

ACADEMIC LESSON PLAN OF WINTER 2026

Discipline: Electrical	Semester: 3 rd	Name of the Teaching Faculty: PREETI PRAGYAN
Subject: ELECTRIC AL CIRCUITS	No. of days/per week class allotted: 3p/week	Semester from: 01.07.2026 to 05.11.2026 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	1. Single Phase A.C Series Circuits 1.1 Generation of alternating voltage 1.2 Phasor representation of sinusoidal quantities 1.3 R, L, C circuit elements its voltage and current response
	2 nd	1.4 R-L combination of A.C series circuit 1.4.1 Impedance, reactance, impedance triangle 1.4.2 Power factor, active power, reactive power, apparent power 1.4.3 Power triangle and vector diagram
	3 rd	1.4 R-L combination of A.C series circuit 1.4.4 Resonance, Bandwidth 1.4.5 Quality factor and voltage magnification in series R-L circuit
2 nd	1 st	1.4 R-C combination of A.C series circuit 1.4.1 Impedance, reactance, impedance triangle 1.4.2 Power factor, active power, reactive power, apparent power 1.4.3 Power triangle and vector diagram
	2 nd	1.4 R-C combination of A.C series circuit 1.4.4 Resonance, Bandwidth 1.4.5 Quality factor and voltage magnification in series R-C circuit
	3 rd	1.4 R-L-C combination of A.C series circuit 1.4.1 Impedance, reactance, impedance triangle 1.4.2 Power factor, active power, reactive power, apparent power 1.4.3 Power triangle and vector diagram
3 rd	1 st	1.4 R-L-C combination of A.C series circuit 1.4.4 Resonance, Bandwidth 1.4.5 Quality factor and voltage magnification in series R-L-C circuit
	2 nd	2. Single Phase A.C Parallel Circuits 2.1 R-L parallel combination of A.C. circuits 2.1.1 Impedance, reactance, phasor diagram, impedance triangle
	3 rd	2. Single Phase A.C Parallel Circuits 2.1 R-L parallel combination of A.C. circuits 2.1.2 Power factor, active power, apparent power, reactive power, power triangle
4 th	1 st	2.1 R-C parallel combination of A.C. circuits 2.1.1 Impedance, reactance, phasor diagram, impedance triangle
	2 nd	2.1 R-C parallel combination of A.C. circuits 2.1.2 Power factor, active power, apparent power, reactive power, power triangle
	3 rd	2.1 R-L-C parallel combination of A.C. circuits 2.1.1 Impedance, reactance, phasor diagram, impedance triangle
5 th	1 st	2.1 R-L-C parallel combination of A.C. circuits 2.1.2 Power factor, active power, apparent power, reactive power, power triangle
	2 nd	2.2 Resonance in parallel R-L, R-C, R-L-C circuit
	3 rd	2.3 Bandwidth, Quality factor and voltage magnification
6 th	1 st	3. Three Phase Circuits 3.1 Phasor and complex representation of three phase supply 3.2 Phase sequence and polarity
	2 nd	3.3 Types of three-phase connections
	3 rd	3.4 Phase and line quantities in three phase star system
7 th	1 st	3.4 Phase and line quantities in three phase delta system
	2 nd	3.5 Balanced and unbalanced load (Cond.)
	3 rd	3.5 Balanced and unbalanced load

