BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI-Hyderabad Campus
SECOND SEMESTER 2021- 2022
COURSE HANDOUT (PART II)

Date: 15-01-2022

In addition to Part I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No : **INSTR F432**
Course Title : **Medical Instrumentation**
Instructor-in-charge : Venkateswaran R
Instructor : Venkateswaran R

1. Scope and Objective:

The objective of this course is to relate specific engineering and instrumentation principles to the task of obtaining physiological data. The course deals with the origin of bioelectric signals, the transducers, electrodes and other devices for recording the bioelectric signals, the design of specific medical instruments and the recent developments in this field.

2. Text Book:
Leslie Cromwell, F J Weibell & E A Pfeiffer, Biomedical Instrumentation & Measurements, 2nd Edition, Prentice hall Of India, 2009

3. Reference Book:

R1: Medical Instrumentation Application and Design John G Webster John Wiley & Sons, Fourth Edition
R2 : Mandeep Singh, Introduction to biomedical instrumentation, second edition, PHI
R3 : R S Khandpur, Handbook of biomedical instrumentation, Tata McGraw-Hill

4. Course Plan:

Lec. No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-3	Introduce man instrument system, problems in measuring a living system	Introduction to Biomedical Instrumentation, problems in measuring a living system, Interfering and Modifying Inputs	T Ch1/ R1 Ch 1 1.1 to 1.10
4-7	Understand active and passive transducers, amplifier, filter circuits	Basic Transducer principles, Amplifiers, filters	T Ch 2/R1 Ch 2 / R1 Ch 3
8-10	Action potentials, bioelectric potentials	Bioelectric potentials	T Ch 3/R1 Ch 4
11-13	Bio potential electrodes, Bio chemical transducers	Electrode theory	T Ch 4/R1 Ch 5/R2 Ch 2
14-15	Heart ,Blood pressure, Heart sounds	Cardiovascular measurements	T Ch 5/R1Ch 7/R2 Ch 3
16-21	ECG, amplifier, leads	Electrocardiography (ECG) Instrumentation	T Ch 6.1/, R1 Ch 6/ R2 Ch 3
22-25	Anatomy,	Nervous Systems : Basic concepts	T Ch10/ R1 Ch

	instrumentation, EEG, EMG ,		4/R2 Ch 5
26-32	Imaging, ultrasonic measurements, CT, MRI	Non-invasive diagnostic instrumentation	T Ch 9, 14/ R1 Ch 12/R2 Ch 8
33-35	Blood pressure	Measurement of blood pressure	T Ch 6.2/R1 Ch 7,8/ R2 Ch 3
36-38	Intensive care monitoring, pacemakers, defibrillators Tests for mechanics of breathing, instrumentation for mechanics of breathing	Patient care, Instrumentation for pacemakers, defibrillators breathing-respiratory measurements	T Ch 7, T Ch 8/ R1 Ch 13/R2 Ch 4
39-40		Student project presentations	

5. Evaluation Scheme:

EC No.	Evaluation Component	Duration (min)	Weightage (%)	Marks (200)	Date & Time	Nature of Component
1	Midsem	90	30	60	As per Timetable	Closed Book
2	Quiz (3 #s)	60	10	20	Announced in Class	Closed Book
3	Project	__	20	40	Announced in Class	Open Book
4	Comprehensive	120	40	80	As per Timetable	Closed Book

6. Chamber Consultation Hours: To be announced in the class.

7. Make-up Policy:

Make Up for any component will be given as per AUGSD rules and regulations. **In all cases prior intimation must be given to IC.**

8. Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor - in – charge