

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 4

BIOMEDICAL ENGINEERING

Subject Name: PHYSIOLOGICAL MEASUREMENT TECHNIQUES(Institute Elective-I)

Sr. No.	Course content
1.	General physiology: Functional System of the cell & its organelle, Homeostasis, Endocytosis, Exocytosis
2.	Membrane physiology: Transport of Ions and Molecules through the cell membrane; Membrane Potentials and Action Potentials; Inhibition of Excitability, Recording Membrane potentials and Action potentials,
3.	Transducers & Biopotential Measurement: Introduction to diff. types of transducers,; pressure, capacitive, displacement, inductive, etc. Electrode-Electrolyte interface, half cell potential, Polarization- polarizable and non-polarizable electrodes, Ag/AgCl electrodes, Electrode circuit model; Electrode and Skin interface and motion artifact. Body Surface recording electrodes for ECG, EMG, EEG and EOG. Electrodes standards. Internal Electrodes- needle and wire electrodes. Micro electrodes- metal microelectrodes, micropipette electrodes. Electrical properties of micro electrodes. Electrodes for electric stimulation of tissue; Methods of use of electrodes.
4.	The Heart: Heart muscle, heart as a pump, Heart sound & blood pressure, cardiac cycle, Cardiac output. Conduction system of the heart, ECG.
5.	Nervous System: Outline of Cranial and Spinal nerves. Structure of Spinal Cord and different Brain parts. Vertebral column and cranial cavity. Neuron, Neuroglial cell, Synapse, Receptors, Sensory tract, motor tract, reflex arc, EEG.
6.	VISION: Structure of Eye, optic nerve, EOG, ERG

7.	Muscles: skeletal muscle, Sarcomere, EMG,
8.	Respiratory system: Mechanism Of Respiration, Pulmonary Ventilation, Pulmonary Volumes and Capacities, Pulmonary function testing.
9.	Interference signals and their elimination: capacitive interference, inductive interference and shielding, electromagnetic interference and shielding, conductively coupled interference, ground loop interference and input guarding to reduce it, internal noise.

REFERENCE BOOKS:

- 1) Anatomy and physiology in health and illness By- Ross and Wilson.
- 2) Cooper, "Electronic Instrumentation and Measuring Techniques", PHI
- 3) Bio-Medical Instrumentation -R. S. Khandpur
- 4) Introduction to biomedical equipment and technology Carr and Brown PUB: Pearson Education- Asia
- 5) Medical instrumentation: John Webster. PUB: John wiley and sons-New York