

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

QUESTION BANK



V SEMESTER

PEI101 – PLC & SCADA

Regulation – 2023

**Academic Year 2025 – 26
(ODD SEMESTER)**

Prepared by

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DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING

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SUBJECT : PEI101 – PLC & SCADA

SEM / YEAR: V Semester / III Year EIE

UNIT I - INTRODUCTION TO PLC & SCADA

PLC: Evolutions of PLCs – Programmable Controllers – Architecture, I/O modules – Comparative study of Industrial PLCs. SCADA: Remote terminal units- Master station - Communication architectures.

PART - A

Q.No.	Questions	BT Level	Competence
1.	Define PLC.	BTL 1	Remember
2.	Describe the features of PLC and PC.	BTL 2	Understand
3.	Point out the applications of PLC.	BTL 2	Understand
4.	Identify four tasks in addition to relay switching operations that PLCs are capable of performing.	BTL 1	Remember
5.	List four distinct advantages that PLCs offer over conventional relay-based control systems.	BTL 1	Remember
6.	The programmable controller operates in real time. What does this mean?	BTL 2	Understand
7.	State two ways in which I/O is incorporated into the PLC.	BTL 1	Remember
8.	What are the two most common types of PLC programming devices?	BTL 1	Remember
9.	Describe the features of PLC and SCADA.	BTL 2	Understand
10.	Identify the hardware elements of SCADA.	BTL 1	Remember
11.	Summarize the I/O modules in PLC.	BTL 2	Understand
12.	Give five factors affecting the memory size needed for a particular PLC installation.	BTL 2	Understand
13.	How does the processor identify the location of a specific input or output device?	BTL 2	Understand
14.	Give the communication architecture for SCADA.	BTL 2	Understand
15.	Explain the need for master station architecture in SCADA.	BTL 2	Understand
16.	How does SCADA handle issues?	BTL 2	Understand
17.	In what two ways can the loop power for current sensing input modules be supplied?	BTL 1	Remember
18.	Most PLC modules use plug-in wiring terminal strips. Why?	BTL 2	Understand
19.	What are the communication protocols used in SCADA?	BTL 1	Remember
20.	Summarize the two main functions of a SCADA system.	BTL 2	Understand
21.	List the criteria for selecting a PLC for an application.	BTL 1	Remember
22.	List any six brands of PLCs available in the market.	BTL 1	Remember
23.	List the SCADA software used in the industry.	BTL 1	Remember
24.	Summarize the differences between SCADA and HMI.	BTL 2	Understand

PART – B

1.	Demonstrate a typical PLC input/output system connection with a neat sketch.	(13)	BTL3	Apply
	(i) Illustrate the working of digital input and output modules in an RTU.	(10)	BTL3	Apply
	(ii) Demonstrate how digital counter or accumulator modules operate in an RTU.	(3)		
3.	Demonstrate the identification and role of typical parts of a PLC with a neat sketch.	(13)	BTL3	Apply

