GOVT. POLYTECHNIC BALANGIR

Department of Electrical Engineering

LESSON PLAN: 2025-26

Name of the Faculty: MD SAMSUDDIN ANSARI

Subject: SENSORS & ACTUATORS

Program: Diploma in Electrical Engineering

Semester: 4th

Total Contact Hours: 45

Total Marks: 100

Assessment: Progressive –30, End Term – 70

Credits: 3

COURSE OBJECTIVES:

After completion of the course, the students will be able to

- Explain the optimized working of the thermal power plant
- Describe the efficient operation of large hydropower plants.
- Describe the efficient operation micro hydropower plants.
- Select the adequate mix of power generation based on economic operation.

Unit 1: Introduction to sensors and measurement(Total Classes-6)				
Class No.	**Topic**	**Subtopic (Elaborated)**	**Simple Teaching Aids/Activities**	**Course Objective**
1	Overview of measurement systems	1.1 Definition of sensors, difference between sensor transmitter and transducer, primary measuring element selection	Chalkboard definition writing, students repeat definitions, discussion on working	CO1
2	Static characteristics	1.2 Range,response time, accuracy, precision, sensitivity.	Chalkboard definition and discussion and video clip	CO1
3	Dynamic characteristics	1.2.1 dead band, dead time, signal transmission	PPT Slides	CO1
4	Types of signal	1.3 Pneumatic signal,Hydraulic signal,electronic signal	discussion on working of theshort video clip	CO1
5	Introduction of Electronic transmitter	1.4 Pnemutictransmiiter	Group discussion and PPT slides	CO1
6	Transmitter	1.4.1 Smart transmitters	Group discussion	CO1
Unit 2: Principles of various Sensors(Total Classes-9)				
Class No.	**Topic**	**Subtopic (Elaborated)**	**Simple Teaching Aids/Activities**	**Course Objective**
1	Classification of sensors	2.1 Characteristics and calibration of different sensors	Chalkboard definition writing, students repeat definition	CO2
2	Working principles	2.2Displacement, Position and Motion sensors, Limit switches, Proximity sensors	Chalkboard definition writing, students repeat definition	CO2

3	Displacement sensor	2.2.1 LVDT, strain gauge, Tacho-generator,. Encoders, Hall sensors,	PPT slides	CO2
4	Light sensor	2.3 Distance sensors. Light Sensor.	Discussion & PPT slides	CO2
5	Motion sensor	2.3.1 Accelerometer, Force, Torque, Tactile sensors	Chalkboard definition writing	CO2
6	Pressure sensor	2.4 Load cells, Piezoelectric	PPT slides	CO2
7	Transducer	2.4.1 Piezoelectric transducer.	Definition	CO2
8	Principle of Piezo Resistive Type	2.5 Variable Capacitive Type	PPT slide and presentation	CO2
9	Principle of Piezo Resistive Type	2.6 Variable reluctance	Definition and presentation	CO2

Unit 3: Pressure and level measuring elements (Total Classes-08)				
Class No.	**Topic**	**Subtopic (Elaborated)**	**Simple Teaching Aids/Activities**	**Course Objective**
1	Bourden tube, Bellows	3.1 Diaphragm.	Chalkboard definition writing, students repeat definitions	CO3
2	Diaphragm	3.2Capacitance Type, Reluctance Type, Strain Gauge Type	discussion on application of gauge	CO3
3	Application of Diaphragm	3.2.1Inductive Type.	Chalkboard definition writing, students repeat definitions	CO3
4	Bellows	3.3 Electrical and Piezoelectric	Chalkboard definition writing	CO3
5	Application of Bellows	3.4 pressure transducers,	Students repeat definitions	CO3
6	McLeod gage	3.4.1 Pirani gage and Ionisation gage.	Chalkboard definition writing	CO3
7	Level sensors	3.4.2Float type, Variable resistive type, Inductive type	PPT slide and presentation	CO3
8	capacitive sensors	3.5 Capacitive type.	PPT slide	CO3
Unit 4: Flow and temperature measuring elements (Total Classes-9)				
Class No.	**Topic**	**Subtopic (Elaborated)**	**Simple Teaching Aids/Activities**	**Course Objective**
1	Flow sensors	4.1 Reynolds numbers; Types of Flow meters	Chalkboard definition writing, students repeat definitions,	CO4
2	Flow measurement	principle of flow measurement:	discussion on Economics of Power Generation	CO4
3	Differential pressure type	4.2 orifices; venturi tubes; flow tubes; flow nozzles; pitot tubes	PPT slides	CO4
4	Orifice	Rotameter, rotating disk & Rotary-vane types	PPT slide and presentation	CO4
5	Velocity meters	4.3 Turbine; Vortex shedding; Electromagnetic and Mass flow	Chalkboard definition writing, students repeat definitions	CO4
6	Flow meter	meters, Anemometer, Ultrasonic flow meter.	Chalkboard definition writing	CO4
7	Temperature	4.4 Thermocouples, Thermistor,	PPT slide and presentation	CO4
8	sensors	4.4.1 RTD	PPT Slides	CO4
9	Temp. Sensor	4.4.2 Pyrometer	Chalkboard definition	CO4

Unit 5: Actuators (Total Classes-09)				
Class No.	**Topic**	**Subtopic (Elaborated)**	**Simple Teaching Aids/Activities**	**Course Objective**
1	Definition and Example	5.1 selection; Types of Actuators;	Chalkboard definition writing, students repeat definitions,	CO5
2	Actuator	5.2 Electro-Pneumatic actuator; cylinder, rotary actuators,	discussion on working of Actuator	CO5
3	Pneumatic actuator	Mechanical actuating system:	PPT slide and presentation	CO5
4	Hydraulic actuator	5.3 Control valves: Construction; Valve coefficient or valve sizing;	Chalkboard definition writing	CO5
5	Characteristics of actuator	valve characteristics; types of valves; valve selection	PPT slide and presentation	CO5
6	Electrical actuating systems	5.4 Solid-state switches, Solenoids, Voice Coil; Electric Motors; Principle of operation	Chalkboard definition writing	CO5
7	Application of motors	5.4.1 application: D.C motors - AC motors - Single phase & 3	Chalkboard definition writing, students repeat definitions	CO5
8	Uses of motors	5.4.2 Phase Induction Motor; Synchronous Motor; Stepper motors	PPT slide and presentation	CO5
9	Types of Actuator	5.5 Piezoelectric Actuator.	Chalkboard definition writing	CO5

Md Samsuddin Ansari
Faculty signature

Signature of the HOD 12/1/22

H.O.D.
Dept. of Electrical Engg.
Govt. Polytechnic
Bolangir