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DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2026-27

INDUSTRIAL AUTOMATION & DRIVES

Course Code : EEPE301(a)	Semester : 5th
Total Periods : 45 Hours	Examination : 3 Hours
Theory Periods : 3 P/Week	Progressive Assessment: 30 Marks
Maximum Marks : 100	End Semester Examination : 70 Marks
Semester From Date : 01/07/2026	To Date : 05/11/2026
Name of the Teaching Faculty: Er. Biswajit Mallik, Sr. Lect. (ELECT)	

WEEK	PERIOD	TOPIC
1st	1st	Introduction to Industrial Automation: Need, concept, and benefits of automation.
	2nd	Types of automation systems: Fixed, Programmable, and Flexible automation.
	3rd	Overview of key industrial systems: PLC, HMI, SCADA, DCS, and Drives.
2nd	1st	PLC Fundamentals: Building blocks of PLC: CPU, memory organization, and power supply.
	2nd	Input/output modules: Discrete (Digital) and Analog I/O modules.
	3rd	Specialty I/O modules and fixed vs. modular PLC types.
3rd	1st	Redundancy in PLC modules and I/O module selection criteria.
	2nd	Interfacing input and output devices with appropriate I/O modules.
	3rd	PLC Programming and Applications: PLC I/O addressing systems.
4th	1st	Relay-type instructions (XIC, XIO, OTE, OTL, OTU).
	2nd	Timer instructions: On-Delay (TON), Off-Delay (TOF), and Retentive Timer (RTO).
	3rd	Counter instructions: Up Counter (CTU), Down Counter (CTD), and High-Speed Counters.
5th	1st	Logical instructions and Comparison instructions.
	2nd	Data handling instructions and Arithmetic instructions.
	3rd	PLC programming languages: FBD, Instruction List, Structured Text, SFC, and Ladder Logic overview.

6th	1st	Ladder logic programming: Examples using relay, timer, and counter instructions.
	2nd	Ladder logic programming: Examples using comparison, logical, and arithmetic instructions.
	3rd	PLC Application: Motor sequence control and Traffic light control.
7th	1st	PLC Application: Elevator control and Tank level control.
	2nd	PLC Application: Conveyor system and Stepper motor control.
	3rd	PLC Application: Reactor control and gate trigger circuits (R and RC circuits).
8th	1st	Electric Drives: Fundamental concepts, need for electric drives, and functional block diagram.
	2nd	Types, functions, and Four-Quadrant operation of motor drives.
	3rd	Electric Braking: Regenerative, AC, and DC rheostatic braking of DC motors during lowering and stopping.
9th	1st	Selection of motor power ratings based on duty cycles and load characteristics.
	2nd	DC Motor Drives: Single-phase and three-phase controlled DC drives.
	3rd	Dual converter controlled DC drives and Chopper controlled DC drives.
10th	1st	Closed-loop control of DC drives and routine maintenance procedures.
	2nd	Induction Motor Drives: Stator voltage control and V/f control method.
	3rd	Slip power recovery schemes and Direct Torque Control (DTC).
11th	1st	Introduction to Synchronous Motor Drives.
	2nd	Practical applications: Speed control of AC and DC motors in industries.
	3rd	SCADA Systems: Introduction to SCADA, architecture, block diagram, and benefits.
12th	1st	SCADA software tools and various editors in SCADA environments.
	2nd	Interfacing SCADA with PLC: Typical connection diagrams and architecture.
	3rd	Object Linking & Embedding for Process Control (OPC) architecture.
13th	1st	Step-by-step process of creating SCADA screens for simple industrial objects.
	2nd	Steps for linking SCADA objects (defining Tags and Items) with PLC ladder programs via OPC.
	3rd	Dynamic animations, alarm configurations, and trending in SCADA screens.
14th	1st	SCADA Applications: Traffic light monitoring and control system.
	2nd	SCADA Applications: Water distribution and treatment systems.
	3rd	SCADA Applications: Pipeline control and monitoring networks.
15th	1st	Integrated case study: PLC-SCADA-Drive integration in manufacturing line.
	2nd	System troubleshooting and maintenance of automated systems.

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01/07/26

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