

Semester I, Paper-2
BIOMEDICAL INSTRUMENTATION

Teaching scheme

Lectures: 4 Hrs/week.
Practical: 2 Hrs/Week.

Examination scheme

Theory: 100 marks
Term work: 25 marks

Unit 1.

(10 Hrs, 20 Marks)

Introduction to gross anatomy of human body, major physiological systems, their structure and function.

Cell structure, basic cell functions, Origin of bio potentials, electrical activity of cells, Introduction to biomedical instruments, classification and justification

Unit 2.

(10 Hrs, 20 Marks)

Transducers for biomedical instrumentation and selection, biomedical electrodes

Cardiological systems: Structure of heart, rhythmicity, cardiac cycle, heart sounds, cardiac output, blood pressure measurement, direct, indirect, Sphygmomanometer, Digital B.P.

Cardio vascular instrumentation: ECG electrodes, & leads, Einthoven triangle, ECG quantification, PC based ECG analysis.

Unit 3.

(10 Hrs, 20 Marks)

Pacemakers, Defibrillators, Biotelemetry, bedside monitors, ICU, Heart Lung machine, Phonocardiograph, Plethysmograph, Artificial Kidney, Blood cell counters,

Unit 4.

(10 Hrs, 20 Marks)

Central Nervous system: The Brain, Receptors, sensory pathway and motor systems, Evoked potential, Electron cephalogram, EEG analysis, EMG.

Mechanics of breathing O₂/CO₂ transport between lungs and tissue cells, Spirometer, Artificial respiration.

Unit 5.

(10 Hrs, 20 Marks)

Imaging system: X-ray, CT Scan, Ultrasonography, MRI, Endoscopy.

Electrical safety: Significance of electrical danger, Physiological effects of electrical current, Ground shock hazard, and methods of accident prevention.

References:

1. Handbook of Biomedical instrumentation, "R S Khandpur", TMH
2. Biomedical instrumentation and measurement, "Cromwell", PHI
3. Introduction to Biomedical instrumentation, "S G Khalekar".
4. Handbook of Biomedical instrumentation, "Webster".

List of Experiments:

1. Study of different biomedical transducers.
2. Study of cardiovascular systems
3. Study of ECG machine
4. Study of EEG simulator.
5. Study of EMG simulator.
6. Study of blood sugar meter.
7. Measurement of heartbeats using heart beat monitor.
8. Measurement of lung capacity using spirometer.
9. Demonstration of defibrillator.
10. Measurement of blood pressure by indirect method.
11. Electrical safety measures in hospitals.

Term work shall consist of at least **eight** experiments based on Syllabus