Birla Institute of Technology & Science, Pilani
Hyderabad Campus

<u>SECOND SEMESTER 2018-2019</u>

<u>Course Handout (Part - II)</u>

Date:07.01.2019

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.	Learning Objectives	Topics to be Covered	Chapter in the Text Book
3	Reliability of data, statistical test, sampling of solids, liquids and gases.	Data handling, sampling in analysis	Chap. 1,2 (T1)
2	EDTA method to estimate total hardness in water , Redox titrations	Complexometric titration's and redox titrations	Chap. 8 (T1)
3	Principal of all types of chromatography and their utility in analysis	Chromatography basic concepts	Chap. 17 (T1)
3	Cation exchange and anion exchange separations emphasizing green chemistry	Ion exchange and adsorption	Chap. 17 (T1)
3	Principles and application of GC and HPLC.	GC and HPLC	Chap. 17 (T1)
3	Extraction of metal chelates, ion-association complexes, applications emphasizing green chemistry	Solvent Extraction	Chap. 16 (T1)
3	Beer's Law, Photometric estimation, selection rules in IR, interpretation of IR	UV-visible and IR spectroscopy	Chap. 14 (T1)

	spectra		
2	Flame AAS, graphite furnace AAS, applications	Atomic absorption spectroscopy	Chap. 15 (T1)
2	Process control automation on line analyzers, computers in analytical chemistry	Automation in analysis	Chap. 19 (T1)
4	Redox titrations, pH metry, ion-selective electrodes and their applications	Potentiometry	Chap.11,12 (T1)
2	DC polarography and its utility in chemical analysis	Polarography	Chap. 21 (R1) (T1)
4	Selected methods for analysis of toxic metal ions	Trace metal estimations	P. 681-753 (T1) (T1)
4	Analysis of air, water, pesticides and other trace metals in environment	Environmental analysis	Lecture notes
2	Radiochemistry, gamma spectrometry beta counters isotope dilution analysis	Radioanalytical methods	Lecture notes

4. Evaluation scheme

S No.	Component	Duration	Weightage (%)	Date and Time	Nature of component
1	Mid semester test	90 min.	35	16/3 11.00 -12.30 PM	Closed book
2	Lab experiments		10		Continuous
*3	Assignment		5		Take home
*4	Group discussion (GD)		5		Open
5.	Comprehensive. Exam.	3 hr	45	13/05 AN	Closed book

***One take home assignment would be given and each student is expected to submit a report on the assigned topic which will be evaluated. Topic for GD based on relevant journal articles or case studies. GD is like an open book component since each group is permitted to bring /refer the journal articles with them during discussion.**

Date for Group discussion (preferably in the last week of April) would be displayed in advance in the class and Chemistry Notice Board. For Group discussion (GD) students would be divided into 4-5 members per group with duration of about 10min per group. Evaluation for each member would be done based on their level of participation and knowledge in the particular topic of discussion assigned to each group.

5. **Make-up Policy:** Make-up will be granted for only very genuine and deserving cases.
6 **Chamber Consultation hours:** To be announced in the class.
7 **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