RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Electronics & Communication Engineering, VI-Semester

Open Elective EC- 604 (B) BIOMEDICAL ELECTRONICS

UNIT I - PHYSIOLOGY AND TRANSDUCERS

Cell and its structure - Resting and Action Potential - Nervous system: Functional organization of the nervous system - Structure of nervous system, neurons - synapse -transmitters and neural communication - Cardiovascular system - respiratory system - Basic components of a biomedical system - Transducers - selection criteria - Piezo electric, ultrasonic transducers – Temperature measurements - Fiber optic temperature sensors.

UNIT II - ELECTRO - PHYSIOLOGICAL MEASUREMENTS

Electrodes -Limb electrodes -floating electrodes - propelled disposable electrodes - Micro, needle and surface electrodes - Amplifiers: Preamplifiers, differential amplifiers, chopper amplifiers -Isolation amplifier. ECG - EEG - EMG - ERG - Lead systems and recording methods – Typical waveforms. Electrical safety in medical environment: shock hazards - leakage current- Instruments for checking safety parameters of biomedical equipments

UNIT III - NON-ELECTRICAL PARAMETER MEASUREMENTS

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound -Pulmonary function measurements - Spiro meter - Photo Plethysmography, Body Plethysmography - Blood Gas analyzers : pH of blood -measurement of blood pCO2, pO2, finger-tip oxymeter - ESR, GSR measurements .

UNIT IV - MEDICAL IMAGING

Radio graphic and fluoroscopic techniques - Computer tomography - MRI - Ultrasonography - Endoscopy - Thermography - Different types of biotelemetry systems and patient monitoring - Introduction to Biometric systems

UNIT V- ASSISTING AND THERAPEUTIC EQUIPMENTS

Pacemakers - Defibrillators - Ventilators - Nerve and muscle stimulators - Diathermy - Heart - Lung machine - Audio meters - Dialysers - Lithotripsy

REFERENCES

1. M.Arumugam, ‘Bio-Medical Instrumentation’, Anuradha Agencies, 2003.
2. L.A. Geddes and L.E.Baker, ‘Principles of Applied Bio-Medical Instrumentation’, John Wiley & Sons, 1975.
3. J.Webster, ‘Medical Instrumentation’, John Wiley & Sons, 1995.
4. C.Rajarao and S.K. Guha, ‘Principles of Medical Electronics and Bio-medical Instrumentation’,Universities press (India) Ltd, Orient Longman ltd, 2000.