4.	(i)	Analyze the functional benefits of fixed I/O configuration in PLCs.	(7)	BTL4	Analyze
	(ii)	Analyze the flexibility offered by modular I/O configuration in PLCs.	(6)		
5.	Apply the knowledge of SCADA to outline its key components with a neat sketch.		(13)	BTL3	Apply
6.	(i)	Demonstrate the operation of analog input modules in RTUs.	(7)	BTL3	Apply
	(ii)	Demonstrate the function of analog output modules in RTUs.	(6)		
7.	Analyze the structure and functions of the input/output (I/O) section of a PLC.		(13)	BTL4	Analyze
8.	(i)	Analyze the interaction between SCADA hardware and software components.	(9)	BTL4	Analyze
	(ii)	Examine the relationship between SCADA and local area networks.	(4)		
9.	Demonstrate the basic function of a discrete AC input module in a PLC system.		(13)	BTL3	Apply
10.	Analyze the software and hardware architecture of SCADA using a neat sketch.		(13)	BTL4	Remember
11.	Analyze the different types of PLC memory design along with their I/O tables.		(13)	BTL4	Create
12.	Apply the principle of operation of discrete AC input/output modules in a PLC using suitable diagrams.		(13)	BTL3	Apply
13.	(i)	Analyze the communication architecture of SCADA including point-to-point and multipoint architectures.	(9)	BTL4	Analyze
	(ii)	Relay station architecture Analyze the role of relay station architecture in SCADA communication.	(4)		
14.	Demonstrate the structure of the master station in SCADA with a neat sketch.		(13)	BTL3	Apply
15.	Demonstrate the basic architecture of PLC using a neat block diagram.			BTL3	Apply
16.	Apply the principles of a data acquisition system to an industrial monitoring task.			BTL3	Apply
17.	Analyze the functions of SCADA and categorize its applications in various industries.			BTL3	Apply
PART-C					
1.	Evaluate the performance of internal blocks of analog input and output modules in PLC with justification.		(15)	BTL5	Evaluate
2.	Design a basic PLC system by selecting suitable hardware components and justify your choice.		(15)	BTL6	Create
3.	Develop a specification sheet for both discrete and analog I/O modules for a given industrial application.		(15)	BTL6	Create
4.	Evaluate the functional role of various components in the RTU hardware structure in SCADA with a neat diagram.		(15)	BTL5	Evaluate
5.	Evaluate various industrial PLCs and recommend the most suitable one for a specific automation task, justifying your choice.		(15)	BTL5	Evaluate

UNIT II - BASICS OF PLC PROGRAMMING (LADDER)

Basics of PLC programming – Ladder Logic – Relay type instructions – Timer/Counter instructions – Program control instructions – Data manipulation and math instructions – Programming Examples.

PART – A

Q.No	Questions	BT Level	Competence
1.	Explain the use of timers in PLC.	BTL 2	Understand
2.	Identify the symbols and state the instructions for NO contact, NC contact, and coil.	BTL 1	Remember
3.	Recognize the PLC ladder logic representation for a NAND gate.	BTL 1	Remember
4.	Identify the condition to turn ON pilot light PL2 based on the status of SS2, PB4, and LS3.	BTL 1	Remember
5.	When is the output of PLC counter energized?	BTL 2	Understand
6.	When is the output of a programmed timer energized?	BTL 2	Understand
7.	Explain the basic concept of a single-input timer circuit in PLC.	BTL 2	Understand
8.	Describe how a PLC can control a light using a counter between 23 and 31.	BTL 2	Understand
9.	Under what condition is a ladder logic rung said to have logic continuity?	BTL 1	Remember
10.	State the condition under which output D turns ON when using switches A, B, and C.	BTL 1	Remember
11.	Express high-speed instruction used in data transfer operations.	BTL 2	Understand
12.	What is involved in a data compare instructions?	BTL 2	Understand
13.	Explain why a stop button is normally closed and a start button is normally open.	BTL 2	Understand
14.	What is the use of MCR instruction?	BTL 1	Remember
15.	State the reason why retentive instructions should not be placed inside an MCR zone.	BTL 1	Remember
16.	Point out the advantages of jump instruction.	BTL 2	Understand
17.	List basic math functions that can be performed on PLCs.	BTL 1	Remember
18.	What standard format is used for PLC math instructions?	BTL 1	Remember
19.	What the jump to subroutine instruction allows the program to do?	BTL 1	Remember
20.	When are the immediate input and immediate output instructions used?	BTL 2	Understand
21.	Identify the programming method in PLC.	BTL 2	Understand
22.	List the differences between timer and counter functions in PLC.	BTL 2	Understand
23.	Write the basic logic conditions for AND and NOR gates in PLC ladder logic.	BTL 1	Remember
24.	Express the logic for the Boolean expression $Y = AB' + C'$ in simple terms.	BTL 2	Understand

PART - B

1.	Apply the following relay-type instructions in a PLC ladder logic context and explain their function:		BTL 3	Apply
	(i) Examine If Closed (XIC)	(4)		
	(ii) Examine If Open (XIO)	(4)		
	(iii) Output Energize (OTE)	(5)		
2.	Analyze the given control requirements and construct a PLC ladder diagram using timer blocks to: <ul style="list-style-type: none"> • Turn ON the motor 5 seconds after the start switch is pressed • Turn ON the lamp 5 seconds after the motor is OFF • Turn OFF the motor 3 seconds after the stop switch is pressed 	(13)	BTL 4	Analyze

