601. BIO-MEDICAL ENGINEERING

Human Anatomy and Physiology: Basics of cell, types of tissues and organ systems:musculoskeletal, respiratory, circulatory, endocrine, nervous, gastro-intestinal and reproductive. Homeostasis.

Bioelectricity: Cell membrane, action potential, strength-duration curve, excitability of different cells. Origin of Bioelectric signals-ECG, EEG, EMG, EOG, ERG and their characteristics Nerve conduction in myelinated and unmyelinated nerve fibers, nerve conduction velocity measurement.

Biomedical instrumentation: General characteristics of medical instruments. Biopotential electrodes- Half cell potential, Offset voltage, principle, Types of External, Internal and Microelectrodes and applications, Transducers for biomedical applications, Electrochemical transducers. Potentiometric sensors, Ampero-metric sensors, ElectroChemical gas sensors. Biosensors – Enzyme–based biosensors, immuno sensors, microbial sensors. Characteristics of bio-potential amplifiers. Recorders for recording biopotential signals.

Biomedical equipment: Working principle and electrodes of ECG, EEG and EMG recorders, Defibrillators, Pacemakers, Electrosurgical unit, Impedance pneumograph, Ventilators, Audiometer, Ophthalmic instrumentation.

Biomechanics: Mechanical properties of bone and soft tissues, viscoelastic models, Analysis of forces in joints. Cardiovascular mechanics. Characteristics and applications of biomaterials.

Biological Control Systems: Feedback control systems, Time and frequency domain analysis, stability analysis. Fundamentals of biological control systems, body temperature regulation, blood pressure control, eyeball movement control.

Biomedical Signal Processing: ECG-QRS detection, arrhythmia detection, various data compression techniques, EEG-detection of alpha, beta, gamma waves, spikes and spindles, Sleep EEG analysis.

Medical Imaging Systems: Principle of operation and image reconstruction of X-Ray, CT, Ultrasound and MRI imaging systems.