Department of Electrical Engineering

Branch: Electrical Engineering	Semester: 4TH	Name of the Lecturer: **J Pratul Nanda**
Subject: SA	No of classes alloted in a week: 5	Duration of Semester: 22.12.2025 - 18.04.2026
Week	Class Day	Theory / practical Topic
1st	1	**Introduction to sensors and measurement.** Overview of measurement systems: Definition of Sensor.
	2	Difference between Sensor,Transmitter and Transducer
	3	Primary measuring element: selection
	4	Static and dynamic characteristics: Range, Response time, Accuracy, Precision; Sensitivity; Dead band; Dead time; Signal transmission:
	5	Types of signal: Pneumatic signal; Hydraulic signal; Electronic Signal.Standard signal ranges
2nd	1	Introduction of Electronic transmitter; Pneumatic transmitter; Smart transmitters.
	2	**Principles of various Sensors:** Classification of sensors, Characteristics and calibration of different sensors
	3	Working Principle of Displacement & Position and Motion sensors,
	4	Working Principle of Limit switches & Proximity sensors,
	5	Working Principle of LVDT & Strain gauge & Encoders
3rd	1	Working Principle of Tacho- generator.
	2	Working Principle of Hall sensors, Distance sensors,Light Sensor.
	3	Describe the principle of Accelerometer, Force, Torque, Tactile sensors, Load cells, Piezoelectric transducer.
	4	Principle of Piezo Resistive Type.
	5	Principle of Variable Capacitive Type; Variable reluctance type sensors.
4th	1	Principle of Synchros and resolver.
	2	**Pressure and level measuring elements:**Bourden tube, Bellows;Diaphragm.
	3	Explain the Application of Diaphragm: Capacitance Type
	4	Application of Diaphragm: Reluctance Type
	5	Application of Diaphragm: Strain Gauge Type
5th	1	Application of Diaphragm: Inductive Type.
	2	Application of Bellows: Electrical and Piezoelectric pressure transducers,
	3	Application of Bellows: McLeod gage,
	4	Application of Bellows: Pirani gage
	5	Application of Bellows: Ionisation gage.
6th	1	Explain the Level sensors: Float type, Variable resistive type,Inductive type, Capacitive type.
	2	**Flow and temperature measuring elements:** Flow sensors: Reynolds numbers
	3	Types of Flow meters,Principle of flow measurement:
	4	Differential pressure type: orifices,venturi tubes
	5	Differential pressure type: flow tubes; flow nozzles;
7th	1	Differential pressure type: pitot tubes and Rotameter
	2	Differential pressure type: Nutating disk & Rotary-vane types.
	3	Discuss about Velocity meters: Turbine & Vortex shedding
	4	Velocity meters: Electromagnetic and Mass flow meters, Anemometer, Ultrasonic flow meter.
	5	Temperature sensors: Thermocouples, Thermistor,RTD, Pyrometer.

8th	1	Temperature sensors: RTD, Pyrometer.
	2	Actuators : Definition and Example of Actuators, selection & Types of Actuators;Pneumatic actuator
	3	Electro-Pneumatic actuator,Cylinder & rotary actuators,
	4	Mechanical actuating system: Hydraulic actuator
	5	Control valves: Construction, Valve coefficient or valve sizing, valve characteristics, types of valves, valve selection.
9th	1	Electrical actuating systems: Solid-state switches, Solenoids, Voice Coil; Electric Motors;
	2	Principle of operation & its application: D.C motors & AC motors
	3	Operation & application: Single phase & 3 Phase Induction Motor.
	4	Principle of operation & application: Synchronous & Stepper Motors.
	5	Principle of operation & application: Piezoelectric Actuator.

Signature of the Lecturer **Signature of the H.O.D.** **Signature of the Principal**