

BIOMEDICAL ENGINEERING

Physiology: Cell, cell potentials, sodium potassium pump, joints, respiratory mechanism conducting system of heart, volume and pressure changes, regulation of heart rate, structure of neuron conduction of action potential in neuron, brain lobes.

Biochemistry: Carbohydrates, structural importance, metabolic pathways and metabolic disorders, lipid chemistry, its metabolic pathways and disorders.

Circuit analysis: DC circuit analysis, Thevenin's and Norton's equivalent circuits, sinusoidal steady state analysis, Transient and resonance in RLC circuits.

Electron devices and circuits: Diodes, Bipolar junction transistor, FET, MOSFET, UJT, Feedback amplifier, oscillators, Differential amplifier, common mode and difference mode analysis, Power amplifiers.

Digital Electronics: Logic gates, combinational circuits, sequential circuits.

Linear Integrated Circuits: Operational amplifier - Ideal characteristics, Performance parameters, Voltage follower, Inverting amplifier, Non- inverting Amplifiers, Summing amplifier, Adder-subtractor, Differentiator, Integrator, Voltage to Current converter, Instrumentation amplifier, filters, Comparators, Multivibrators and Schmitt trigger - A/D and D/A converters.

Microprocessor and Applications: Microprocessors - 8085 and 8086 architectures and interfaces, microcontrollers and applications.

Digital signal processing: Discrete time signals and systems, DTFT, Z transform, DFT, FFT, IIR and FIR filters, Realization of digital filters.

Control systems: Transfer function, Time and frequency response analysis, stability analysis.

Sensors and Measurements: Strain gauge, LVDT, Capacitive transducer, RTD, Thermistor, Thermocouple, Scintillation counter, Photo multiplier tube, photoelectric and piezoelectric transducer, DC and AC Bridges, Biomedical applications of sensors, Biosensors- Ion selective Field Effect Transistor (ISFET), immunologically sensitive FET (IMFET), Blood glucose sensors.

Bio Medical Instrumentation: Electrodes, Half-cell potential, offset potential, types of electrodes and their equivalent circuits, artifacts during biopotential recording, characteristics of bio amplifier. ECG, PCG, EEG, EMG, Pulse rate measurement, Respiration rate measurement, GSR, Blood cell counter, measurement of blood pressure, Blood flow measurement, Cardiac output, pH electrode,

Bio Medical Equipment: Patient monitoring system, Pacemaker and its types, Defibrillator and its types, Different types of diathermy, Spirometer, Ventilators, Biotelemetry, Stimulators, Heart lung machine, Hemodialyzer, Electrical safety

Bio Mechanics: Stress and strain characteristics, Elasticity, Viscoelasticity, Flow properties of blood, mechanical properties of bones and soft tissues, types of joints, lubrication of joints.

Medical Imaging Systems: Ionising radiation and non ionising radiation, effects, cavitation effect, types of radioactive decay, interaction with matter, attenuation, annihilation, Compton scattering, Production of X- Ray, radiation units: Roentgen, Gray Sievert, CT generations, MR signal generation, T1 and T2 relaxation processes, Doppler shift, ultrasound Echo generation, PACS.

Biomaterials: Basic properties of biomaterials- Metallic, Ceramic, Polymeric and Composite, Fundamental characteristics of Implants- biocompatibility, bioactivity, biodegradability, Basics of drug delivery, Basics of tissue engineering.