3.	Apply retentive on-delay timer instructions in a sample PLC scenario and explain their behavior with an example.	(13)	BTL 3	Apply
4.	Construct the ladder logic diagram for a motor control system with start, stop, thermal overload, and status indicators.	(13)	BTL 3	Apply
5.	Implement a ladder logic diagram that toggles motor ON/OFF using a single push button.	(13)	BTL 3	Apply
6.	Analyze the sequence and design a ladder logic diagram based on the following control events: M and N turn ON/OFF with delay; fan turns ON after both are OFF.		BTL 4	Analyze
7.	Develop a ladder logic program for an automatic car parking system to indicate full (red) and available (green) status based on car count.	(13)	BTL 3	Apply
8.	A timer is to turn on a fan switch 8.6 sec after a wall switch is turned ON. If the wall switch is turned OFF during the 8.6 sec. time interval, the timer is to reset to zero seconds, so that when the wall switch is again turned ON, the delay is the full 8.6 sec. Construct the Ladder Logic Diagram.	(13)	BTL 3	Apply
9.	Apply various PLC data move functions in example scenarios and explain their usage.	(13)	BTL 3	Apply
10.	Analyze the operational differences between the MCR instruction and Retentive Timer in PLC programming.	(13)	BTL 4	Analyze
11.	Apply the Less-than Compare and Jump to Subroutine functions with suitable PLC examples.	(13)	BTL 3	Apply
12.	Apply TON, TOFF, RTO, CTU, and CTD timer/counter instructions in PLC programming with examples.	(13)	BTL 3	Apply
13.	Analyze the meaning and role of the following terms in PLC systems: Execution time, Isolation, Processing time, Dry contacts, Master Reset.	(13)	BTL 4	Analyze
14.	Apply branch instructions in PLC ladder logic with relevant examples.	(13)	BTL 3	Apply
15.	Analyze the function of an Up-Down Counter using a timing diagram.	(13)	BTL 4	Analyze
16.	Apply PLC data manipulation instructions with examples.	(13)	BTL 3	Apply
17.	Apply various program control instructions used in PLC programming.	(13)	BTL 3	Apply

PART C

1.	A conveyor is supposed to have exactly 45 parts on it. Three indicating lights used to indicate the conveyor count status: less than 45, yellow; exactly 45, green; and more than 45, red. The count of parts on the conveyor is set at 45 each morning by an actual count of parts. There are two sensors on the conveyor. One is actuated by parts entering the conveyor, and the other is actuated by parts leaving. Create a PLC program using compare functions.	(15)	BTL6	Create
2.	Evaluate the design and operation of an automatic bottle filling system including hardware layout and control logic.	(15)	BTL5	Evaluate
3.	Create a PLC ladder program for a traffic light control system that manages red, yellow, and green light sequences.	(15)	BTL 6	Create
4.	(i) Create a ladder logic diagram for liquid level control application	(10)	BTL6	Create
	(ii) How to use a PC as a PLC?	(5)	BTL5	Evaluate

5.	<p>Create a ladder logic program to convert Celsius temperature to Fahrenheit. The operation of the program can be summarized as follows:</p> <ol style="list-style-type: none"> 1. The thumbwheel switch connected to the input module indicates Celsius temperature. 2. The program is designed to convert the recorded Celsius temperature in the data table to Fahrenheit values for display. 3. The following conversion formula forms the basis for the program: $F = \left(\frac{9}{5} \times C\right) + 32$ 4. In this example, a current temperature reading of 60°C is assumed. 5. The MUL instruction multiplies the temperature (60°C) by 9 and stores the product (540) in address N7:0. 6. Next, the DIV instruction divides 5 into the 540 and stores the answer (108) in address N7:1. 7. Finally, the ADD instruction adds 32 to the value of 108 and stores the sum (140) in address O:13. 8. Thus 60°C = 140°F. 	(15)	BTL 6	Create
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UNIT III - PLC PROGRAMMING (OTHER LANGUAGES)

Functional block programming - Sequential function chart – Instruction list – Structured text programming – PLC controlled sequential Process Examples.

