Subject Code : P8APE4

ELECTIVE COURSE – IV - BIO MEDICAL INSTRUMENTATION

Unit I- Bio electric signals and Electrodes

Fundamentals of medical instrumentation- physiological system of the body- sources of biomedical signals- basic medical instrumentation- intelligent medical instrumentation system- Origin of Bio electric signals- Recording Electrodes – Silver – Silver chloride electrodes-Electrodes for ECG-Electrodes for EEG- Electrodes for EMG Electrical conductivity of Electrode Jellies and Creams- Micro electrodes.

Unit II- Recording systems and recorders

Basic recording system-General considerations for signal conditioners-preamplifiers-source of noise in low level measurements- Biomedical signal analysis technique- main amplifier and driver stage- writing systems- direct writing recorders-the ink jet recorders-potentiometric recorder-digital recorders- Instrumentation tape recorders-Electrocardiograph, Vector cardiograph, Phonocardiograph – Electroencephalograph - Electromyograph and other Biomedical recorders- Bio feed back instrumentation.

Unit III - Measurement and analysis techniques

The Heart and cardiovascular system - Heart Blood pressure - Characteristics of Blood flow - Heard Sounds (the cardiovascular system) -Electro cardiography- measurement of Blood pressure- measurement of Blood flow and cardiac output, Plenthysmography - measurement of heat sounds-The physiology of the respiratory system of tests and instrumentation for the mechanics- breathing- Respiratory therapy Equipment- Origin of EEG-Action Potentials of the brain- evoked potentials- Anatomy of the brain- brain waves-placement of electrodes- Recording set up- Analysis of EEG.

Unit IV - Magnetic Resonance and Ultrasonic Imaging systems

Principles of NMR Imaging system - Image reconstruction Techniques-Basic NMR components- Biological efforts of NMR Imaging- Advantages of NMR Imaging System -Diagnostic ultra sound- physics of ultrasonic waves-medical ultra sound- basic pulse – echo apparatus, A – scan - echocardiograph (M mode)- B-scanner-Real time ultrasonic Imaging systems-Multi element Linear Array Scanners- Digital Scan converter-Biological effects of Ultra sound.

Unit V - Advanced Bio medical systems

Pacemakers- Need for Cardiac pacemaker- External Pace makers-Implantable Pace makers- recent developments in Implantable Pacemakers-Pacing system Analyzer-Defibrillators- Need for a Defibrillator- DC Defibrillator-Implantable Defibrillators-Pacer - Cardioverter –Defibrillator Analyzers - Physio therapy and electro therapy equipment- High frequency heat therapy – short

wave diathermy – microwave and ultrasonic therapy – pain relief through electrical simulation

Books for Study

1. R.S. Khandpur, Handbook of Biomedical instrumentation, Tata McGraw Hill Publishing Company Limited. New Delhi, (2003). (Unit I, II, IV & V)
2. Lestlie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Bio medical instrumentation and measurements, PHI, New Delhi. (Unit-III)

Book for Reference

1. M.Arumugam, Biomedical Instrumentation, Anuradha Agencies, Kumbakonam, (2000).