8 th	1 st	3.6 Neutral shift in unbalanced load
	2 nd	3.7 Three phase power, active, reactive and apparent power in star and delta system
	3 rd	4. Network Reduction and Principles of Circuit Analysis 4.1 Source transformation
9 th	1 st	4.2 Star/delta and delta/star transformation (Contd.)
	2 nd	4.2 Star/delta and delta/star transformation
	3 rd	4.3 Mesh Analysis
10 th	1 st	4.4 Node Analysis
	2 nd	5. Network Theorems 5.1 Superposition theorem(Contd.)
	3 rd	5.1 Superposition theorem
11 th	1 st	5.2 Thevenin's theorem (Contd.)
	2 nd	5.2 Thevenin's theorem
	3 rd	5.3 Norton's theorem (Contd.)
12 th	1 st	5.3 Norton's theorem
	2 nd	5.4 Maximum power transfer theorem (Contd.)
	3 rd	5.4 Maximum power transfer theorem
13 th	1 st	5.5 Reciprocity Theorem
	2 nd	6. Two Port Network 6.1 Open Circuit Impedance Parameters (Contd.)
	3 rd	6.1 Open Circuit Impedance Parameters (Contd.)
14 th	1 st	6.2 Short Circuit Admittance Parameters
	2 nd	6.2 Transmission Parameters
	3 rd	6.2 Hybrid Parameters
15 th	1 st	6.3 Interrelationship of Two Port Network
	2 nd	6.3 Interrelationship of Two Port Network
	3 rd	6.4 Inter Connection of Two Port Network

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COURSE OUTCOME

CO1:	Explain various characteristics of different single phase AC series, AC parallel circuits and terms related to three phase circuits.
CO2:	Solve problems using network reduction & principles of circuit analysis
CO3:	Apply Network theorems in analyzing and solving electrical circuit problems
CO4:	Describe two-port networks.

ACADEMIC LESSON PLAN OF WINTER 2026

Discipline: Electrical	Semester: 5 th	Name of the Teaching Faculty: PREETI PRAGYAN
Subject: ENERGY CONSERVATION AND AUDIT	No. of days/per week class allotted: 3p/week	Semester from: 01.07.2026 to 05.11.2026 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	I. Energy Conservation Basics Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario.
	2 nd	Energy conservation and Energy audit; concepts and difference
	3 rd	Indian Electricity Act 2001; relevant clauses of energy conservation (contd.)
2 nd	1 st	Indian Electricity Act 2001; relevant clauses of energy conservation
	2 nd	BEE and its Roles, MEDA and its Roles (contd.)
	3 rd	BEE and its Roles, MEDA and its Roles
3 rd	1 st	Star Labelling: Need and its benefits.
	2 nd	II. Energy Conservation in Electrical Machines • Need for energy conservation in induction motor and transformer. • Energy conservation techniques in induction motor by: • Improving Power quality.
	3 rd	• Motor survey • Matching motor with loading. • Minimizing the idle and redundant running of motor.
4 th	1 st	• Operating in star mode. • Rewinding of motor. • Replacement by energy efficient motor • Periodic maintenance
	2 nd	Energy conservation techniques in Transformer. • Loading sharing • Parallel operation
	3 rd	• Isolating techniques. • Replacement by energy efficient transformers. Periodic maintenance.
5 th	1 st	• Energy Conservation Equipment: Soft starters, Automatic star delta convertor
	2 nd	Variable Frequency Drives, Automatic p. f. controller (APFC)
	3 rd	Intelligent p. f. controller (IPFC)
6 th	1 st	• Energy efficient motor; significant features, advantages, applications and limitations.
	2 nd	• Energy efficient transformers, amorphous transformers; epoxy Resin cast transformer / Dry type of transformer
	3 rd	III. Energy conservation in Electrical Installation systems Aggregated Technical and commercial losses (ATC);
7 th	1 st	Power system at state, regional, national and global level.
	2 nd	Technical losses; causes and measures to reduce by. a) Controlling I ² R losses. b) Optimizing distribution voltage
	3 rd	c) Balancing phase currents d) Compensating reactive power flow Commercial losses: pilferage, causes and remedies
8 th	1 st	Energy conservation equipment: Maximum Demand Controller ,
	2 nd	kVAR Controller, Automatic Power Factor controller (APFC)
	3 rd	Energy Conservation in Lighting System a) Replacing Lamp sources. b) Using energy efficient luminaries.