PART – A

Q.No	Questions	BT Level	Competence
1.	Name the four basic elements of an FBD.	BTL 1	Remember
2.	Define Add-On instruction in FBD.	BTL 1	Remember
3.	Define structured text programming.	BTL 1	Remember
4.	Explain the terms Branching and Convergence in Sequential Function Charts.	BTL 2	Understand
5.	List some structured text operators.	BTL 1	Remember
6.	Explain what is meant by instruction list.	BTL 2	Understand
7.	State difference between structured text and Ladder programming.	BTL 1	Remember
8.	Explain the purpose of the assume data available indicator.	BTL 2	Understand
9.	Describe how a function block feedback loop is created.	BTL 2	Understand
10.	Explain the purpose of Sequential function chart.	BTL 2	Understand
11.	Identify the meaning of solid and dashed lines in FBD connections.	BTL 2	Understand
12.	Draw the logic gates symbol for AND gate and NAND gate in function block diagram.	BTL 2	Understand
13.	Describe the program scan function in an FBD program.	BTL 2	Understand
14.	Compare the graphical representation of a function block diagram to that of a logic ladder diagram.	BTL 2	Understand
15.	State what the dot on a function block input/output pin represents.	BTL 1	Remember
16.	Compare the functions of input and output reference tags in FBD.	BTL 2	Understand
17.	Describe how an FBD program is initiated.	BTL 2	Understand
18.	Explain data latching as it applies to function block inputs.	BTL 2	Understand

19.	Identify which pins of a function block are inputs and which are outputs.		BTL 2	Understand
20.	Explain how input and output parameter options for a function block are set.		BTL 2	Understand
21.	Write the difference between functional block diagram and ladder logic.		BTL 1	Remember
22.	List the five standard PLC programming languages.		BTL 1	Remember
23.	Explain how PLC is used in sequential control.		BTL 2	Understand
24.	Name the three types of sequential circuits.		BTL 1	Remember
PART - B				
1.	Apply Function Block Diagram instructions by drawing a neat sketch and identifying the types of elements and boxes used in FBD programming.	(13)	BTL3	Apply
2.	Analyze the function and difference between the following Bit Logic instructions used in FBD:		BTL 4	Analyze
	(i) AND Logic Operation and OR Logic Operation	(9)		
	(ii) EXOR Logic Operation	(4)		
3.	<p>Illustrate the use of the basic logic bit instructions in FBD program for the conveyor belt application.</p> <ul style="list-style-type: none"> In this application there are two sets of start and stop pushbuttons, one at the beginning of the conveyor and one at the end of the belt. These pushbuttons (PB-1 through PB-4) are wired to input points. The two start buttons use NO contacts, and they are labeled PB-1 and PB-2. The two stop buttons use NC contacts, and they are labeled PB-2 and PB-4. The control program allows the operator to start and stop the conveyor belt from either end. There is a position detection switch (ZS-1) at the end of the conveyor to sense when a production part reaches the end of the conveyor. This input signal is used by the PLC control program to automatically stop the conveyor when a part reaches the end of the conveyor. 	(13)	BTL3	Apply
4.	(i) Write a FBD program to turn on a process pump, 2 seconds after the outlet valve on the pump has been opened by PLC output Q124.3. In this application, assume that the pump starter relay is connected to PLC output address Q124.4 and assume that internal bit B3/4 is used to stop the pump.	(7)	BTL3	Apply
	(ii) Write a FBD program to count the number of parts rejected during a production operation and activate an alarm beacon if the number of rejected parts reaches 20 parts, during any production run. Assume that the part rejection signal is connected to input I124.1, a production line running signal is given by internal bit B3/2, a counter reset pushbutton is connected to input I124.3 and the alarm beacon is connected to output Q124.4.	(6)		

