Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year BE Branch Electronic & Instrumentation					
Subject Code & Name	**Instructions Hours per week**			**Marks**	**TH**	**CW**	**SW**	**Pr**	**Total**
4EI303 Bio-Medical Instrumentation	**L**	**T**	**P**	**Max**	**100**	**50**	**50**	**50**	**250**
Duration of Theory Paper: 3 hrs	**4**	**-**	**2**	**Min**	**35**	**25**	**25**	**25**	**110**

Course Objective: To encompass students for understand linkages between medical sciences and engineering techniques So that to have a fair views of physiological system of the body along with the instrumentation essential for the detection, acquisition and quantification of the bio signals.

Prerequisite: Basic course in sensors & transducers and biology

COURSE OF CONTENTS

Unit I

Basic Medical Instrumentation system, General Constraints in design of medical instrumentation system, Biomedical Telemetry ,Patient Safety, Laser used in Biomedical Fields, Automated Drug Delivery Systems

Unit-II

Fundamental of Medical instrumentation, Type of Bioelectrical Signals, electrodes used for ECG,EEG,EMG, microelectrodes, electrode jellies and cream, Transducers used for Displacements, position, motion, pressure, body temperature, optical fiber sensor, biosensors, smart sensors, Biomedical recorders like ECG,PCG,VCG,EEG,EMG.

Unit III

Oximeters like Ear, Pulse and intravascular oximeter, Ultrasonic, NMR, LASER Doppler blood flow meter, Cardiac output measurement techniques like Dye dilution, Thermal Dilution, Ultrasound Method, Pulmonory Function Analysers,Respiratory gas anlysers,Blood pH,Blood pCO_2 measreument, Methods of Cell Counting, Pure tone, Speech Audiometers.

Unit IV

X-ray machines, Dental X-ray machines, Digital Radiography, Principles and, System components of Tomography, Principles of NMR, its components and biological effects. Ultrasonic & Thermal imaging systems.

Unit V

Cardiac Pacemakers like external, implantable pacemakers, implantable, DC, Pacer-cardioverter Defibrillators, Artificial Kidney, Dialyzers, Haemodialysis machine. Stone disease problem, lithotriptor systems, Anesthesia machine, Mechanism of artificial ventilation, Types of Ventilator

References:

[1].Cromwell,Weibull & Pfeiffer,*Biomedical instrumentation and Measruments,*2/e,PHI New Delhi-1999
[2].R.S.Khadpur,*Handbook o f Biomedical Instrumentation*,2/e,TMH Pub.Company,New Delhi
[3]. Nandini K. Jog, *Electronics in Medicine and Biomedical Instrumentation*, Prentice Hall
[4] Dr. A. Arumugam ,*Biomedical Instrumentation*, , Anuradha Agencies, Chennai.
[5] Domach,*Introduction to Biomedical Engineering*, Pearson Education
[6] C Raja Rao & S.K Guha *Principles of Medical Electronics & Biomedical Instrumentation,* , University Press.
[7] J.G. Webster,*Handbook of Medical Electronics,*