko reactions, reactions with ylides: Wittig and Corey-Chaykovsky reaction; Rupe rearrangement. |
| November2022 | Oxidations and reductions: Clemmensen, Wolff-Kishner, $LiAlH_4$, $NaBH_4$, MPV, Oppenauer, Bouveault-Blanc, acyloin condensation; oxidation of alcohols with PDC and PCC; periodic acid and lead tetraacetate oxidation of 1,2-diols. |

**PAPER: CC-7P (ORGANIC CHEMISTRY LAB), FUCTIONAL GROUP DETECTION– I (20 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| August 2022 | Detection of special elements, Solubility and classification. |
| September 2022 | Detection of the following functional groups by systematic chemical tests. |
| October 2022 | Detection of the following functional groups by systematic chemical tests |
| November 2022 | Preparation, purification and melting point determination of a crystalline derivative of the given compound.<br>Identification of the compound through literature survey. |

**UG SEMESTER-IV**

**PAPER: CC-10T (ORGANIC CHEMISTRY), FUCTIONAL GROUP DETECTION– I (20 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| February 2024 | Wagner-Meerwein rearrangement, pinacol rearrangement, dienone-phenol; Wolff rearrangement in Arndt-Eistert synthesis, benzil-benzilic acid rearrangement, Demjanov rearrangement, Tiffeneau–Demjanov rearrangement. |
| March 2024 | Rearrangement to electron-deficient centre: rearrangements: Hofmann, Curtius, Lossen, Schmidt and Beckmann, Baeyer-Villiger oxidation, cumene hydroperoxide-phenol rearrangement and Dakin reaction. |
| April 2024 | *Migration from oxygen to ring carbon*: Fries rearrangement and Claisen rearrangement, Fries rearrangement, Claisen rearrangement, Beckmann rearrangement, Baeyer-Villiger oxidation. |
| May 2024 | Migration from nitrogen to ring carbon: Hofmann-Martius rearrangement**,** Fischer-Hepp rearrangement, N-azo to C-azo rearrangement, Bamberger rearrangement, Orton rearrangement and benzidine rearrangement. |
| PERIOD | TOPIC(S) TO BE COVERED |
| February 2023 | Colligative properties: thermodynamic treatment, applications, abnormalities |
| March 2023 | Phase rule: thermodynamic derivation, one- and multi-component systems |
| April 2023 | First order phase transition and Clapeyron equation |
| May 2023 | Binary solutions; Class tests |

**PAPER: CC-10P (ORGANIC CHEMISTRY LAB), Quantitative Estimations (20 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| February 2023 | Estimation of glucose by titration using Fehling's solution, Estimation of sucrose by titration using Fehling's solution, |
| March 2023 | Estimation of vitamin-C, Estimation of aromatic amine (aniline) by bromination (Bromate-Bromide) method, Estimation of phenol by bromination. |
| April 2023 | Estimation of urea, Estimation of formaldehyde. |

**UG SEMESTER-V**

**PAPER: CC12T (ORGANIC CHEMISTRY): Carbocycles and Heterocyclic compounds (25 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| July 2022 | Polynuclear hydrocarbons and their derivatives, synthetic methods include Haworth, Bardhan-Sengupta, Bogert-Cook and other useful syntheses (with mechanistic details); fixation of double bonds and Fries rule. |
| August 2022 | Property of heterocyclic compound with single heteroatom. |
| September 2022 | Synthesis of some five and six membered heterocyclic compound. |
| October 2022 | Chemical reactions of heterocyclic compounds. |

**PAPER: CC12T (ORGANIC CHEMISTRY LAB): Spectroscopic Analysis of Organic Compounds (10 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| July 2022 | Assignment of labelled peaks in the $^{1}$H NMR spectra of the known organic compounds. |
| August 2022 | Assignment of labelled peaks in the IR spectrum of the same compound explaining the relative frequencies of the absorptions. |
| September 2022 | Analysis of full spectra of some compound. |
| October 2022 | Analysis of full spectra of some compound. |
| November 2022 | Analysis of full spectra of some compound. |

**UG SEMESTER-VI**

**PAPER: DSE3T: (GREEN CHEMISTRY): (10 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| January 2023 | Examples of Green Synthesis/ Reactions and some real world cases. |
| February 2023 | Examples of Green Synthesis/ Reactions and some real world cases. |
| March 2023 | Future Trends in Green Chemistry |

**PAPER: DSE3P: (GREEN CHEMISTRY LAB): (10 Lectures)**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| January 2023 | Preparation of biodiesel from vegetable/ waste cooking oil. |
| February 2023 | Photoreduction of benzophenone to benzopinacol in the presence of sunlight. |

**PG SEMESTER-I**

**PAPER: CEM 102 (ORGANIC CHEMISTRY):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| October 2022 | Unit-1: Pericyclic reaction-1 |
| November 2022 | Unit-1: Organic transformations by using pericyclic reaction. |
| December 2022 | Unit-1: Synthesis of organic compound by using pericyclic reaction. |

**PG SEMESTER-II**

**PAPER: CEM 202 (ORGANIC CHEMISTRY):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| February 2023 | Unit-1: Pericyclic reaction-2 |
| March 2023 | Unit-2: Reagents chemistry-2 |

**PG SEMESTER-III**

**PAPER: CEM 302 (ORGANIC CHEMISTRY SPECIALIZATION):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| September 2022 | Unit-1: Pericyclic Reaction-III |
| October 2022 | Unit-1: Pericyclic Reaction-III |
| November 2022 | Unit-4: Organometallic Chemistry |

**PAPER: CEM 303 (ORGANIC CHEMISTRY SPECIALIZATION):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| September 2022 | Unit-5: Peptides and Nucleic acids |
| October 2022 | Unit-6: Green Chemistry. |

**PAPER: CEM 395 (ORGANIC CHEMISTRY SPECIALIZATION):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| September 2022 – December 2022 (16 weeks) | Review work in an area of transition metal naoparticle catalysed reaction. |

**PG SEMESTER-IV**

**PAPER: CEM 401 Advanced Spectroscopy-II (COMMON PAPER):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| February 2023 | Unit-1: NMR Spectroscopy I |
| March 2023 | Unit-3: NMR Spectroscopy I |

**PAPER: CEM 403 (ORGANIC CHEMISTRY SPECIALIZATION):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| February 2023 | Unit-2: Stereochemistry IV |
| March 2023 | Unit-3: Stereochemistry V |
| April 2023 | Unit-4: Stereochemistry VI |

**PAPER: CEM 495 (ORGANIC CHEMISTRY SPECIALIZATION):**

| PERIOD | TOPIC(S) TO BE COVERED |
|---|---|
| February 2023 – May 2023 (16 weeks) | Review work in an area of transition metal naoparticle annulations reaction of aryl halide and diarylacetylene. |