10.	Write an IL program to turn off a conveyor belt on a production line after 150 parts have been produced. Assume the following: 1. Output bit Q124.3 = 0, turns off the conveyor belt; 2. Input bit I124.7 changes from 0 to 1 and then back to 0 each time a new part is produced; 3. A normally open (NO) pushbutton connected to input I124.2 is used to set the production count to150, 4. A NO pushbutton connected to input I124.3 is used to reset the counter to zero and stop the conveyor belt.	(13)	BTL3	Apply
11.	(i) Write an IL program to open a fill valve on a process tank to allow an ingredient to be added to the tank for 30 seconds. Assume that the fill valve is wired to PLC output point Q124.4 and a momentary normally open (NO) pushbutton connected to PLC input point I124.6 is used by an operator to open the fill valve. Use timer T3 and input bit I124.2 to reset the timer in the program.	(13)	BTL3	Apply
12.	Write an IL program to turn off a conveyor belt on a production line after 10 parts have been produced. Assume the following: 1. Output bit Q124.5 = 0, turns off the conveyor belt; 2. Input I124.6 changes from 0 to 1 and then back to 0 each time a production part is rejected; 3. Input I124.7 changes from 0 to 1 and then back to 0 each time a new part is produced; 4. A NO pushbutton connected to input I124.2 is used to set the production count to10; 5. A NO pushbutton connected to input I124.3 is used to reset the counter to zero and to stop the conveyor belt. Use counter number 4 in the IL program.	(13)	BTL3	Apply
13.	(i) List the basic statement types for ST program.	(6)	BT4	Analyze
	(ii) Explain conditional statements and iteration statements in Structured Text programming.	(7)		
14.	(i) Write a structured text program for the following: a tank is filled by opening valve 1, as long as level switch 1 is not triggered and the drain valve is closed. (ii) Write a structured text program to set the temperature of an enclosure by switches to the values 40, 50, 60, and 70, and switch on fan 1 when the temperature is 60 and fan 2 when it is70.	(6) (7)	BTL3	Apply
15.	Explain structured text implementation of conditional statements, iterative statements.	(13)	BTL4	Analyze
16.	Analyze the iteration statements used in structured text.	(13)	BTL4	Analyze
17.	What is sequential function chart and what are its elements? Explain with relevant sketch.	(13)	BTL4	Analyze
PART C				

1.	Write a FBD program to turn off a conveyor belt on a production line after 50 parts have been produced. Assume the following for the control program: 1. Output bit Q124.5 = 0, turns off the conveyor belt; 2. Input I124.1 is set to 1 each time a production part is rejected; 3. Input I124.2 is set to 1 each time a new part is produced; 4. A normally open (NO) pushbutton connected to input I124.6 is used to set the production count to 50, and 5. A NO pushbutton connected to input I124.7 is used to reset the counter to zero and to stop the conveyor belt.	(15)	BTL5	Evaluate
2.	Write an IL program that delays the starting of a process pump for 10 seconds to allow a valve in the discharge line of the pump to fully open. Assume that the Pump starter relay is wired to PLC output point Q124.2 and a normally open switch connected to input point I124.0 is used by an operator to start the pump.	(15)	BTL 5	Evaluate
3.	Examine how convergence is represented by an SFC with neat diagram.	(15)	BTL5	Evaluate
4.	(i) Write a FBD program to subtract the integer data in word MW20 from the integer data in word MW18 and store the result in word MW22 if the input bit I:124.0 is true. Then divide the result by 2 and store the final result in word MW24. (ii) Write a FBD program to subtract a 32-bit floating point number in word MD70 from a 32-bit floating-point number in word MD74 and store the result in word MD78 if input I124.0 is set to 1. Then divide the result by 4.5 and store the final result in word MD82.	(8) (7)	BTL 5	Evaluate
5.	Write an instruction list program for a counter to control a machine is required to direct 6 tins along one path for packaging a box and then 12 tins for packaging another box. A deflector might be controlled by a photocell sensor that gives an output every times a tin passes and also draw the functional block diagram.	(15)	BTL5	Evaluate

UNIT IV DISTRIBUTED CONTROL SYSTEM

DCS: Evolution & types – Hardware architecture – Field control station – Interfacing of conventional and smart field devices (Modbus and Profinet) with DCS Controller – Communication modules – Operator and Engineering Human interface stations – Study of any one DCS available in market.

