ANNAMALAI UNIVERSITY

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

25ECVAC04	BIOMEDICAL INSTRUMENTATION	L	T	P
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UNIT I : FUNDAMENTALS OF BIOMEDICAL ENGINEERING

Introduction, generalized medical instrumentation system, components of instrumentation system, physiological systems of the body, cardiovascular system. Respiratory system, Nervous system, CNS, PNS, generation of bioelectric potentials, Action potential, Resting potential, Neuronal communication.

UNIT II : BIOSENSORS, ELECTRODES AND REORDERS

The electrode – electrolyte interface, Polarization, Ag/Agcl Electrodes, Body surface electrodes, Internal Electrodes. Transducers in general, Pressure Transducers, Temperature transducers, pulse sensors, Basic recording system, Direct Writing recorder, UV recorders, Thermal array recorders, Electrostatic recorder, Instrumentation Tape recorder

UNIT III : IMAGING MODALITIES AND ANALYSIS

Information content of an image, Modulation transfer function, Noise – equivalent bandwidth, generation of X-rays, X-ray machine, computed Tomography, Magnetic Resonance Imaging – Principle, Image reconstruction techniques, Basic NMR components, Ultrasonic Imaging systems – Types of ultrasound imaging, Applications of different scan, Bio Telemetry.

UNIT IV : ELETRICAL PARAMETERS ACQUISITION AND ANALYSIS

Electrocardiogram, Effects of artifacts on ECG recordings, ECG recorder Principles, EEG & EMG recorders, ERG, Phonocardiogram, stethoscope, BP measuring Instrument - Sphygmomanometer and cardiac catheterization, ultrasonic blood flow meter, Principle of Photoelectric calorimeter, computerized patient monitoring system. Respiratory rate – Gas volume – Flow rate of CO_2, O_2 in exhaust air - PH of blood, ESR, GSR measurements – Plethysmography.

UNIT V : LIFE ASSISTING AND THERAPEUTIC DEVICES

Pacemaker systems – Different pacing modes of operation, Transcutaneous Electrical Nerve stimulation (TENS) – Stimulation modes & application techniques, surgical diathermy, Heart lung machine, Hemo Dialysis, Lithotripsy, Laser applications in medicine, and introduction to electrical safety.

TEXT BOOKS

1. Leshie Cromwell, Fred. J. Weibell and Erich. A. Pfeiffer, Biomedical Instrumentation and Measurements, Third Edition, PHI, 2011.
2. R.Anandanatarajan, Biomedical Instrumentation, PHI Learning, 2009.

REFERENCES

1. Prof.Venkataram.S.K, Bio-Medical Electronics & Instrumentation, Galgotia Publications, 2000.
2. R.S. Khandpar, Hand Book of Biomedical Instrumentation and measurement, McGraw Hill publishing Co., 1990.
3. Aston, Principles of Biomedical Instrumentation and measurements, McGraw Hill publishing Co., 1990.
4. M. Arumugam, Biomedical Instrumentation, Anuradha Agencies Publishers, VidayalKaruppar, 612 606, Kumbakonam, R.M.S: 1992.
5. John. Can. Brown, Introduction to Bio Medical Equipment Technology, Pearson Education of ASIA, 2001.