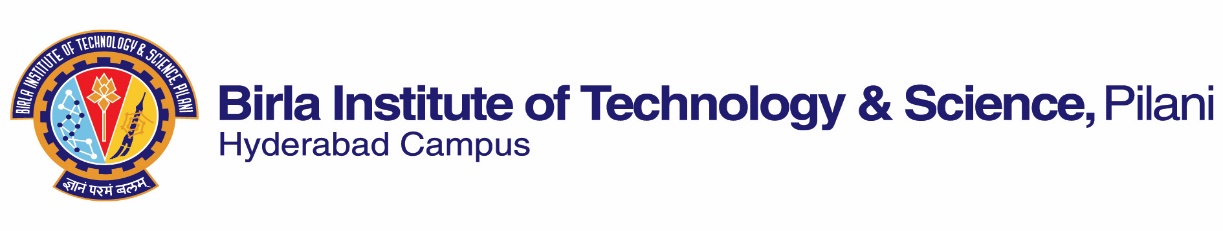
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**second SEMESTER 2022-2023**

**Course Handout (Part ‑ II)**

Date:16.01.2023

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

***Course No.* : CHEM F329**

***Course Title* Analytical Chemistry**

***Instructor‑in‑charge* : N. RAJESH**

1. **Course Description:** Data handling, sample preparation, unit operations, volumetric analysis, potentiometry, chromatography, solvent extraction, trace metal separation and estimation in biological and environmental samples with emphasis on green chemistry.

2. **Scope & Objective of the Course:** The objective of this course is to provide a comprehensive survey of the basic concepts in analytical chemistry. The topics to be covered include a brief review of classical methods of analysis, data handling, instrumental methods of analysis and their applications. Separation methods in environmental analytical chemistry such as solvent extraction and chromatography will also be dealt with in detail. The course involves considerable classroom participation in the form of analyzing case studies, group discussions etc. Considerable emphasis would be given to **greener methodologies for the detoxification of toxic metal ions, dyes, PCB’s etc from industrial effluents. Lab component involving the above methods would form a part of the evaluation scheme.**

**Text Book:** T1. Analytical Chemistry, GARY. D. CHRISTIAN, 6th ed. Wiley, 2003.

**Reference Book:** R1. Fundamentals of analytical chemistry, Skoog, West Holler, 7th Ed,

Harcourt Pub, 2001.

3. **Course Plan:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Lec. No.** | **Topics to be Covered** | **Learning outcome** | **Learning Objectives** | **Chapter in the Text Book** |
| 3 | Data handling, sampling in analysis | Relevance of statistics in handling data | Reliability of data, statistical test, sampling of solids, liquids and gases. | Chap. 1,2 (T1) |
| 2 | Complexometric titration’s and redox titrations | Importance of classical methods in environmental appln | EDTA method to estimate total hardness in water , Redox titrations | Chap. 8 (T1) |
| 3 | Chromatography basic concepts | Separation principles | Principal of all types of chromatography and their utility in analysis | Chap. 17 (T1) |
| 4 | Ion exchange and adsorption | Relevance in separation science and technology | Cation exchange and anion exchange separations emphasizing green chemistry | Chap. 17 (T1) |
| 3 | GC and HPLC | Sophisticated instrumental separation in industry | Principles and application of GC and HPLC. | Chap. 17 (T1) |
| 3 | Solvent Extraction | Importance in hydrometallurgy and nuclear industry | Extraction of metal chelates, ion-association complexes, applications emphasizing green chemistry | Chap. 16 (T1) |
| 3 | UV-visible and IR spectroscopy | Understand spectrophotometric principles in trace analysis | Beer’s Law, Photometric estimation, selection rules in IR, interpretation of IR spectra | Chap. 14 (T1) |
| 2 | Atomic absorption spectroscopy | Importance in ppm and ppb analysis in diverse applications | Flame AAS, graphite furnace AAS, applications | Chap. 15 (T1) |
| 2 | Automation in analysis | Sophisticated automations in industry and its relevance today | Process control automation on line analyzers, computers in analytical chemistry | Chap. 19 (T1) |
| 4 | Potentiometry | Importance of electroanalytical techniques in trace analysis | Redox titrations, pHmetry, ion-selective electrodes and applications | Chap.11,12 (T1) |
| 2 | Polarography | Importance of electroanalytical techniques in trace analysis | DC polarography and its utility in chemical analysis | Chap. 21  (T1) (R1) |
| 4 | Trace metal estimations | Utility of distinct methods for trace metal analysis | Selected methods for analysis of toxic metal ions | P. 681-753 (T1) |
| 4 | Environmental analysis | Speciation and sub ppb level analysis of toxic contaminants | Analysis of air, water, pesticides and other trace metals in environment | Lecture notes |
| 1 | Radioanalytical methods | Relevance of analytical techniques in nuclear chemistry | Radiochemistry, gamma spectrometry beta counters isotope dilution analysis | Lecture notes |

**4. Evaluation scheme**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **S No.** | **Component** | **Duration** | **Weightage (%)** | **Date and Time** | **Nature of component** |
| 1 | Mid semester test | 90 min. | 35 | 18/03 4.00 - 5.30PM | Closed book |
| 2 | Lab experiments |  | 15 | Continuous | Open |
| \*3 | Assignments/Quiz |  | 10 | Take home | Open |
| 4. | Comprehensive. Exam. | 3 hr | 40 | 20/05 AN | Closed book |

\***Home assignment topics would be given and each student is expected to submit a report on the assigned topic which will be evaluated.**

**5**. **Make‑up Policy:** Make‑up will be granted for only very genuine and deserving cases.

1. **Chamber Consultation hours:** To be announced in the class.
2. **Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

8. **Notices:** Relevant notices regarding the course will be displayed on Chemistry Notice Board/CMS.

**Instructor-In charge**  **N. RAJESH**

