BHUBANANANDA ORISSA SCHOOL OF ENGINEERING, CUTTACK

Lesson Plan of Industrial Measurement and Instrumentation-I

By

Sidharth Sekhar Mallick, Lecturer AE&I

Academic Year -2022-23(summer)

VISION & MISSION OF APPLIED ELECTRONICS & INSTRUMENTATION ENGINEERING DEPARTMENT

VISION OF THEDEPARTMENT:-

To produce efficient professional in applied electronics & instrumentation engineering and other allied area's with update technical knowledge to meet the challenges of society in relevant sector.

MISSION OF THE DEPARTMENT:-

- To provide the student competent in applied electronics and instrumentation engineering with societal, environmental and human values through quality education, training.
- Provide knowledge of basic science, applied mathematics, instrumentation technology and communicative skills to identify and solve problems related to Applied Electronics and Instrumentation engineering.
- To enable the students to acquire various parameter measurement and automatic control technology used for industrial automation and inculcate quality of leadership, mentorship &teamwork in collaboration with parents, alumni & industry.

PROGRAMME EDUCATIONAL OBJECTIVES:

- To provide students with a solid foundation in basic science, electrical, electronics, instrumentation and interdisciplinary subjects that is necessary to excel in professional career, entrepreneur in future and/or higher education.
- To prepare students to meet the needs and face the challenges of real life as well as industry automation and digitalization in terms of technical, economic and social feasibility.
- To inculcate professionalism, communication skills, attitudes, team work and to adapt to the current trends by engaging in lifelong learning.
- To utilize the technology in domestic, medical, industry and community for proper utilization of instrument for measurement & control.

Discipline: Applied Electronics & Instrumentation Engineering.	**Semester :** 3rd	**Name of the teaching faculty:** Sidharth Sekhar Mallick
Subject: Industrial Measurement & Instrumentation-I	No. of Days/per week class allotted: **05 periods/per week** **(TUE,WED, SAT:- 1 Period each & FRI:- 02 Period)**	Semester From Date:- 14-02-2023 To Date:-23-05-2023 No. of weeks: **15 weeks**
Week	**Class Day**	**Theory Topics**
1st	14/02/2023	Introduction, syllabus discussion and Previous year question discussion
	15/02/2023	**Unit-1MEASUREMENT OF TEMPERATURE** 1.1 Classify methods of temperature measurements 1.2 Explain measurement of temperature by non-electrical methods. A. Liquid expansion type
	17/02/2023	B. Solid expansion type. , Continuing… C. Gas & Vapour expansion type.
	17/02/2023	1.3 Explain measurement of temperature by electrical methods of measurement. A. Resistance thermometer i. State advantage of resistance thermometers areother types. ii. Describe the method of measurement of change in resistance by null balance bridge method.
2nd	21/02/2023	iii. Compensation of lead resistance by 3-wire &4-wire method.
	22/02/2023	B. Thermocouples. i. Explain principle of thermoelectricity (See back, Pettier, Thompson effects). Continuing…
	24/02/2023	ii. Classify thermocouples materials. iii. Describe the function of thermocouple extension wires.
	24/02/2023	iv. Describe the methods of measurement of output of thermocouples state the types of thermocouples insulation materials & their function.
	25/02/2023	v. State the advantages &disadvantages of thermocouples

