

Course code	Course name	L-T-P-Credits	Year of Introduction
AE403	BIOMEDICAL INSTRUMENTATION	3-0-0-3	2016
Prerequisite : Nil			
Course objectives			
<ul style="list-style-type: none"> To impart knowledge of the principle of operation and design of biomedical instruments. To render a broad and modern account of biomedical instruments. To introduce idea about human physiology system 			
Syllabus			
Electro physiology- Bioelectric potential and cardiovascular measurements- Respirator and pulmonary measurements and rehabilitation- Patient monitoring systems- Clinical Laboratory Instruments- Imaging technique & Telemetry.			
Expected outcome			
At the end of the semester students will			
<ol style="list-style-type: none"> be able to understand about human physiology have knowledge of the principle operation and design and the background knowledge of biomedical instruments and specific applications of biomedical engineering 			
Text Books			
<ol style="list-style-type: none"> Arumugam.M. "<i>Biomedical Instrumentation</i>", Anuradha Agencies Publishers, Kumbakonam, 2006. Leslie Cromwell, Fred J. Weibell and Erich A. Pfeiffer, "<i>Biomedical Instrumentation and Measurements</i>", 2nd Edition, Prentice Hall, New Delhi, 1998. 			
Reference Books:			
<ol style="list-style-type: none"> Geddes L. A. and Baker L. E., "<i>Principles of Applied Biomedical Instrumentation</i>", 3rd Edition, John Wiley, New York, 1989. John. G. Webster, "<i>Medical Instrumentation, Application and Design</i>" John Wiley, New York, 1998 R.S.Khandpur, "<i>Handbook of Biomedical Instrumentation</i>", Prentice Hall of India, New Delhi, 2003 Richard Aston, "<i>Principles of Bio-medical Instrumentation and Measurement</i>", Merril Publishing Company, New York, 1990. 			
Course Plan			
Module	Contents	Hours	Semester Exam Marks
I	Electro physiology: Review of physiology and anatomy, resting potential, action potential, bioelectric potentials, cardiovascular dynamics, electrode theory, bipolar and unipolar electrodes, surface electrodes, physiological transducers. Systems approach to biological systems.	7	15%
II	Bioelectric potential and cardiovascular measurements: EMG - Evoked potential response, EEG, foetal monitor. ECG phonocardiography, vector cardiograph, BP, blood flow cardiac output, plethysmography, impedance cardiology, cardiac arrhythmia's, pace makers, defibrillators.	6	15%
FIRST INTERNAL EXAMINATION			
III	Respirator and pulmonary measurements and rehabilitation:	7	15%

	Physiology of respiratory system, respiratory rate measurement, artificial respirator, oximeter, hearing aids, functional neuromuscular simulation, physiotherapy, diathermy, nerve stimulator, artificial kidney machine.		
IV	Patient monitoring systems: Intensive cardiac care, bedside and central monitoring systems, patient monitoring through bio-telemetry, implanted transmitters, telemetering multiple information. Sources of electrical hazards and safety techniques.	7	15%
SECOND INTERNAL EXAMINATION			
V	Clinical Flame photometer - spectrophotometer - Colorimeter- chromatography- Automated Biochemical analysis system - Blood Gas Analyzer: Blood pH Measurement- Measurement of Blood pCO ₂ - Blood pO ₂ Measurement- Blood Cell Counters: Types and Methods of cell Counting.	7	20%
VI	Recent trends: Medical imaging, X-rays, laser applications, ultrasound scanner, echo cardiography, CT Scan MRI/NMR, cine angiogram, colour doppler systems, Holter monitoring, endoscopy.	8	20%
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN:

Maximum Marks:100

Exam Duration: 3 Hours

Part A

Answer any two out of three questions uniformly covering Module 1 and 2 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

Part B

Answer any two out of three questions uniformly covering Module 3 and 4 together. Each question carries 15 marks and may have not more than four sub divisions.

(15 x 2 = 30 marks)

Part C

Answer any two out of three questions uniformly covering Module 5 and 6 together. Each question carries 15 marks and may have not more than four sub divisions.

(20 x 2 = 40 marks)