

## UEI608: BIO-MEDICAL INSTRUMENTATION

**L T P Cr**  
**3 0 2 4.0**

**Course Objectives:** The objective of this course is to introduce student to basic biomedical engineering technology and introduce different biological signals, their acquisition, measurements and related constraints.

**Introduction of Bio-medical Instrumentation, Sources of Bioelectric Potentials and Electrodes:** Introduction to man-instrument system, components of the man-instrument system, Physiological system of the body, Problems encountered in measuring a living system. Resting and action potentials, Propagation of action potentials, Bioelectric potentials, Biopotential electrodes, Biochemical transducers. Review of transducers

**Cardiovascular System and Measurements:** The heart and cardiovascular system, ECG, blood pressure and its measurement, respiration and pulse rate, characteristics and measurement of blood flow meter, cardiac output, phethismography, pacemaker, defibrillators, heart sounds and its measurement,

**Respiratory and Neuro-muscular System:** The physiology of the respiratory system, test and instrument for the mechanics of breathing, the somatic nervous system, EEG, EMG and GSR.

**Measurement and Recording of Noninvasive Diagnostic Instrumentation, Patient Care and Electrical Safety:** Principle of ultrasonic measurement, ultrasonic, thermography, elements of intensive care monitoring, X-ray, CT – Scan and MRI, tonometer, dialysis, diathermy, Shock hazards from electrical equipment.

**Laboratory work:** Study the variance in pulse rate of subject in a batch, use Spiro meter on the subject, auditory system checkup using Audiometer, Measurement of Heart Rate using Stethoscope, Blood pressure using Sphygmomanometer, Pulse Rate and SpO<sub>2</sub> using Pulse Oximeter, Skin Conductance and Skin Potential using Galvanic Skin Response Module, Pulse Rate using Polyrite machine, Respiration Rate using Polyrite. Electromyogram test using EMG biofeedback Trainer.

### Course Learning Outcomes (CLO):

After the successful completion of the course the students will be able to:

1. differentiate and analyse the biomedical signal sources.
2. elucidate cardiovascular system and related measurements.
3. explain the respiratory and nervous systems and related measurements
4. measure non-invasive diagnostic parameters.

### Text Books:

1. *Cromwell, L. and Weibell, F.J. and Pfeiffer, E.A., Biomedical Instrumentation and Measurement, Dorling Kingsley (2006) 2<sup>nd</sup> ed.*
2. *Carr, J.J. and Brown, J.M., Introduction to Biomedical Equipment Technology, Prentice Hall (2000) 4<sup>th</sup> ed.*

### Reference Books:

1. *Geddes, L.A., and Baker, L.E., Principles of Applied Biomedical Instrumentation, Wiley InterScience (1989) 3<sup>rd</sup> ed.*
2. *Khandpur, R.S., Handbook of Biomedical Instrumentation, McGraw Hill (2003) 2<sup>nd</sup> ed.*
3. *Webster, J.G., Medical Instrumentation Application and Design, John Wiley (2007) 3<sup>rd</sup> ed.*

### Evaluation Scheme:

S.NO.	Evaluation Elements	Weightage
1	MST	25
2	EST	40
3	Sessional (May include Assignments//Quizzes/Lab Evaluations)	35