



III Year-II Semester		L	T	P	C
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BIO MEDICAL ENGINEERING (RT32045A)					

Prerequisite Course:

Analog communication. Digital Communication

Course Description and Objectives:

This course includes the basic and advanced principles, concepts, and operations of medical sensors and devices, the origin and nature of measurable physiological signals and also including design of electronic instrumentation. This course aimed to impart the knowledge of realistic design and experimentation with amplifiers for biopotential measurement.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

Cos	Course Outcomes	POs
1	Understands basic concepts of BME and man Instrumentation system	3
2	Able to gain knowledge on importance of electrodes and transducers in BME	3
3	Gains knowledge on cardiovascular measurements	2
4	Gains knowledge on various working of various imaging instruments	2

Syllabus:

UNIT I:

Objective: To learn Sources of Bioelectric potentials and Electrodes.

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

UNIT II:

Objective: To learn about functioning of Cardiovascular System

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 Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds, Event detection, PQRS & T-Waves in ECG, the first & second Heart beats, ECG rhythm analysis, the di-crotic notch in the carotid pulse detection of events and waves, analysis of exercise ECG, analysis of event related potentials, correlation analysis of EEG channels, correlation of muscular contraction.

UNIT III:

Objective: To study about Patient Care & Monitory and Measurements in Respiratory System

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 physiology of respiratory system,



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tests and instrumentation for mechanics of breathing, respiratory theory equipment, analysis of respiration.

UNIT IV:

Objective: To gain knowledge on bio telemetry.

Introduction to bio telemetry, Physiological parameters adaptable 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:

Objective: To understand the concepts of X-ray and radioisotope instrumentation and electrical safety of medical equipment

X-ray and radioisotope instrumentation and electrical safety of medical equipment: Generation of Ionizing radiation, instrumentation for diagnostic 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.

UNIT VI:

Objective: To understand the concepts of Modern Imaging Systems.

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

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)