

The Maharaja Sayajirao University of Baroda Polytechnic Diploma in Electronics & Communication Engg. (HPP)			ACADEMIC YEAR 2023-24	
Year	III	BIOMEDICAL INSTRUMENTATION (ELE3634)	Lecture/Lab Hrs per week	4/2
Semester	II		Max marks	100
Pre-Requisite: Basic Mathematics, Basic Electronics				
CO1	Explain physiological systems, sources of bioelectric signals, and electrode types used for ECG, EMG, and EEG.			
CO2	Operate biomedical measuring and monitoring instruments such as blood-pressure meters, respiration and heart-rate monitors, ECG/EMG/EEG systems, blood-flow meters, colorimeters, and blood-analysis meters.			
CO3	Describe patient safety principles including electric-shock hazards, leakage currents, and biomedical equipment testing.			
CO4	Summarize modern medical imaging systems including X-ray, MRI, ultrasonography, and echocardiography.			
CO5	Analyze therapeutic equipment such as pacemakers, defibrillators, diathermy units, radiotherapy machines, and haemodialysis systems.			
BT	1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation			
COURSE CONTENT/SYLLABUS				
Unit	Unit Name	Hrs	Weightage	CO
1	BIOELECTRIC SIGNALS & ELECTRODES Physiological system of Body, Sources of Biomedical Signals, Bioelectric Signals, ECG, EMG, EEG Electrodes, Microelectrodes	8	10	CO1, CO2
2	MEASURING RECORDING AND MONITORING INSTRUMENTS Basic Medical Instrumentation system, Blood Pressure Measurement, Respiration Rate Measurements, Heart Rate Measurement, ECG, EMG, EEG, Blood-flow Meters, Colorimeter, Blood pH Measurements, Blood pO2 Measurements, Blood Cell Counter.	18	30	CO2
3	PATIENT SAFETY Electric Shock Hazards, Leakage Currents, Electric Safety analyzer, Testing of Bio-Medical Equipments	4	8	CO3
4	MORDEN IMAGING SYSTEM X-Ray Machine, MRI, Ultrasonic Imaging system, Echo-cardiograph	8	10	CO4
5	THERAPEUTIC EQUIPMENTS Cardiac Pacemakers, Defibrillators, Surgical Diathermy Machine, Shortwave Diathermy, Microwave Diathermy, X-Ray Radio therapy Equipment, Haemodialysis Machine	14	30	CO5
6	PATIENT MONITORING & BIOMEDICAL TELEMETRY ICU Patient Monitoring System, Wireless Telemetry, Single Channel and Multi Channel Telemetry System.	8	12	CO4, CO5
		60	100	
REFERENCE BOOKS:				
1.	Bio-Medical Instrumentation- R.S.Khandpur; TMH.			
2.	Bio-Medical Instrumentation & Measurement – Irina Cromwell, Carol Weibell.			
3.	Bio - medical Instrumentation by Can and Brown.			
4.	X-Ray techniques for students by Mochasnay.			