

## **ELECTIVE-I EC- 5005 (2) BIO MEDICAL INSTRUMENTATION**

### **UNIT I - PHYSIOLOGY AND TRANSDUCERS**

Cell and its structure - Resting and Action Potential - Nervous system: Functional organisation 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 - Fibre optic temperature sensors.

### **UNIT II - ELECTRO - PHYSIOLOGICAL MEASUREMENTS 9**

Electrodes -Limb electrodes -floating electrodes - pregelled 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 9**

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound -Pulmonary function measurements - spirometer - Photo Plethysmography, Body Plethysmography - Blood Gas analysers : pH of blood -measurement of blood pCO<sub>2</sub>, pO<sub>2</sub>, 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

### **TEXT BOOKS**

1. R.S.Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd., 2003.
2. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, 2002 / PHI.

### **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.