		typesthermometer.
3rd	28/02/2023	vi. Explain the cold junction compensation of thermocouple.
	01/03/2023	C. Thermistors. i. Explain the basic principle &characteristics of thermistors.
	03/03/2023	ii. State the method of temperature measurement by thermistors & their uses. D. Pyrometers. i. Explain the principle & operation of radiation & optical pyrometer with suitable diagram.
	03/03/2023	E. Describe the function & use of temperature switch. **Unit-2 MEASUREMENT OF PRESSURE** 2.1 Classify methods of pressure measurement.
	04/03/2023	2.2 Explain theworking principle& use of mechanical methods of measurements of pressure by: i. manometers (U-tube, Well Type, Inclined type) , Continuing…
4th	10/03/2023	ii. Elastic type pressure gauge (Bourdon tube, Diaphragm, Bellows) iii. Bell gauge
	10/03/2022	2.3 Explain the working principles& use of electrical methods of measurement of pressure by : i. Strain gauge pressure transducer ii. Capacitive pressure transducer, Continuing…
	11/03/2023	iii. Reluctance pressure transducer iv. Piezoelectric pressure transducer
5th	14/03/2023	2.4 Describe the operation and Explain the working principle of vacuum gauge i. Thermal conductivity Gauge
	15/03/2023	ii. McLeod gauge, Continuing…
	17/03/2023	iii. Hot filament ionization vacuum gauge
	17/03/2023	2.5 Explain the working principle of mechanical & pneumatic pressure transmitter, Pressure Switch (Two wire and four wire type of transmitter) and State their uses.
	18/03/2023	**Revision on Chapter 1 & 2**

6th	21/03/2023	**Class Test-1**
	22/03/2023	**Unit-3 MEASUREMENT OF FLOW AND LEVEL** 3.1 Classify flow meters and explain the principle of operation with diagram.
	24/03/2023	3.2 Variable head type flow meter: Explain the principle of operation, advantages & disadvantages of i. Orifice plate, ii. Venturi tube, Continuing...
	24/03/2023	iii. Nozzles, iv. Dall tube, v. Elbow Taps
	25/03/2023	3.3 Explain variable area flow meter (Rota meter), Cylinder & Piston type & their uses.
7th	28/03/2023	3.4 Explain Non-hydraulic meter and State their industrial uses. i. Magnetic flow meter ii. Ultrasonic flow meter
	29/03/2023	3.5 Describe the construction and explain working principle of thermal flow meter.
	31/03/2023	3.6 Describe the construction and explain principle of Quantity flow meter i. Positive displacement type
	31/03/2023	ii. Reciprocating piston type 3.7 Level Measurement i. Classify level indication
8th	04/04/2023	ii. Explain the working of sight glass, float type of indicator and displacement level detector. Continuing…
	05/04/2023	iv. Explain the working of capacitive level detector and radiation level detector. v. State and explain the function of different types of level switches.
	08/04/2023	**Unit -4 MEASUREMENT OF FORCE, TORQUE & SHAFT POWER** 4.1 Define force, torque and shaft power.
9th	11/04/2023	4.2 Explain basic method of measurement of force.
	12/04/2023	4.3 State &Explain equal and non-equal arm balance.
	15/04/2023	4.4 Explain multiple level systems of force measurement.
10th	18/04/2023	4.5 Explain Hydraulic and Pneumatic load cell.
	19/04/2023	4.6 Explain methods of measurement of torque using strain sensor and magentostrictive torque- transducer.
	21/04/2023	4.7 Explain measurement of shaft power using rope break and prony brake.
	21/04/2023	**Revision on chapter-3 &4**

	22/04/2023	**Unit -5 TELEMETRY & VARIOUS CONVERTERS** 5.1 Define telemetry. 5.2 General telemetry system.
11th	25/04/2023	**Internal assessment**
	26/04/2023	**Internal assessment**
	28/04/2023	5.3 Types of telemetry system.
	28/04/2023	5.4 Problems in telemetry system.
	29/04/2023	5.5 Pressure to current converter.
12th	02/05/2023	5.6 Pressure to voltage converter.
	03/05/2023	**Unit -6 Aquastic measurement -:** 6.1 Define Aquastic pressure.
	06/05/2023	6.2 Explain characteristic of sound pressure level & power level.
13th	09/05/2023	6.3 explain the function of typical sound system such as microphone.
	10/05/2023	**Revision on chapter- 5 & 6**
	12/05/2023	**2nd Internal Assessment**
	12/05/2023	Revision and important question discussion on unit-1 & 2
	13/05/2023	Quiz test on chapter- 4,5 &6 and important question discussion
14th	16/05/2023	Class Test-2
	17/05/2023	Revision and important question discussion on unit-1 & 2
	20/05/2023	Revision and important question discussion on unit-3 & 4
15th	23/05/2023	Revision and important question discussion on unit-5 & 6