BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani
Pilani Campus

INSTRUCTION DIVISION

FIRST SEMESTER 2015-2016
Course Handout (Part - II- B)

Date: 03/08/2015

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. : **PHA F313**
Course Title : **Instrumental Methods of Analysis**
Instructor-in-Charge : **Priti Jain**
Instructors : **Mr. Prashant Raut, Mr. Vajir Malik**

No of Lecture Hours per week: 03 **No. of Practical hours per week : Three (1 X 3)**

1. Scope and Objective of the Course :

The course is aimed at exposing the students to modern analytical techniques in relevance to pharmaceutical industries. Training with respect to the operation of sophisticated instruments, interpretation of results obtained for the characterization of molecules, their qualitative and quantitative evaluation are emphasized.

2. Text Books :

1. Williard H.H., et al., - "Instrumental Methods of Analysis", CBS Pub., New Delhi, 7th ed., 1988
2. Parimoo P, -"Instrumental Methods of Analysis", CBS Pub., New Delhi, 1988

3. Reference Books :

1. Ewing, Galen Wood. - "Instrumental Methods of Chemical Analysis", 5th Edition, Mc.Graw-Hill, Inc., N.Y., 1985.
2. Robert M Silverstein, Francis X Webster -"Spectroscopic Identification of Organic Compounds", Sixth Edition, John Wiley and Sons, Inc., N.Y., 2002.
3. A.H.Beckett and J.B. Stenlake -" Practical Pharmaceutical Analysis", 3rd Edition, CBS Pub., NewDelhi., Vol. I & II, 1968
4. Skoog. Holler. Nieman. “Principles of Instrumental Analysis”, 5th Edition, Thomson Publishers, NewDelhi, 2006.
5. B. K. Sharma. “Instrumental Methods of Chemical Analysis”, 27th Edition. Goel Publishing House, Meerut. 2011.
6. Donald L. Pavia, Gary M. Lampman, George S. Kriz, James A. Vyvyan. “Introduction to Spectroscopy”,4th Edition, Brooks Cole Publishers.
7. R. Mahesh, Sajeev C, N. Sridhar, Laboratory manual on “Instrumental Methods of Analysis” – EDD Notes. 4th Edition., 2003.

4. Course Plan:

	Topic	Lectures No.	References.
1.	Introduction to Instrumental Methods of Analysis	1- 4	TB-1: 1-5; TB-2: 1, 2
2.	UV Spectroscopy	5-7	TB-1: 6, 7; TB-2: 14, 15
3.	IR Spectroscopy	8-12	TB-1: 11; TB-2: 18
4.	Spectro-fluorimetry	13-15	TB-1: 8; TB-2: 17
5.	Polarimetry	16-17	TB-2: 10
6.	NMR Spectroscopy	18-21	TB-1: 15; TB-2: 19
7.	Mass Spectroscopy	22-25	TB-1: 16; TB-2: 20
8.	Flame photometry	26-27	TB-1: 9, 10; TB-2: 16

9.	Chromatographic techniques – Introduction	28-29	TB-1: 17; TB-2: 21
	Gas Chromatography	30-32	TB-1: 18; TB-2: 21
	High Performance Liquid Chromatography	33-35	TB-1: 19, 20; TB-2: 21
	High Voltage/Gel Electrophoresis (basis, column, solvent selection, separation)	36-37	TB-2: 21, 22
10	Thermography	38	TB-1: 25; TB-2: 25
11.	Introduction to Hyphenated Techniques	39-40	RB-4-20

$ Lecture topics in Theory may be altered depending on situations and will be shared by Team Members.

Learning Objectives (Topics: 1-8)

This course is a laboratory oriented course. Exposure to principles, instrumentation, calibration and operation of analytical instruments, obtaining spectral data, their interpretation, evaluation of qualitative and quantitative aspects of drugs and their estimation - both known and unknown, applications of every technique, are covered.

Practical

S. No. Name of Experiment

1. **UV - Visible**
   a) Determination of λ max, verification of Beer-Lambert's Law
   b) Determination of binary mixtures
   c) Difference, derivative spectroscopy
   d) Unknowns - intrepretation and analysis

2. **IR**
   a) Handling solid, liquid, gaseous samples
   b) Effect of solvents on IR absorptions
   c) Unknowns - intrepretation, functional group analysis

3. **Polarimetry**
   a) Determination of muta-rotation in glucose, unknown
   b) Estimation of specific rotations for a few selected drugs
   c) Evaluation/analysis of isomers in mixtures

4. **Spectro-fluorimetry**
   a) Estimation of selected drugs compounds, unknown
   b) Quenching effect and its significance
   c) Evaluation of drugs in formulations, intrepretation

5. **Flame photometry and A.A.S***
   a) Calibration, estimation of elements, applications

6. **Electrophoresis**
   (Paper)
   a) Instrumentation, applications - separation of amino acids
   b) Identification/separation/purification of samples
   Electrophoresis *
   (Gel)
   c) Instrumentation, applications - separation of proteins / cell components
   d) Identification/separation/purification of samples

7. **Chromatography**
   (HPLC)
   a) Instrumentation, method development approaches.

b) Separation and estimation of selected drug samples
c) Unknown identification, applications

Chromatography*
(HPTLC)

d) Instrumentation, method development approaches.
e) Separation and estimation of selected drug samples
f) Unknown identification, applications

8. **Thermography**

a) Instrumentation, calibration of DSC
b) Unknown-identification, applications

(* These experiments would be demonstrated / performed depending on time availability either as a regular experiment or as a part of an assignment)

Note: 1.Modifications / adjustments would be made in the theory/experimental pattern / part, if necessary as and when situation arises.
2. Students should maintain and bring updated record note-books for every practical class.
3. Make-ups for practical are not always possible. However, depending upon the genuineness of the situations, students may be permitted to perform back-log experiments, if any instructor is free, outside regular class hours.
4. It is imperative that all students come prepared for the experiment in the next turn completing all pending work concerned with the previous experiment. Adequate preparation for the practical in terms of principles and operation of the instrument as per instructions, familiarization of protocols involved, outside class hours, is mandatory.

5. Evaluation:

EC No.	*Evaluation Component*	*Duration*	Weightage (%)	*Date & Time*	Remarks
1.	Mid term	90 min	30	5/10 8:00 - 9:30 AM	CB
2.	Continuous assessment		30		CB
3.	Comprehensive Exam.	180 min	40 (20 +20)	1/12 FN	CB + OB

Note:
** Continuous assessment will be based on theory covered in class. Topics and number will be announced in the class. It will be based on home assignments, tutorials, projects, laboratory, viva- voce and class participation*

6. **Chamber consultation hours**: (3121 - Pharmacy Cubicles) - To be announced in class.
7. **Notices**: Notices concerning the course will be displayed on the Pharmacy Group N.B. only.
8. **Make-Ups**: Make-Ups are not given as a routine. It is solely dependent upon the GENUINENESS OF THE CIRCUMSTANCES under which a student fails to appear in a scheduled evaluation component. In such circumstances, prior permission should be obtained from the Instructor-in-Charge. IN NO CASE THE MAKE-UP APPLICATION BE SLIPPED INSIDE THE CHAMBER OF THE INSTRUCTOR-IN-CHARGE. However, the decision of the Instructor-in-Charge in the above matter will be final.

Instructor -in-Charge
PHA F313