9 th	1 st	c) Using light controlled gears. d) Installation of separate transformer / servo stabilizer for lighting. e) Periodic survey and adequate maintenance programs.
	2 nd	Energy Conservation techniques in fans, Electronic regulators.
	3 rd	IV. Energy conservation through Cogeneration and Tariff • Co-generation and Tariff; concept, significance for energy conservation
10 th	1 st	Co-generation • Types of cogeneration on basis of sequence of energy use (Topping cycle, Bottoming cycle) contd.
	2 nd	Types of cogeneration on basis of sequence of energy use (Topping cycle, Bottoming cycle) contd.
	3 rd	Types of cogeneration on basis of sequence of energy use (Topping cycle, Bottoming cycle)
11 th	1 st	Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration, Reciprocating engine cogeneration).contd.
	2 nd	Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration, Reciprocating engine cogeneration).contd.
	3 rd	Types of cogeneration basis of technology (Steam turbine cogeneration, Gas turbine cogeneration, Reciprocating engine cogeneration).
12 th	1 st	• Factors governing the selection of cogeneration system. • Advantages of cogeneration.
	2 nd	• Tariff: Types of tariff structure: Special tariffs; Time-off-day tariff, Peak-off-day tariff, Power factor tariff, Maximum Demand tariff, Load factor tariff.
	3 rd	• Application of tariff system to reduce energy bill.
13 th	1 st	III. Energy Audit of Electrical System • Energy audit (definition as per Energy Conservation Act)
	2 nd	• Energy audit instruments and their use. (contd.)
	3 rd	• Energy audit instruments and their use.
14 th	1 st	• Questionnaire for energy audit projects. (contd.)
	2 nd	• Questionnaire for energy audit projects.
	3 rd	• Energy flow diagram (Sankey diagram)
15 th	1 st	• Simple payback period, Energy Audit procedure (walk through audit and detailed audit). (contd.)
	2 nd	• Simple payback period, Energy Audit procedure (walk through audit and detailed audit).
	3 rd	• Energy Audit report format.

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COURSE OUTCOME

CO1:	Interpret energy conservation policies in India.
CO2:	Implement energy conservation techniques in electrical machines.
CO3:	Apply energy conservation techniques in electrical installations.
CO4:	Use Co-generation and relevant tariff for reducing losses in facilities.
CO5:	Undertake energy audit for electrical system.

ACADEMIC LESSON PLAN OF WINTER 2026

Discipline: Electrical	Semester: 5 th	Name of the Teaching Faculty: PREETI PRAGYAN
Subject: INDUSTRIAL AUTOMATION & DRIVES	No. of days/per week class allotted: 3p/week	Semester from: 01.07.2026 to 05.11.2026 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	Introduction to Industrial Automation • Automation: Need and benefits.
	2 nd	• Types of automation system: Fixed, Programmable, Flexible
	3 rd	• Different systems used for Industrial automation: PLC, HMI, SCADA, DCS, Drives (contd.)
2 nd	1 st	• Different systems used for Industrial automation: PLC, HMI, SCADA, DCS, Drives
	2 nd	PLC Fundamentals • Building blocks of PLC: CPU, Memory organization, Input- output modules (discrete and analog),
	3 rd	• Specialty I/O Modules, Power supply
3 rd	1 st	• Fixed and Modular PLC and their types, Redundancy in PLC module
	2 nd	• I/O module selection criteria
	3 rd	• Interfacing different I/O devices with appropriate I/O modules
4 th	1 st	III. PLC Programming and Applications • PLC I/O addressing
	2 nd	• PLC programming Instructions: Relay type instructions, Timer instructions: On delay, off delay, retentive
	3 rd	Counter instructions: Up, Down, High speed, Logical instructions, Comparison Instructions
5 th	1 st	Data handling Instructions, Arithmetic instructions.
	2 nd	• PLC programming language: Functional Block Diagram (FBD), Instruction List.
	3 rd	• Structured text, Sequential Function Chart (SFC), Ladder Programming.
6 th	1 st	• Simple Programming examples using ladder logic: Language based on relay, timer counter, logical, comparison, arithmetic and data handling instructions. (contd.)
	2 nd	• Simple Programming examples using ladder logic: Language based on relay, timer counter, logical, comparison, arithmetic and data handling instructions.
	3 rd	• PLC Based Applications: Motor sequence control, Traffic light control, Elevator control, Tank Level control, Conveyor system, Stepper motor control, Reactor Control Gate trigger circuits – Resistance and Resistance-Capacitance circuits.
7 th	1 st	• PLC Based Applications: Motor sequence control, Traffic light control, Elevator control, Tank Level control, Conveyor system, Stepper motor control, Reactor Control Gate trigger circuits – Resistance and Resistance-Capacitance circuits.
	2 nd	IV. Electric Drives • Fundamental Concept of Electric Drive ○ Need of Electric Drives, Functional Block diagrams of an electric drives.
	3 rd	○ Types and Functions ○ Four Quadrant Operation of Motor Drive
8 th	1 st	• Electric Braking ○ Electric Braking of DC motor during lowering of loads and stopping
	2 nd	Regenerative braking, AC and DC rheostatic braking (contd.)
	3 rd	Regenerative braking, AC and DC rheostatic braking
9 th	1 st	• Selection of motor power rating • DC Motor Drives ○ Single phase and three phases-controlled DC drives,

