

COURSE CODE: 1153EE102	COURSE TITLE: BIO MEDICAL INSTRUMENTATION	L	T	P	C
		3	0	0	3
COURSE CATEGORY:					
Allied Elective					
PREAMBLE :					
The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance. The fundamental principles of equipment that are actually in use at the present day are introduced.					
PREREQUISITE COURSES:					
<ul style="list-style-type: none"> • Basic Electrical Engineering 					
RELATED COURSES:					
<ul style="list-style-type: none"> • Control systems 					
COURSE EDUCATIONAL OBJECTIVES:					
<p>The objectives of the course are to make the students, To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration. Methods of different transducers used.</p> <ul style="list-style-type: none"> • To introduce the student to the various sensing and measurement devices of electrical origin. • To provide the latest ideas on devices of non-electrical devices. • To provide latest knowledge of Pulmonary Measurement & Bio Telemetry • To bring out the important and modern methods of imaging techniques. 					
COURSE OUTCOMES :					
Upon the successful completion of the course, students will be able to:					
CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)			
C01	To emphasize an acquaintance of the physiology of the heart, blood circulation and circulation respiration and the methods of different transducers used.	K2			
C02	To demonstrate student to the various sensing and measurement devices of electrical origin and Instruments for checking safety parameters	K3			
C03	To understand the latest ideas on devices of non-electrical devices.	K3			
C04	To apply the latest knowledge of Pulmonary Measurement & Bio Telemetry	K2			
C05	To highlight the important and modern methods of imaging techniques and biometric system	K2			

CORRELATION OF COs AND POs

COs	PROGRAM OUTCOMES											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L		H								M	
CO2	M							L			L	
CO3			M								M	
CO4			H					M			M	
CO5			M									

COURSE CONTENT:**UNIT I | FUNDAMENTALS OF BIOMEDICAL ENGINEERING | 9**

Cell and its structure – Resting and Action Potential – Nervous system – Basic components of a biomedical system- Cardiovascular systems- Respiratory systems - Biomechanics of soft tissues - Basic mechanics of spinal column and limbs- Transducers – selection criteria – Piezo electric, ultrasonic transducers - Temperature measurements - Fibre optic temperature sensors.

UNIT II | BIOMEDICAL MEASUREMENT | 9

Electrodes –types-Amplifiers - ECG – EEG – EMG – ERG - Electrical safety in medical environment, shock hazards – leakage current-Instruments for checking safety parameters of biomedical equipments.

UNIT III | NON ELECTRICAL PARAMETERS MEASUREMENT AND DIAGNOSTIC PROCEDURES | 9

Measurement of blood pressure - Cardiac output - Heart rate - Heart sound - Pulmonary function measurements – spirometer – Photo Plethysmography, Body Plethysmography – Blood Gas analysers, pH of blood –measurement of blood pCO₂, pO₂, finger-tip oxymeter - ESR, GSR measurements.

UNIT IV | PULMONARY MEASUREMENT AND BIO TELEMETRY | 9

Physiology of respiratory system – Respiratory rate measurement – wire and wireless Biotelemetry – Telemetering multiple information – implanted transmitters – causes of electrical hazards and safety techniques.

UNIT V | MEDICAL IMAGING SYSTEM | 9

Ultrasound scanner – Echo cardiography – Coloar Doppler system – CAT and CT scan – MRI Imaging – Cine angiogram – LASER Imaging – Endoscope.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Leslie Cromwell, Biomedical Instrumentation and Measurement, Prentice hall of India, New Delhi,2007.
2. Joseph J.carr and John M. Brown, Introduction to Biomedical Equipment Technology, John Wileyand sons, New York, 4th Edition, 2012
3. Khandpur R.S, Handbook of Biomedical Instrumentation, , Tata McGraw-Hill, New Delhi, 2nd Edition, 2003

REFERENCE BOOKS:

1. John G. Webster, Medical Instrumentation Application and Design, John Wiley and sons, NewYork, 1998.
2. Duane Knudson, Fundamentals of Biomechanics, Springer, 2nd Edition, 2007.
3. Suh, Sang, Gurupur, Varadraj P., Tanik, Murat M., Health Care Systems, Technology and Techniques, Springer, 1st Edition, 2011.
4. Ed. Joseph D. Bronzino, The Biomedical Engineering Hand Book, Third Edition, Boca Raton, CRC Press LLC, 2006.
5. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.