PART - A

Q.No	Questions	BT Level	Competence
1.	Define Distributed Control System (DCS) with an example.	BTL 1	Remember
2.	What do you mean by Local Control Unit?	BTL 1	Remember
3.	Name any two popular industrial communication protocols.	BTL 1	Remember
4.	What are the different functions performed by DCS?	BTL 1	Remember
5.	What are the display hierarchy used in the DCS system?	BTL 1	Remember
6.	Write the important features incorporated in high level engineering interface.	BTL 1	Remember
7.	What is the need can be satisfied in designing an industrial grade LCU?	BTL 2	Understand
8.	Predict the function of LCU.	BTL 2	Understand
9.	Give some application of DCS.	BTL 2	Understand
10.	Give some communication protocol used in distributed control system.	BTL 2	Understand
11.	List the common approaches used in designing redundant LCU architectures.	BTL 1	Remember
12.	Identify different configurations of controllers used in industrial systems.	BTL 2	Understand
13.	State the key features of a graphic display in control systems.	BTL 1	Remember
14.	List the factors influencing communication types in DCS.	BTL 1	Remember

15.	Describe the difference between engineering and operator workstations in DCS.		BTL 2	Understand
16.	Explain the important architectural parameters considered in controller design.		BTL 2	Understand
17.	List the features incorporated in HLEI.		BTL 1	Remember
18.	Describe the basic differences among individual, centralized, and distributed control systems.		BTL 2	Understand
19.	Name common bus standards used in process industries.		BTL 1	Remember
20.	Explain the role of communication interfaces in DCS.		BTL 2	
21.	Point out the various elements in DCS.		BTL 2	Understand
22.	List the various architecture of DCS.		BTL 2	Understand
23.	List the types of redundant controllers used in Distributed Control Systems (DCS).		BTL 1	Remember
24.	Describe the differences between LLHI and HLHI in control systems.		BTL 2	Understand
PART - B				
1.	Demonstrate the hierarchy of DCS with neat diagram.	(13)	BTL 3	Apply
2.	(i) Describe the evolution of DCS.	(8)	BTL4	Analyze
	(ii) Distinguish between essential and optional requirements of an LCU.	(5)		
3.	Use diagrams to show different architectures of the local control unit (LCU).	(13)	BTL 3	Apply
4.	(i) Assess the process input output design issues in LCU.	(7)	BTL4	Analyze
	(ii) Assess the importance of local control unit in DCS.	(6)		
5.	(i) Categorize the key process interface issues encountered in DCS design.	(7)	BTL 3	Apply
	(ii) Implement suitable communication facilities used in process industries.	(6)		
6.	Illustrate the functional building blocks of an LCU with a labeled diagram.	(13)	BTL 3	Apply
7.	Compare the various features of hybrid, centralized and distributed control systems.	(13)	BTL4	Analyze
8.	Show the importance of DCS software in improving process automation.	(13)	BTL 3	Apply
9.	Investigate security design approaches and requirements for LCU.	(13)	BTL4	Analyze
10.	(i) Classify the features available in high-level operator interfaces.	(7)	BTL4	Analyze
	(ii) Differentiate between low and high level operator interfaces in terms of functionality and performance.	(6)	BTL4	Analyze
11.	Explain the functional requirements of operator interfaces in monitoring process control and process record keeping.	(13)	BTL 3	Apply
12.	Demonstrate the role of smart field devices in a DCS with neat sketches.	(13)	BTL 3	Apply
13.	Evaluate the functions of low and high-level operator interfaces in DCS.	(13)	BTL4	Analyze
14.	(i) Use the functions of each DCS block to explain its role in a control system.	(7)	BTL 3	Apply
	(ii) Outline the communication system performance requirements of LCU.	(6)		
15.	Interpret the advantages of different operator interfaces. Also explain the importance operator display used in process industry.	(13)	BTL4	Analyze
16.	Explain any one popular communication protocol used in field level.	(13)	BTL 4	Analyze
17.	Sketch and label various types of displays used in DCS systems.	(13)	BTL 3	Apply