	2 nd	Dual converter control of DC drives
	3 rd	Chopper controlled DC drives,
10 th	1 st	Close loop control of DC drive o Maintenance procedure.
	2 nd	• Induction Motor Drives o Stator voltage control,
	3 rd	V/f controlled induction motors
11 th	1 st	Slip power recovery
	2 nd	direct torque control
	3 rd	• Introduction to Synchronous Motor Drives (contd.)
12 th	1 st	• Introduction to Synchronous Motor Drives
	2 nd	• Applications o Speed control of AC motor /DC Motor.
	3 rd	V. Supervisory Control and Data Acquisition System (SCADA) • Introduction to SCADA: o Typical SCADA architecture/block diagram, Benefits of SCADA
13 th	1 st	o Various editors of SCADA
	2 nd	• Interfacing SCADA system with PLC: o Typical connection diagram, o Object Linking & embedding for Process Control (OPC) architecture,
	3 rd	o Steps in Creating SCADA Screen for simple object,
14 th	1 st	o Steps for Linking SCADA object (defining Tags and Items) with PLC ladder program using OPC.
	2 nd	o Steps for Linking SCADA object (defining Tags and Items) with PLC ladder program using OPC.
	3 rd	o Steps for Linking SCADA object (defining Tags and Items) with PLC ladder program using OPC.
15 th	1 st	• Applications of SCADA: o Traffic light control
	2 nd	• Applications of SCADA: o water distribution
	3 rd	• Applications of SCADA: o pipeline control.

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COURSE OUTCOME

C01:	Identify different types of automation systems.
C02:	Illustrate interfacing of I/O devices with the PLC modules.
C03:	Develop ladder logic programs for simple industrial automation applications.
C04:	Select suitable motor drives, DC motors, and AC motors for various industrial and electric drive applications.
C05:	Explain the concept and architecture of SCADA systems.

