BMPC3004 BIOMEDICAL SIGNAL PROCESSING (3-0-0)

Course Objectives:

1. To introduce the fundamental concepts of biomedical instrumentation
2. To enable students to understand and apply measurement techniques for bio-signals
3. To provide a comprehensive understanding of cardiovascular and respiratory measurement systems
4. To understand the patient safety protocols and electromagnetic interference issues

Module-I: Introduction to Biomedical Instrumentation (7 Hours)

Genesis of Biomedical Instrumentation, Man-Instrument System, Genesis of Biopotential, Electrode-Electrolyte Interface Basic theories.

Module-II: Measurement system for Bio-signals (8 Hours)

Measurements and characteristics of physiological signals-ECG, EEG, EMG. Electrodes, sensors and transducers for bio-signals. Bio-electric amplifiers

Module-III: Cardiovascular and Respiratory Measurements (6 Hours)

Physiological pressure measurements-Direct and Indirect methods, Cardiovascular devices-Pacemaker and Defibrillator principles and types. Human respiratory systems and measurements.

Module-IV: Patient Care and Monitoring (6 Hours)

Patient monitoring systems, Intensive and coronary care units. Medical ultrasonography, Electrosurgery generators

Module V: Patient Safety (3 Hours)

Electromagnetic interference to medical electronic equipment, Patient Safety

Course Outcomes:

By the end of this course, students will be able to:

CO1 Describe the genesis of biopotentials and their general, electrical characteristics
CO2 Understand the genesis and basic principles of medical instrumentation
CO3 Discuss the applications of amplifiers in biomedical signal recording
CO4 know the usefulness and functioning of cardiovascular devices
CO5 know the electromagnetic interference and medical equipment maintenance

Text Books:

1. L. Cromwell, Biomedical Instrumentation and Measurements, Pearson Education India
2. R. A. Natarajan, Biomedical Instrumentation and Measurements, Prentice-Hall of India
3. R. S. Khandpur, Handbook of Biomedical Instrumentation, McGraw-Hill Education

References:

1. R. Aston, Principles of Biomedical Instrumentation and Measurement, Pearson Prentice Hall