34082 - BIO MEDICAL INSTRUMENTATION

DETAILED SYLLABUS

UNIT- I BIO-ELECTRIC SIGNALS AND ELECTRODES

Elementary ideas of cell structure, Bio – potential and their generation – resting and action potential – propagation of action potential. Electrodes – Micro – Skin surface – needle electrodes. CLINICAL MEASUREMENT: 16 Measurement of Blood pressure (direct, indirect) – blood flow meter (Electro magnetic & ultrasonic blood flow meter) – blood pH measurement - Measurement of Respiration rate – measurement of lung volume – heart rate measurement – Measurement of body and skin temperature - Chromatography, Photometry, Flurometry.

UNIT- II BIO - MEDICAL RECORDERS

Electro cardiograph (ECG) – Lead system – ECG electrodes – ECG amplifiers – ECG recording units – analysis of ECG curves. Nervous system – EEG recorder – 10-20 lead system – recording techniques – 16 EEG wave types – Clinical use of EEG – brain tumour Electro – myograph (EMG) – EMG waves – measurement of conduction velocity – EMG recording techniques – Electro – retinograph (ERG) Audiometer – principle – types – Basics audiometer working.

UNIT- III THERAPEUTIC INSTRUMENTS

Cardiac pacemaker – classification – External pace makers – implantable pacemaker – pacing techniques – programmable pacemaker – Cardiac defibrillators – types – AC and DC defibrillators - 16 Heart lung machine with Block diagram. Dialysis – Hemo dialysis – peritoneal dialysis. Endoscopes Endoscopic laser coagulator and applications – physiotherapy equipment – short wave diathermy – micro wave diathermy – ultrasonic therapy unit (block / circuit) – Ventilators – types – modern ventilator block diagram.

UNIT- IV BIOTELEMETRY AND PATIENT SAFETY

Introduction to biotelemetry – physiological – adaptable to biotelemetry – components of a biotelemetry system – application of telemetry – elements of biotelemetry; AM, FM transmitter and receiver – requirements for biotelemetry system – radio telemetry with sub carrier – single channel and multi channel telemetry – Telemedicine; introduction, working, applications. Patient safety: Physiological effects of electric current – Micro and macro shock – leakage current – shock hazards from electrical equipment. Methods of Accident Prevention – Grounding – Double 15 Insulation – Protection by low voltage – Ground fault circuit interrupter

– Isolation of patient connected parts – Isolated power distribution system. Safety aspects in electro surgical units – burns, high frequency current hazards, Explosion hazards.

UNIT- V MODERN IMAGING TECHNIQUES

LASER beam properties – block diagram – operation of CO2 and NDYag LASER – applications of LASER in medicine. X ray apparatus – 15 block diagram – operation – special techniques in X-ray imaging – Tomogram – computerized Axial tomography – Ultrasonic imaging techniques – Echo cardiography – Angiography – CT scanner - Magnetic resonance imaging techniques.

Text Book

Dr.M. Arumugam – Biomedical Instrumentation Anuradha

publications, Chennai (Page no. 1-15, 21-33, 117-136,142-159,164- 179, 182-195, 202-209, 212-215, 255 – 256, 274-277, 285-286, 266- 268, 293-297, 299- 310, 319-320, 329 – 340, 347-358, 360-367, 374- 390, 390-400).

Reference Books

1. Leslie Cromwell –Fred j. Wibell, Erich A.P Feither – Bio medical Instrumentation and measurements, II Edition.
2. (Page no. 49-64, 63-76, 93-97, 106-149,195-205, 260- 276, 296-303, 316 – 339, 363-383,430-439) • Jacobson and Webstar – Medicine and clinical Engineering.
3. R.S .Khandpur – Hand book of Bio –Medical Instrumentation.
4. Medical Electronics - Kumara doss
5. Introduction to Medical Electronics. B.R. Klin
6. Introduction to Biomedical Instrumentation Mandeep Singh Printice Hall India 2010.