

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF INDUSTRIAL CHEMISTRY
COURSE CURRICULUM

| PART-A: Introduction | | | |
|---|--|---|---|
| Program: Bachelor in Science (Honor/ Honors with Research) | | Semester - VII | Session: 2024-2025 |
| 1 | Course Code | ICSE-06T | |
| 2 | Course Title | ORGANIC SYNTHESIS | |
| 3 | Course Type | DSE | |
| 4 | Pre-requisite(if,any) | As per program | |
| 5 | Course Learning Outcomes(CLO) | <ul style="list-style-type: none"> ➤ To apply stereochemical concepts to predict the outcomes of chemical reactions ➤ To understand the reaction mechanism of named reactions ➤ To understand the reaction mechanism of rearrangement reactions ➤ To develop the ability to apply knowledge of heterocyclic chemistry to predict the behavior of heterocyclic compounds in various chemical reactions | |
| 6 | Credit Value | 3 Credits | Credit = 15 Hours -learning & Observation |
| 7 | Total Marks | Max.Marks: 100 | Min Passing Marks:40 |
| PART -B: Content of the Course | | | |
| Total No. of Teaching-learning Periods(01 Hr. per period) - 45 Periods (45 Hours) | | | |
| Unit | Topics(Course contents) | | No.of Period |
| I | Stereochemistry:- Introduction to conformation and conformational analysis Conformation of cyclohexane and its mono, di and poly substitute derivatives, Declain perhyroanthracene, perhydrophenanthrene, role of spectroscopy in the study of conformational analysis, Conformational and reactivity. | | 12 |
| II | Reactions:- Introduction & Mechanism of Mannich reaction, Introduction & Mechanism of Oppanauer oxidation, Introduction & Mechanism of Meerven-pondorf-verley reduction, Introduction & Mechanism of Ullman reaction, Introduction & Mechanism of Sandmayer reaction, Introduction & Mechanism of Buckerer reaction, Introduction & Mechanism of Grignard reaction, Introduction & Mechanism of Kolbe's Schmidt reaction. | | 11 |
| III | Rearrangement:- Introduction & Mechanism of Fries rearrangement, Introduction & Mechanism of Benzidine rearrangement, Introduction & Mechanism of Von Richter rearrangement, Introduction & Mechanism of Whitmore rearrangement, Introduction & Mechanism of Schmidt rearrangement, Introduction & Mechanism of Hoffman rearrangement, Introduction & Mechanism of Curties rearrangement, Introduction & Mechanism of Pinacol – Pinacolone rearrangement. | | 11 |
| IV | Reagents:- Properties, uses and preparation of N-bromosuccinamide, Aluminum isopropoxide, Polyphosphoric acid, Sodium borohydride, Lithium Aluminium Hydride, Diazo methane, Liquid ammonia. Heterocyclic Compounds:- Introduction, Classification and nomenclature, importance of heterocyclic compounds. Preparation and properties:- Simple (five member) – Pyrroles, Furan, Thiophene, Pyrazole, Imidazole, Iminazole, Oxazole, Thiazole, Fused (five member) – Indole, Benzofuran, Benzothiophene, Simple (six member) – Pyridine, Pyrans, Pyridazine, Pyrimidine, Pyrazine, Fused (six member) – Quinoline, Phenoxazine | | 11 |
| Keywords | Organic Compounds, Reaction Mechanism, Named Reactions, Heterocyclic Compounds, Oxidizing and/reducing Agents | | |

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Verma, D. K. (2005). Handbook of Organic Name Reactions, Reagents, and Applications (1st ed.). Elsevier.
2. Soni, P. L., Bahl, B. S., & Bahl, A. (2019). Organic Chemistry. S. Chand & Company Ltd.

Reference Books Recommended –

1. March, J. (1985). Advanced Organic Chemistry: Reactions, Mechanisms, and Structure (3rd ed.). Wiley.
2. Morrison, R. T., & Boyd, R. N. (1992). Organic Chemistry (6th ed.). Prentice-Hall of India.
3. Finar, I. L. (1973). Organic Chemistry: Stereochemistry and the Chemistry of Natural Products (Vol. 1 & 2). Longman.
4. Fieser, L. F., & Fieser, M. (1967). Current Topics in Organic Chemistry (Vol. 1). Reinhold.

