EC-311C	BIOMEDICAL INSTRUMENTATION (ELECTIVE - I)	L	T	P	C
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COURSE OBJECTIVES:

1. To Bio-signals and their characteristics, biological parameters and relationship between them.
2. To understand the principles involved in acquiring different bio-signals.
3. To represent these principles in form of mathematical equations.
4. understand or become aware of different Therapeutic equipment.
5. understand Modern medical imaging systems.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. understand about Bio-signals and their characteristics, biological parameters and relationship between them.
2. understand about the principles involved in acquiring different bio-signals.
3. understand about Anatomy of the nervous system-neuronal communication
4. understand or become aware of different Therapeutic equipment.
5. understand about Modern medical imaging systems-Radiography.

UNIT I **(10)**

Bio-signals and their characteristics, organization of cell, Nernst equation of membrane, Resting and Action potentials. Bio-amplifiers, characteristics of medical instruments, problems encountered with measurements from living systems.Bio-potential electrodes - Body surface recording electrodes, Internal electrodes, micro electrodes. Bio-chemical transducers - reference electrode, the pH electrodes, Blood gas electrodes.

UNIT II **(10)**

Heart and cardiovascular system Heart electrical acvitity, blood pressure and heart sounds.Cardiovascular measurements electro cardiography â€“ electroeardiogram, ECG Amplifier, Electrodes and leads, ECG recorder principles. Types of ECG recorders. Principles of blood pressure and blood flow measurement.

UNIT III **(10)**

Anatomy of the nervous system-neuronal communication, electro encepherogram (EEG), EEG Measurements EEG electrode-placement system, interpretation of EEG, EEG system Block diagram, pre-amplifiers and amplifiers.Anatomy of vision, electrophysiology of the Eye (ERG) Spatial properties of ERG, the electrooculogram (EOG), Ophthalmoscopes, Tonometer for eye pressure measurement.

UNIT IV **(10)**

Therapeutic equipment, Pacemaker, Defibrillator, Shortwave diathermy. Hemodialysis machine. Respiratory Instrumentation - Mechanism of respiration, Spirometry, Pneumotachograph, Ventilators.

UNIT V **(10)**

Modern medical imaging systems-Radiography, computed Radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Nuclear Medicine, Single Photon Emission Computed Tomography (SPECT), Positron Emission Tomography (PET), Ultrasonography.

LEARNING RESOURCES:

TEXT BOOK(s):

1. Leslie Cromwell - Biomedical Instrumentation and Measurements, 2nd Edition, PHI, 2006.
2. John G Webster - Medical Instrumentation - Application and Design, John Wiley and Sons,3rd Edition.

REFERENCE BOOK(s):

Joseph Carr and Brown - Introduction to Biomedical equipment technology.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/102104043