

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



LESSON PLAN

SUBJECT: FUNDAMENTALS OF INSTRUMENTATION

ACADEMIC SESSION: 2026-27

FACULTY: SMT RASHMITA GOUDA, LECTURER(STAGE-I)

SEMESTER: 3RD


H O D (AE&I)
HOD
AE & I Department
B.O.S.E, Cuttack-753007

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COURSE OUTCOMES

After completion of course the student will be able to

- CO1:** Remember different units and standards of measurement.
- CO2:-** Understand the basic of instrumentation and different characteristics of instrument
- CO3:-** Explain errors in Measurement and Statistical analysis of measurement.
- CO4:-** Explain the elements of instrumentation system
- CO5:-** Analyze and Design mathematical model of 1st order and 2nd order system

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Discipline: AE&I Engineering	Semester: 3 RD	Name of the teaching faculty: Rashmita Gouda
Subject:	No. of Days/ per week class allotted: 03 periods per week.	Semester From Date: 01-07-2026 To Date: 05-11-2026
Week	Class Day	Topics to be covered
1	1st	Unit-I: Principles of measurement, units & standards:- Idea of measurement of process & measuring instrument
2	1st	Selection criteria of measuring instrument
	2nd	Concept instrumental units
	3rd	The relationship between electrostatic unit & electromagnetic unit.
3	1st	Concept of S.I system of units & its advantage & disadvantage
	2nd	S.I. based units, supplementary units, derived units.
	3rd	Classification of standards: Absolute standard, Secondary standard, Inter laboratory standard.
4	1st	Unit-II: Principles of Instrumentation: - Definition of Terminology: Measurement, Instrumentation and Metrology
	2nd	Basic concepts of Instrumentation, Model of generalized measurement system
	3rd	function of different components of measurement system
5	1st	Performance Characteristics of Instruments: Static & Dynamic characteristics,

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	2nd	Specification, range, sensitivity, accuracy, precision,
	3rd	error, drift, threshold, resolution
6	1st	hysteresis, correction, span, linearity
	2nd	repeatability, reproducibility, speed of response, lag, fidelity,
	3rd	Calibration of instruments, need and methods.
7	1st	Revision of Unit-I & Unit-II
	2nd	Unit-III: Errors in Measurement and Statistical analysis: - Errors in measurement: definitions
	3rd	Random and Systematic error, Reduction of error
8	1st	Loading effects on measuring systems
	2nd	Reduction of loading error
	3rd	Probability distribution function
9	1st	chi-square test
	2nd	curve fitting technique
10	1st	power spectral density and autocorrelation
	2nd	Static characteristics of a system: relating with statistical analysis.

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	3rd	Unit-IV: Elements of instrumentation system: - Generalized input-output configurations of measuring systems: Desired, interfering and modifying input
11	1st	Electrical equivalents of mechanical and other systems
	2nd	Input-Output configurations.
	3rd	Types of standard test signals: impulse, step
12		
13	1st	Ramp and Parabolic signals
	2nd	Classification of systems according to their mode of operation
	3rd	Basic idea of electronic, pneumatic and hydraulic instrumentation
14	1st	Need of Signal conditioning elements, Block diagram
	2nd	Examples of Signal conditioning elements
	3rd	Revision of Unit-III & Unit-IV
15	1st	Unit-V: Mathematical Models of systems
	2nd	Mathematical Models of 1 st order system
	3rd	Examples of 1 st order system
16	1st	Mathematical Models of 2 nd order system
	2nd	Examples of 2 nd order system

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	3rd	System transfer function
17	1st	Step response of 1 st order system & its time domain specification
18	1st	Step response of 2 nd order system & its time domain specification
	2nd	Revision of Unit-V
	3rd	Probable Q& A discussion
19	1st	Probable Q& A discussion
	2nd	Probable Q& A discussion
	3rd	Probable Q& A discussion


 Signature of Faculty


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