Online Resources–

➤ e-Resources / e-books and e-learning portals

Online Resources–

➤ e-Resources / e-books and e-learning portals

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment(CIA):30 Marks

End Semester Exam(ESE):70 Marks

| | | |
|---|---|--|
| Continuous Internal Assessment(CIA): (By Course Teacher) | Internal Test / Quiz-(2): 20 +20 Assignment/Seminar- 10 Total Marks -30 | Better marks out of the two Test / Quiz+ obtained marks in Assignment shall be considered against 30 Marks |
| End Semester Exam (ESE): | Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20Marks Section B: Descriptive answer type qts., 1out of 2 from each unit- 4x10=40Marks | |

Name and Signature of Convener & Members of CBoS:

(Handwritten signatures in blue ink)

FOUR YEAR UNDERGRADUATE PROGRAM(2024 – 28)
DEPARTMENT OF INDUSTRIAL CHEMISTRY
COURSE CURRICULUM

| PART-A: Introduction | | | |
|---|--|--|--|
| Program: Bachelor in Science (Honors/Honors with Research) | | Semester - VII | Session: 2024-2025 |
| 1 | CourseCode | CHSE-06P | |
| 2 | CourseTitle | ORGANIC SYNTHESIS LAB. COURSE | |
| 3 | CourseType | DSE | |
| 4 | Pre-requisite(if,any) | - | |
| 5 | Course Learning Outcomes(CLO) | <ul style="list-style-type: none"> ➤ Apply knowledge of organic reaction mechanisms to perform single and two-stage syntheses of various aromatic and heterocyclic compounds. ➤ Develop essential laboratory skills in organic synthesis, including purification techniques (crystallization, distillation, etc.) and characterization methods (melting point, IR spectroscopy). ➤ Demonstrate proficiency in the preparation and characterization of key aromatic and heterocyclic molecules, ➤ Gain experience in the synthesis of diverse organic functional groups | |
| 6 | CreditValue | 1 Credits | Credit =30 Hours Laboratory or Field learning/Training |
| 7 | TotalMarks | Max.Marks:50 | Min Passing Marks:20 |
| PART -B: Content of the Course | | | |
| TotalNo.of learning-Training/performancePeriods:30 Periods (30 Hours) | | | |
| Module | Topics(Coursecontents) | | No.ofP eriod |
| Lab./Field Training/ Experiment Contents of Course | Single and Two stage organic preparations, purification and characterization Benzylic acid from Benzoin, p- Chlorotoluine from p-Toludine, 2,4-Dinitrophenylhydrazine from Chlorobenzene, m- Nitrobenzoic acid from methyl benzoate, 2,4- Dinitrophenol from Chlorobenzene, o- Aminobenzoic acid from Phthalic anhydride, hydantoin from benzyl, p-Aminoazobenzene from Aniline, thiazoles from acetophenones, pyrimidines from aldehydes/ketones and thiourea, eosin from resorcinol & phthalic anhydride, Indigo from anthranilic acid, methyl orange from aniline, 5-hydroxy-1,3-benzothiole from hydroquinone, Benzimidazole from urea. | | 30 |
| Keywords | Organic Compounds, Organic Synthesis Methods, Solvent, Purification, Characateriztion | | |

Signature of Convener & Members (CBoS):

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. Singh, P. R., Kapoor, V. P., & Kapoor, I. P. S. (1981). *Experimental Organic Chemistry (Vol. I & II)*. Tata McGraw Hill.
2. Dey, A. K., & Sitaraman, K. (1992). *Laboratory Manual in Organic Chemistry*. Allied Publishers.
3. Bansal, R. K. (1990). *Laboratory Manual of Organic Chemistry (2nd ed.)*. Wiley Eastern.

Reference Books Recommended –

1. Furniss, B. S., Hannaford, A. J., Smith, P. W. G., & Tatchell, A. R. (1989). *Vogel's Textbook of Practical Organic Chemistry (including Qualitative Organic Analysis)*. Longman Scientific & Technical.
2. Jag Mohan. (2003). *Organic Analytical Chemistry: Theory and Practice*. Narosa Publishing House.
3. Mann, F. G., & Saunders, B. C. (1970). *Practical Organic Chemistry (4th ed.)*. Longman.

Online Resources–

- e-Resources / e-books and e-learning portals
- <https://ocw.mit.edu/courses/res-5-0001-digital-lab-techniques-manual-spring-2007/pages/videos/>
- <https://extension.berkeley.edu/search/publicCourseSearchDetails.do?method=load&courseId=40422>
- <https://www.organic-chemistry.org/>

Online Resources–

- e-Resources / e-books and e-learning portals

PART-D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment(CIA):15 Marks

End Semester Exam(ESE):35Marks

| | | |
|---|---|---|
| Continuous Internal Assessment(CIA): (By Course Teacher) | Internal Test / Quiz-(2): 10 & 10 Assignment/Seminar + Attendance- 05 Total Marks -15 | Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks |
| | End Semester Exam (ESE): | Laboratory / Field Skill Performance: On spot Assessment P. Performed the Task based on lab. work - 20 Marks Q. Spotting based on tools & technology (written) – 10 Marks R. Viva-voce (based on principle/technology) - 05 Marks |

Name and Signature of Convener & Members of CBoS: