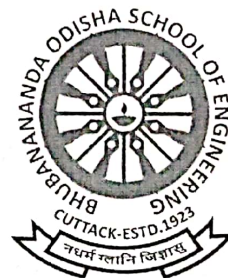


BHUBANANANDA ODISHA SCHOOL OF ENGINEERING, CUTTACK
DEPARTMENT OF APPLIED ELECTRONICS & INSTRUMENTATION ENGG.



LESSON PLAN

SUBJECT: BIOMEDICAL INSTRUMENTATION

ACADEMIC SESSION: 2026-27

FACULTY: Er. NIRANJAN NAYAK, LECTURER(STAGE-II)

SEMESTER: 5TH

Sd/-

H O D (AE&I Engg.)



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DEPARTMENT OF APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING
LESSON PLAN

COURSE OUTCOMES

CO1: - Describe biomedical instrumentation fundamentals, physiological systems (cardiovascular, respiratory, nervous), bio-sensors/transducers, and bio-electric potentials.

CO2: - Explain electrode theory, types (Ag-AgCl, pH, PO₂, PCO₂), ECG instrumentation, cardiac output measurement, pacemaker, EMG, and EEG interpretation.

CO3: - Describe working principles and applications of plethysmography, diathermy, defibrillator, pacemaker, blood pressure/flow monitor, and endoscope.

CO4: - Explain measurement of pH/ESR/O₂/Hb, X-ray instrumentation, ultrasonography, ultrasound/IR medical imaging, radioisotope instrumentation, and digital X-ray operation.

CO5: - Describe biomedical computer applications, telemedicine, physiological effects of electrical current, shock hazards, and electrical safety standards for medical equipment.

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LESSON PLAN

Discipline: AE&I Engineering	Semester: 5 TH	Name of the teaching faculty: Er. NIRANJAN NAYAK
Subject: BIOMEDICAL INSTRUMENTATION	No. of Days/ per week class allotted: 03 periods per week.	Semester From Date: 01-07-2026 To Date: 05-11-2026 No. of weeks: 15 weeks
Week	Class Day	Theory Topics
1 st	1st	UNIT-1 Introduction to Biomedical Instruments: 1.1 Fundamentals & specification of biomedical instrumentation system, physiological system of body. a. Cardiovascular system. b. Respiratory system. c. Nervous system.
	2nd	1.1 Fundamentals & specification of biomedical instrumentation system, physiological system of body. a. Cardiovascular system. b. Respiratory system. c. Nervous system.
	3rd	1.2 Different types of sensors & transducers for biological application. a. Types, b. Properties, c. Characteristics.
2 nd	1st	1.2 Different types of sensors & transducers for biological application. a. Types, b. Properties, c. Characteristics.
	2nd	1.3 Explain sources of bio-electric potential. a. Action potential & its propagation, b. Resting potential & its propagation, c. Bio-electric potential.
	3rd	1.3 Explain sources of bio-electric potential. a. Action potential & its propagation, b. Resting potential & its propagation, c. Bio-electric potential.

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3 rd	1 st	1.4 Introduction to physiology of cardiac, nervous, muscular systems;
	2 nd	Revision of Unit-1
	3 rd	UNIT-2 Electrodes: 2.1 Electrode theory,
4 th	1 st	2.2 Different types of electrodes- Hydrogen Calomel, Ag-AgCl, pH, PO ₂ Pco ₂ electrodes, selection criteria of electrodes.
	2 nd	2.3 ECG measurement and Instrumentation techniques;
	3 rd	2.4 Measurement of Cardiac output and Cardiac rate,
5 th	1 st	2.5 Electrocardiography, Cardiac pace-maker
	2 nd	2.6 Measurement of Electrical Activities in Muscles, Heart and Brain: Electromyography, Electroencephalograph and their interpretation.
	3 rd	2.6 Measurement of Electrical Activities in Muscles, Heart and Brain: Electromyography, Electroencephalograph and their interpretation.
6 th	1 st	Revision of Unit-2
	2 nd	UNIT-3 Medical equipment: 3.1 Plethysmography,
	3 rd	3.2 Diathermy,
7 th	1 st	3.3 Defibrillator,
	2 nd	3.4 Pace maker,

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	3rd	3.5 Blood pressure monitor,
8 th	1st	3.6 Blood flow monitor,
	2nd	3.6 Blood flow monitor,
	3rd	3.7 Endoscope
9 th	1st	Revision of Unit-3
	2nd	CLASS TEST-1
	3rd	UNIT-4 Instrumentation in clinical laboratory: 4.1 Measurement of pH, ESR, oxygen, Hb in blood;
10 th	1st	4.1 Measurement of pH, ESR, oxygen, Hb in blood;
	2nd	4.2 X-ray and Ultrasonography.
	3rd	4.2 X-ray and Ultrasonography.
11 th	1st	4.3 Medical Imaging- Ultrasound imaging and IR Imaging.
	2nd	4.4 Basic of X-ray & radioisotope instrumentation.
	3rd	4.4 Basic of X-ray & radioisotope instrumentation.
12 th	1st	4.5 Instrumentation for diagnostic x-ray & handling of x-ray machine.
	2nd	4.5 Instrumentation for diagnostic x-ray & handling of x-ray machine.
	3rd	4.6 Basic concept & operation of digital x-ray machine.

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13 th	1st	4.6 Basic concept & operation of digital x-ray machine.
	2nd	Revision of Unit-4
	3rd	UNIT-5 Patient safety & electrical safety of medical equipment: 5.1 Application of biomedical engineering & computer application in medical field.
14 th	1st	5.2 Tele medicine.
	2nd	5.3 Physiological effect of electrical current.
	3rd	5.4 Shock hazard of electrical biomedical equipment.
15 th	1st	Revision of Unit-5
	2nd	CLASS TEST-2
	3rd	Sample Questions Practice


Signature of Faculty


AE & I Department
B.O.S.E, Cuttack-753007