Birla Institute of Technology & Science, Pilani
Hyderabad Campus

INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
Course Handout Part II

Date: 01-08-2016

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 : **A. SAJELI BEGUM**

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 handling of sophisticated instruments and their operation, interpretation of results obtained with relevance to the identification and characterization of molecules, their qualitative and quantitative evaluation and control are emphasized.

Textbooks:
i. Willard H.H., et al., - "Instrumental Methods of Analysis", CBS Pub., New Delhi, 7th ed., 1988
ii. Parimoo P, Pharmaceutical Analysis", CBSi, 1988
iii. Mahesh, R & Others Instru. Methods of Analysis Lab Manual Notes EDD, 2007.

Reference books
i. Ewing, Galen Wood. - "Instrumental Methods of Chemical Analysis", Seventh Edition, McGraw- Hill, Inc., N.Y., 1988
ii. Robert M Silverstein, Francis X Webster -"Spectroscopic Identification of Organic Compounds", Eighth Edition, John Wiley and Sons, Inc., N.Y., 2014.
iii. A.H. Beckett and J.B. Stenlake -"Practical Pharmaceutical Analysis", Fourth Edition, CBS Pub., New Delhi., Vol. I & II, 1988.
iv. Gerhard Talsky,- "Derivative Spectroscopy", VCH-Weinheim, FRG, 1994.
v. Maureen Melvin,-"Electrophoresis", John Wiley and Sons, Inc., N.Y., 1987.
vi. B.G.Nagavi,-"Laboratory Handbook of Instrumental Drug Analysis", Vallabh Prakashan, New Delhi, 1996.

Course Plan:
a. Lecture Plan

Lect No.	Learning Objectives	Topics	Chapter in the Text Book
1	Introduction of various analytical	Introduction to	TB-1: 1-5;

	techniques applicable in field of Pharmacy	Instrumental Methods of Analysis	TB-2: 1,2
2-5	Learn the principle, instrumentation and application - Difference, Derivative Spectroscopy	UV Spectroscopy	TB-1: 6, 7; TB-2: 14,15 TB-1: 2,3; TB-2:14,15
6-9	Theory, instrumentation, spectral data analysis	IR Spectroscopy	TB-1: 11 ; TB-2: 18
10-11	Theory and factors governing spectrofluorimetry	Spectrofluorimetry	TB-1: 8; TB-2: 17
12	Theory and applications	Polarimetry	TB-2: 10
13-21	Knowledge on proton and carbon NMR – Theory and spectra interpretation	NMR Spectroscopy	TB-1: 15; TB-2: 19
22-26	Theory, various instrumental aspects and data analysis	Mass Spectroscopy	TB-1: 16; TB-2: 20
27-28	Theory and application of DSC and TGA	Thermography	TB-1: 25; TB-2: 25
29-39	Knowledge in the area of separation, purification and quantitative analysis of drugs through various chromatographic techniques	Chromatographic Techniques • Introduction • Gas Chromatography • HPLC • High Voltage/ Gel Electrophoresis	TB-1: 17; TB-2: 21 TB-1: 18; TB-2: 21 TB-1: 19,20; TB-2: 21 TB-2: 21,22
40-42	Theory, instrumentation and applications	Flame photometry and A.A.S	TB-1: 9,10; TB-2: 16

b. Plan for Laboratory:

Laboratory sessions will be conducted so that students get hands on experience on all the sophisticated analytical instruments. Certain instruments will only be demonstrated to the students. The comprehensive list of experiments is given below.

S.No.	Name of Experiments
	Experiments Involving Hands On Experience
1	**UV – Visible** Determination of max, verification of Beer-Lambert's Law Determination of binary mixtures Difference, derivative spectroscopy Unknowns - interpretation and analysis
2	**IR**

	Handling solid samples Unknowns - interpretation, functional group analysis
3	**Polarimetry** Determination of muta-rotation in glucose, unknown Estimation of specific rotations for a few selected drugs Evaluation/analysis of isomers in mixtures
4	**Spectrofluorimetry** Estimation of selected drugs compounds, unknown Quenching effect and its significance Evaluation of drug in formulations
5	**Paper Electrophoresis** Instrumentation, applications - separation of proteins / cell components Identification/separation/purification of samples
6	**HPLC** Instrumentation, method development approaches. Separation and estimation of selected drug samples Unknown identification, applications
7	**Thermography** Instrumentation, calibration of DSC, TGA Unknown-identification, applications
Demonstration Based Experiments	
8	**Flame photometry and A.A.S.** Calibration, estimation of elements, applications
9	**GC** Instrumentation, method development approaches. Separation and estimation of selected drug samples Unknown identification, applications
10	**NMR and Mass** Interpretation of spectra and characterization of organic compounds based upon IR, NMR and Mass

Note:

i. Modifications/adjustments would be made in the theory/experimental pattern / part, if necessary as and when situation arises.

ii. Students should maintain and bring updated record note-books for every practical class.

iii. 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.

iv. 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.

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Test I	60 min	15	9/9, 10.00--11 AM	CB
Test II	60 min	15	24/10, 10.00--11 AM	CB
Lab Quiz	30 min	5		CB
Laboratory**	-	20		
Viva-Voce (Final)	-	10		
Compre. Exam.	3 hr	35	03/12 AN	CB: 15 % OB: 20 %

Note:

** Laboratory component may include assignments, which will be practical or theoretical type that would include interpretation of IR, NMR, Mass spectral, Elemental data - characterization of compounds, etc., besides identification and estimation of known and unknown drugs in given samples based on experiments performed , etc.

Chamber Consultation Hour: To be announced in class

Notices: Notices concerning the course will be displayed on the Department of Pharmacy N.B. only

Make-up Policy: 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
Instructor -in-Charge
PHA F313

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