



# बिरसा मुंडा ट्रायबल युनिवर्सिटी Birsā Munda Tribal University

राजपिपला, जि० नर्मदा Rajpipla, Dist. Narmda

Established by Tribal Development Department, Govt. of Gujarat

## School of Science

### M.Sc. (Chemistry) Programme

**Subject Code & Name: MS01ECHE02 & Natural products Extraction Techniques and Chromatographic Separation**

#### Teaching and Evaluation Scheme:

| Teaching Scheme |  |   |       | Examination Scheme  |     |     |     |
|-----------------|--|---|-------|---------------------|-----|-----|-----|
| Credits         |  |   |       | Component Weightage |     |     |     |
|                 |  |   |       | CCE                 |     | SEE |     |
| T               |  | P | Total | TH                  | PWE | TH  | PWE |
| 2               |  | 2 | 4     | 25                  | 25  | 25  | 25  |

|                               |                                                                       |
|-------------------------------|-----------------------------------------------------------------------|
| Programme Name                | M.Sc.                                                                 |
| Semester                      | I                                                                     |
| Course Code                   | MS01ECHE02                                                            |
| Course Title                  | Natural products Extraction Techniques and Chromatographic Separation |
| Course Content Type (Th./Pr.) | Theory & Practical                                                    |
| Course Credit                 | 4                                                                     |
| Sessions+ Lab. Per Week       | 4                                                                     |
| Total Teaching/Lab. Hours     | 60 Hours                                                              |
| * 2 Laboratory = 1 Session    |                                                                       |

#### Learning Objectives

1. To study extraction and separation procedures of natural products.
2. To study purification of isolated natural products.
3. To study fundamentals of various chromatographic techniques.
4. To learn practical aspects of separation techniques like TLC, paper chromatography, column chromatography.

#### Prerequisites (if any)

#### Learning Outcomes

On the Completion of this course, students will able to:

1. Extract and isolate various natural products from flowers and plants.
2. Separate various organic compounds utilizing concepts of chromatography.



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## School of Science M.Sc. (Chemistry) Programme

| Detailed Contents                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| UNIT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TOPIC/SUB-TOPIC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | TEACHING HOURS |
| I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Natural product chemistry:</b> <ul style="list-style-type: none"><li>➤ Principles of separations, purification methods.</li><li>➤ Simple and vacuum distillations.</li><li>➤ Steam volatile compounds, steam distillation and its use in perfume industries, extraction of essential oils.</li><li>➤ Isolation of essential components from mint, tulsi and various flowers.</li></ul>                                                                                                                                          | 15             |
| II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Chromatographic Separations:</b> <ul style="list-style-type: none"><li>➤ Principles of chromatographic separations, distribution law, stationary and mobile phase, <math>R_f</math> values, factors affecting separations.</li><li>➤ Adsorption and Partition chromatography.</li><li>➤ Ascending and descending chromatography.</li><li>➤ Theory and applications of TLC and column chromatography for various components of the mixtures.</li><li>➤ Fundamental concepts of chromatography involved in GC and HPLC.</li></ul> | 15             |
| <b>Text Book(s)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |
| <b>Reference Books</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |
| <ol style="list-style-type: none"><li>1. V K Ahluwalia and Sunita Dhingra, (2000), Comprehensive Practical Organic Chemistry Qualitative Analysis,</li><li>2. Vogel's Textbook of Inorganic Quantitative Analysis; Pearson Education Ltd</li><li>3. Analytical Chemistry, G.D. Christian, John Willey &amp; Sons. 6<sup>th</sup> Edition, 2004.</li><li>4. Fundamentals of Analytical Chemistry, Skoog, West, Holler, Crouch, 10<sup>th</sup> Edition, Cengage Learning. 2022</li></ol> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |
| <b>Web Resources</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |
| <ol style="list-style-type: none"><li>1. Google books, INFLIBNET, Google Web</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |



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### Required Software(s) (if any)

### Practical(s) (if any)

- |                                                                                                                                                                                                                                                                                                 |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 1. Solvent extraction of flowers.<br>2. Steam distillation of mint.<br>3. Steam distillation of tulsi.<br>4. Paper chromatography of plant pigments.<br>5. TLC of organic compounds and determination of $R_f$ value.<br>6. Column chromatography of various combinations of organic compounds. | 30 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|

**L::** Lecture, **T::** Tutorial, **P::** Practical

**CCE::** Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation; slip tests (announced/surprised), attendance etc. or any combination of these)

**PWE::** Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

**SEE::** Semester End Evaluation