GANPATUNIVERSITY

FACULTYOFENGINEERING& TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Biomedical Engineering
Semester	V	Version	1.0.0.0
Effective from Academic Year	2024-25	Effective for the Batch admitted in	July 2022
Course Code	2BM5108	Course Name	Laboratory Instruments

Teaching Scheme						Examination Scheme(Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	-	1	-	4	Theory	40	60	100
Hours	3	-	2	-	5	Practical	30	20	50

Pre-requisites

Subject requires a basic fundamental understanding of biology and instrumentation basic.

Course Outcomes

On successful completion of the course, the students will be able to:

CO1	**Recall** and identify common laboratory instruments used in biomedical engineering.
CO2	**Understand** the fundamental principles and operating mechanisms of various laboratory instruments.
CO3	**Apply** knowledge of laboratory instruments to utilizing proper techniques for calibration, operation, and maintenance.
CO4	**Summarize** safety aspects for laboratory instruments.

Theory Syllabus

Unit	Content	Hrs.
1	INTRODUCTION Classification of Laboratory Instruments, Categorization based on functionality and application areas, Standard operating procedures for basic instruments.	5
2	FUNDAMENTAL PRINCIPLES OF LABORATORY INSTRUMENTS Basic Principles of Measurement, Introduction to instrumental analysis, Advantages of chemical analysis over classical methods, Beer Lambert's law. Classification: Spectral, electro analytical and separative methods.	7
3	GENERAL LABORATORY INSTRUMENTS Centrifuge - High-Speed Centrifuge & Micro centrifuge, Autoclave, Hot Air Oven., Analytical Balances, Precision Balances, Calibration & safety aspects.	6
4	MICROSCOPY Light Microscope, Electron Microscope, Fluorescence Microscope, Calibration & safety aspects.	5
5	SPECTROPHOTOMETERS & ELECTROPHORESIS EQUIPMENT UV-Visible Spectrophotometer Infrared Spectrophotometer - Instrumentation and Components, Operating Procedures, Applications, Calibration & safety aspects. Overview of electrophoresis, Types of Electrophoresis, Basis for electrophoretic separations, Applications to biomolecules, Calibration & safety aspects.	7
6	ANALYZERS & BLOOD CELL COUNTER Blood Gas Analyzer, Chemistry Analyzer, Hematology Analyzer, Coagulation Analyzer Types of blood cells, Methods of cell counting, Automatic recognition and differential counting of cells, Calibration & safety aspects.	7
7	CHROMATOGRAPHY INSTRUMENTS Classification, Gas chromatography: Principle, Constructional details, GC detectors, Liquid Chromatography, High Performance Liquid Chromatography (HPLC): Principle, constructional details, Calibration & safety aspects.	8

Practical Content

Term work and Practical shall be based on the above syllabus.

Text Books	
1	Handbook of Analytical Instruments by R. S. Khandpur Pub.: Tata McGraw–Hill Publications
2	Introduction to Instrumental Analysis by Robert D. Braun Pub.: McGraw-Hill Book Company
Reference Books	
1	Instrumental Methods of Analysis by Willard, Merritt, Dean, Settle Pub.: CBS Publishers & Distributors
2	Principles of Instrumental Analysis by Skoog, Holler Pub.: Thomson Brooks
3	Instrumental Methods of Chemical Analysis by Galen W. Ewing Pub.: McGraw-Hill Book Company
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses/102107028/
2	https://lecturenotes.in/notes/22016-note-for-analytical-instrumentation-ai-by-gorantla-harsha

Mapping of CO with PO and PSO:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1	1	2	1	2	1	2	1	2	2	2	2
CO2	2	3	2	1	2	1	1	2	1	2	1	1	3	3	2
CO3	1	2	1	2	2	1	2	1	2	3	1	2	2	2	2
CO4	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1