ACADEMIC LESSON PLAN OF WINTER 2026

Discipline: Electrical	Semester: 3 rd	Name of the Teaching Faculty: PREETI PRAGYAN
Subject: ELECTRICAL CIRCUITS LAB(G1)	No. of days/per week class allotted: 4p/week	Semester from: 01.07.2026 to 05.11.2026 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C series circuit. Draw phasor diagram.
	2 nd	Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C series circuit. Draw phasor diagram.
2 nd	1 st	Use voltmeter, ammeter, wattmeter to determine active, reactive and apparent power consumed in given R-L-C series circuit. Draw phasor diagram.
	2 nd	Use variable frequency supply to create resonance in given series R-L-C circuit or by using variable inductor or variable capacitor.
3 rd	1 st	Use variable frequency supply to create resonance in given series R-L-C circuit or by using variable inductor or variable capacitor.
	2 nd	Use variable frequency supply to create resonance in given series R-L-C circuit or by using variable inductor or variable capacitor.
4 th	1 st	Use voltmeter, ammeter, wattmeter, p.f meter to determine current, p.f., active, reactive and apparent power for given R-L-C parallel circuit with series connection of resistor and inductor in parallel with capacitor.
	2 nd	Use voltmeter, ammeter, wattmeter, p.f meter to determine current, p.f., active, reactive and apparent power for given R-L-C parallel circuit with series connection of resistor and inductor in parallel with capacitor.
5 th	1 st	Use voltmeter, ammeter, wattmeter, p.f meter to determine current, p.f., active, reactive and apparent power for given R-L-C parallel circuit with series connection of resistor and inductor in parallel with capacitor.
	2 nd	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying mesh analysis.
6 th	1 st	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying mesh analysis.
	2 nd	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying mesh analysis.
7 th	1 st	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying node analysis.
	2 nd	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying node analysis.
8 th	1 st	Use voltmeter, ammeter to determine current through the given branch of a electric network by applying node analysis.
	2 nd	Use voltmeter, ammeter to determine current through the given branch and voltage across the given element of circuit by applying superposition theorem.
9 th	1 st	Use voltmeter, ammeter to determine current through the given branch and voltage across the given element of circuit by applying superposition theorem.
	2 nd	Use voltmeter, ammeter to determine current through the given branch and voltage across the given element of circuit by applying superposition theorem.
10 th	1 st	Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Thevenin's theorem
	2 nd	Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Thevenin's theorem
11 th	1 st	Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Thevenin's theorem
	2 nd	Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Norton's theorem
12 th	1 st	Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Norton's theorem

	2 nd	Use voltmeter, ammeter to determine equivalent circuit parameter in a given circuit by applying Norton's theorem
13 th	1 st	Using Simulink, determine A.C voltage and current response in given R, L, C circuit.
	2 nd	Using Simulink, determine A.C voltage and current response in given R, L, C circuit.
14 th	1 st	Using Simulink, determine A.C voltage and current response in given R, L, C circuit.
	2 nd	Using Simulink, create resonance in given series R-L-C circuit
15 th	1 st	Using Simulink, create resonance in given series R-L-C circuit
	2 nd	Using Simulink, create resonance in given series R-L-C circuit

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COURSE OUTCOME

CO1:	Experimentally analyze R–L–C series and parallel circuits to determine electrical parameters using measuring instruments.
CO2:	Determine branch currents in electrical networks using mesh and node analysis and assess balanced three-phase star and delta loads using measuring instruments.
CO3:	Determine circuit parameters and performance by experimentally verifying and analyzing electrical network theorems with voltmeters and ammeters.
CO4:	Apply circuit analysis methods, resonance concepts, and network theorems to model, simulate, and analyze electrical circuits using Simulink Simscape.

ACADEMIC LESSON PLAN OF WINTER 2026

Discipline: Electrical	Semester: 3 rd	Name of the Teaching Faculty: PREETI PRAGYAN
Subject: PROGRAMMI NG FOR PROBLEM SOLVING (G1&G2)	No. of days/per week class allotted: 2p/week	Semester from: 01.07.2026 to 05.11.2026 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	Basics of MATLAB Programming
2 nd	1 st	Elementary features in a vector array
3 rd	1 st	Elementary Features In Matrices
4 th	1 st	Elementary features in Eigen values and Eigen vectors
5 th	1 st	Matrix operations, matrix operators, creating matrix arrangement
6 th	1 st	Indexing array value, other operations
7 th	1 st	Mathematical operations on array, array types,
8 th	1 st	Loops and execution of control
9 th	1 st	Working with M-files, Scripts and functions
10 th	1 st	Plotting and programming output
11 th	1 st	Plotting and programming output
12 th	1 st	Plotting and programming output
13 th	1 st	Plotting and programming output
14 th	1 st	Introduction to MATLAB Simulink, Simulink libraries
15 th	1 st	Introduction to MATLAB Simulink, Simulink libraries

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COURSE OUTCOME

CO1:	Apply foundational concepts of C programming such as structure, data types, variables, constants, operators, input/output operations to develop simple and efficient programs.
CO2:	Demonstrate concept of Arrays and basic algorithms in C programming language to design, write and execute structured programs.
CO3:	Develop and implement MATLAB programs using arrays, vectors, matrices, scripts and functions to solve computational and mathematical problems.
CO4:	Use MATLAB Simulink environment to model, simulate the systems and produce graphical outputs and plots to analyze the results.

