/GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Biomedical Engineering
Semester	VI	Version	2.0.0.1
Effective from Academic Year	2024-25	Effective for the Batch admitted in	July 2022
Course Code	2BM6103	Course Name	Diagnostic Techniques & Instrumentation

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

Knowledge of Humans Biology, Instrumentation and Electronics.

Course Outcomes

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

CO1	**Remember** applications and principle of operation for Diagnostic Techniques.
CO2	**Understand** the techniques used to measure cardiac output.
CO3	**Apply** the knowledge of diagnostic aides to understand recently developed equipment.
CO4	Able to **differentiate** different principles of diagnostic instruments.

Theory Syllabus

Unit	Content	Hrs.
1	BLOOD FLOW METERS Electromagnetic Blood flow meters, Ultrasonic Blood Flow meters, NMR Blood Flow meter and Laser Doppler Blood Flow meter.	5
2	CARDIAC OUTPUT MEASUREMENT Indicator dilution Method, Dye dilution Method, Thermal dilution Techniques, Measurement of Continuous Cardiac Output Derived from the Aortic Pressure Waveform, Impedance Technique, Ultrasound method, Ambulatory monitoring Instruments, Phonocardiogram, Photo Plethysmography.	8
3	PATIENT MONITORING SYSTEMS Concepts, Measurement of heart rate, pulse rate, Blood pressure, Temperature, Respiration rate, computerized patient monitoring system.	7
4	SPECIAL DIAGNOSTIC TECHNIQUES Endoscopy, Laparoscopy, Thermography.	4
5	PULMONARY FUNCTION ANALYZER: Natural Process of Breathing, O2 and CO2 Transport, Regulation of Breathing, Pulmonary function Measurement, Spirometry, Pneumotachometer, Measurement of volume, Respiratory gas analysers, Pulmonary function analysers, Apnoea detectors.	8
6	AUDIOMETERS AND HEARING AIDS Mechanism of Hearing, Measurement of sound, Basic Audiometer, Pure Tone Audiometer, Speech Audiometer, Evoked Response Audiometry System, Calibration of Audiometers, Hearing Aids, Two Channel Audiometry.	6
7	BIOMEDICAL TELEMETRY AND TELEMEDICINE Wireless Telemetry, Single channel telemetry, Multichannel Wireless telemetry, Multi-patient telemetry, Transmission of Physiological signal over telephone lines, Telemetry of ECG and Respiration, Implantable Telemetry system for Blood pressure and Blood flow, Signal noise in telemetry system, Telemedicine.	7

Practical content:

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

Text Books:

1	Handbook of Biomedical Instrumentation by R. S. Khandpur Pub.: Tata McGraw

2	Principles of Applied Biomedical Instrumentation by Geoddes L. A. and Baker L. E. Pub.: John Wiley
Reference Books	
1	Biomedical Electronics and Instrumentation by S. K. Venkata Ram Pub.: Galgotia Publication Pvt. Ltd.
2	Medical Instrumentation Application and Design by John Webster Pub.: John Wiley and Sons
3	Biomedical Instrumentation and Measurements by Leslie Cromwell, Fred J. Weibell Pub.: Prentice Hall India Learning Private Limited
4	Introduction to Biomedical Equipment Technology by Joseph J. Carr, John M. Brown Pub.: Wiley and Sons
ICT/MOOCs Reference	
1	https://nptel.ac.in/courses

Mapping of CO with PO and PSO:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	3	3	1	2	3	0	0	0	0	0	0	1	2	1	1
CO2	3	3	2	2	3	0	0	0	0	0	0	1	2	1	1
CO3	3	3	2	1	3	0	0	0	1	0	1	2	1	2	3
CO4	3	3	2	1	3	0	0	0	0	0	0	2	2	1	3