III Year - I Semester | **L T P C**
20EC5422 | **3 0 0 3**

BIO-MEDICAL ELECTRONICS
(OPEN ELECTIVE – I)

Course Objectives:

- To understand the basic sources of bioelectric potentials and electrodes.
- To know about cardiovascular system.
- To understand the elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment.
- To identify about bio telemetry, implantable units.
- To analyze instrumentation for the medical use of radioisotopes, radiation therapy, Modern Imaging Systems.

UNIT–I: Sources of Bioelectric potentials and Electrodes:

Resisting and Action Potentials, Propagation of Action Potentials, The Bioelectric Potentials. Electrodes: Electrode theory, Potential Electrodes, Biochemical Transducers, introduction to bio-medical signals.

UNIT–II: The Cardiovascular System:

The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds, Cardio Vascular Measurements, Electrocardiography, Measurement of Blood Pressure, measurement of Heart Sounds, Event detection, PQRS & T-Waves in ECG, the first & second Heart beats, ECG rhythm analysis, analysis of exercise ECG.

UNIT–III: Patient Care & Monitory and Measurements in Respiratory System

The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators, the respiratory system: tests and instrumentation for mechanics of breathing.

UNIT–IV: Bio telemetry and Instrumentation for the clinical laboratory

Introduction to bio telemetry, the components of bio telemetry system, implantable units, applications of telemetry in patient care-The blood tests on blood cells, chemical test, automation of chemical tests.

UNIT–V: X-ray and radioisotope instrumentation and electrical safety of medical equipment:

Instrumentation for X-rays, special techniques, instrumentation for the medical use of radioisotopes, radiation therapy - Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention.

Modern Imaging Systems: Tomography, Magnetic resonance Imaging System, Ultrasonic Imaging System, Medical Thermography.

Course Outcomes:

A student who successfully fulfils this course requirement will be able to:

S. No	Course Outcome	BTL
1.	Understand the basic sources of bioelectric potentials and electrodes.	L2
2.	Know about cardiovascular system.	L2
3.	Know the elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment.	L2
4.	Understand the concepts of bio telemetry, implantable units.	L4
5.	Analyze the instrumentation for the medical use of radioisotopes, radiation therapy, Modern Imaging Systems.	L4

Correlation of Cos with Pos & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	2	2	1	-	-	-	-	-	-	-	-	-	2	-
CO 2	2	2	1	-	-	-	-	-	-	-	-	-	2	-
CO 3	1	2	1	-	-	-	-	-	-	-	-	-	2	-
CO 4	1	2	2	-	-	-	-	-	-	-	-	-	3	-
CO 5	1	3	-	-	-	-	-	-	-	-	-	-	3	-

Text Books:

1. Biomedical Instrumentation and Measurements – C. Cromwell, F.J.Weibell, E.A.Pfeiffer – Pearson education.
2. Biomedical signal analysis – Rangaraj, M. Rangayya – Wiley Interscience – John willey & Sons Inc.

Reference Books:

1. Hand Book of Bio-Medical Instrumentation – R.S. Khandpur, (TMH).
2. Introduction to Bio-Medical Engineering – Domach, (Pearson).
3. Introduction to Bio-Medical Equipment Technology – Cart, (Pearson).