ACADEMIC LESSON PLAN OF WINTER 2026

Discipline: Electrical	Semester: 3 rd	Name of the Teaching Faculty: PREETI PRAGYAN
Subject: INDUSTRIAL AUTOMATIO N & DRIVES LABORATOR Y (G1,G2)	No. of days/per week class allotted: 4p/ week	Semester from: 01.07.2026 to 05.11.2026 No. of weeks: 15 weeks
Week	Class/week	Theory Topics
1 st	1 st	Identify various parts of the given PLC and front panel status indicators.
	2 nd	Identify various parts of the given PLC and front panel status indicators.
2 nd	1 st	Use PLC to test the START STOP logic using two inputs and one output.
	2 nd	Use PLC to test the START STOP logic using two inputs and one output.
3 rd	1 st	Develop/Execute a ladder program for the given application using following: - timer, counter, comparison, logical, arithmetic instructions
	2 nd	Develop/Execute a ladder program for the given application using following: - timer, counter, comparison, logical, arithmetic instructions
4 th	1 st	Develop/Execute a ladder program for the given application using following: - timer, counter, comparison, logical, arithmetic instructions
	2 nd	Develop/Execute a ladder program for the given application using following: - timer, counter, comparison, logical, arithmetic instructions
5 th	1 st	Use PLC to control the following devices like lamp, motor, push button switches, proximity
	2 nd	Develop / test the Ladder program for sequential control application of lamps/ DC motors.
6 th	1 st	Develop / test the Ladder program for sequential control application of lamps/ DC motors.
	2 nd	Develop ladder program for Traffic light control system.
7 th	1 st	Develop ladder program for Traffic light control system.
	2 nd	Develop ladder program for Traffic light control system.
8 th	1 st	Develop ladder program for Traffic light control system.
	2 nd	Dismantle the given DC motor to identify its different parts
9 th	1 st	Dismantle the given AC motor to identify its different parts
	2 nd	Dismantle the given AC motor to identify its different parts
10 th	1 st	Control the speed of DC Motor using armature voltage control method
	2 nd	Control the speed of DC Motor using armature voltage control method
11 th	1 st	Control the speed of DC Motor using field current control method
	2 nd	Control the speed of DC Motor using field current control method
12 th	1 st	Control the speed of three phase squirrel cage induction motor using stator voltage control
	2 nd	Control the speed of three phase squirrel cage induction motor using stator voltage control
13 th	1 st	Control the speed of the given three-phase induction motor by using constant V/f method / by varying frequency and plot the graph between speed and frequency.
	2 nd	Control the speed of the given three-phase induction motor by using constant V/f method / by varying frequency and plot the graph between speed and frequency.
14 th	1 st	Control the speed of the given three-phase induction motor by using constant V/f method / by varying frequency and plot the graph between speed and frequency.
	2 nd	Control the speed of the given three-phase induction motor by using constant V/f method / by varying frequency and plot the graph between speed and

		frequency.
15 th	1 st	Control the speed of three phase squirrel cage induction motor using stator voltage control
	2 nd	Control the speed of the given three-phase induction motor by using constant V/f method / by varying frequency and plot the graph between speed and frequency.

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COURSE OUTCOME

CO1:	Interface input and output devices with PLC modules and develop PLC ladder programs for industrial automation applications.
CO2:	Select suitable motor drives along with appropriate DC and AC motors for various electric drive applications.
CO3:	Prepare simple SCADA applications for industrial monitoring and automation systems.
CO4:	Control the speed and torque of electric motors for efficient operation in automation systems.