

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)  
ACCREDITED BY NAAC WITH 'A++' GRADE  
IBRAHIMBAGH, HYDERABAD – 500 031  
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

### Introduction to Biomedical Electronics

(Open Elective - III)

SYLLABUS FOR B.E. V – SEMESTER (Civil, CSE, IT, EEE & Mechanical)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: <b>U21OE510EC</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To provide fundamental knowledge of biomedical signals, transducers and various instruments.	On completion of the course, students will be able to 1. recite the basic need of biomedical signals and basic instruments. 2. comprehend the principles of basic bioelectric signals, electrodes and transducers in biomedical electronics. 3. demonstrate the principle of various therapeutic, prosthetic and non invasive instruments for use and prediction of diseases. 4. understand the mathematical, physical and computational principles underlying modern medical imaging system for visualization and analysis of medical image data.

#### CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2			1							1		3
CO2	2	2											1		3
CO3	2	1	3			2									2
CO4	3	2	2			2									3

#### UNIT - I :

**Basics of Biomedical Electronics:** Physiological systems of the body, sources of biomedical signals, basic medical instrumentation system, performance requirements of medical instrumentation systems, Intelligent medical instrumentation systems, General constraints in design of medical instrumentation systems.

#### UNIT - II :

**Bioelectric Signals, Electrodes, Transducers:** Origin of bioelectrical signals, recording electrodes, electrodes for ECG, EEG, EMG, micro-electrodes. Transducer: Introduction, classification of transducers, performance characteristics of transducers, displacement position and motion transducers, pressure transducers, photoelectric transducer.

#### UNIT - III :

**Therapeutic and Prosthetic Devices:** Cardiac pacemaker, defibrillators, hemodynamic & haemodialysis, ventilators, infant incubators, surgical instruments, therapeutic applications of laser.

#### UNIT - IV :

**Non-invasive Instrumentation:** Temperature measurements, principles of ultrasonic measurements and its applications in medicine, medical thermography, physics of thermography infrared detectors and thermographic detectors.

#### UNIT - V :

**Modern Medical Imaging System:** Radiography: Production of X-rays, units of X-radiation, block diagram of X-ray machine, MRI, computed tomography: Block diagram and working.

#### Learning Resources:

- L. Cromwell, Biomedical Instrumentation and Measurements, Prentice Hall.
- Handbook of Biomedical Instrumentation by R.S. Khandpur.
- S.K. Venkata Ram, Bio-medical Electronics and Instrumentation, Galgotia Publications, Pvt. Ltd.

The break-up of CIE : Internal Tests + Assignments + Quizzes

- No. of Internal Tests :  Max. Marks for each Internal Test :
- No. of Assignments :  Max. Marks for each Assignment :
- No. of Quizzes :  Max. Marks for each Quiz Test :

Duration of Internal Tests: 90 Minutes