PART C

1.	Why HART is called a Hybrid protocol? Elucidate in detail the communication layer of HART protocol.		(15)	BTL5	Evaluate
2.	(i)	Shared Communication plays critical role in DCS. Is it true? Justify.	(9)	BTL5	Evaluate
	(ii)	Asses the different architectural issues in DCS.	(6)		
3.	Develop an industrial case study of your choice and explain the role of DCS.		(15)	BTL6	Create
4.	Compose the control, analysis and optimization in thermal power plant interfaced with DCS.		(15)	BTL6	Create
5.	Evaluate the steps involved in creating a control strategy for a process in a DCS, justifying the selection of each stage in the design process.		(15)	BTL5	Evaluate

UNIT V ADVANCED TOPICS IN AUTOMATION

Introduction to Networked Control systems – Plant wide control – Internet of things – Cloud based Automation – OLE for Process Control – Safety PLC – Case studies: PLC - SCADA -DCS.

PART - A

Q.No	Questions	BT Level	Competence
1.	Define Network Control System (NCS).	BTL 1	Remember
2.	Give the scope of OPC.	BTL 2	Understand
3.	Writ any examples of NCS.	BTL 1	Remember
4.	What are the fundamental of plant wide control?	BTL 1	Remember
5.	List the basic needs and importance of IoT in industrial applications.	BTL 1	Remember
6.	Give some applications for plant wide control.	BTL 1	Remember
7.	List the features of plant wide control.	BTL 1	Remember
8.	What is needed is a common way for applications to access data from any data source like a device or a database?	BTL 2	Understand
9.	Demonstrate about the Heterogeneous Computing Environment.	BTL 2	Understand
10.	List the benefits and basic purposes of using cloud-based automation in industrial systems.	BTL 1	Remember
11.	Predict the use of local server.	BTL 2	Understand
12.	Define a remote server.	BTL 1	Remember
13.	List the features of cloud based automation.	BTL 1	Remember
14.	Explain the concept of the snowball effect.	BTL 2	Understand
15.	List the steps involved in the plant-wide control system design procedure.	BTL 1	Remember
16.	Describe the use of cloud-based automation in industrial systems.	BTL 2	Understand
17.	Name any two cloud-based automation software.	BTL 1	Remember
18.	Explain the advantages and disadvantages of IoT in simple terms.	BTL 2	Understand
19.	What is meant by plant wide control?	BTL 1	Remember
20.	What are the benefits of cloud based automation?	BTL 1	Remember
21.	List the applications of Networked Control systems.	BTL 1	Remember
22.	Explain the basic differences between traditional control theory and networked control systems.	BTL 2	Understand
23.	What are the five main types of clouds computing?	BTL 2	Understand
24.	List any two innovative applications of cloud with internet of things.	BTL 1	Remember

PART - B

1.	Analyze the framework of a networked control system and highlight its components.	(13)	BTL 4	Analyze
2.	Explain in with neat diagram of Alice networked control system	(13)	BTL 3	Apply
3.	Analyze the various design procedure for plant wide design control.	(13)	BTL 4	Analyze
4.	Apply the concept of cloud-based automation to a typical industrial application.	(13)	BTL 3	Apply
5.	Analyze the structure and flow of a Process Control Information Architecture.	(13)	BTL 4	Analyze
6.	Write short notes on layer and types of cloud.	(13)	BTL 3	Apply
7.	(i) Illustrate the working of the Internet of Things (IoT) with a labeled diagram. (ii) Summarize the various applications of IOT.	(10) (3)	BTL 3	Apply
8.	Explore and analyze recent research trends in the field of IoT.	(13)	BTL 4	Analyze
9.	(i) Analyze the role of OPC in integrating systems within heterogeneous environments.	(10)	BTL 4	Analyze

	heterogeneous computing environment. (ii)What is the need and list the benefits of OPC	(3)		
10.	With neat diagram, explain OPC Client/Server Relationship.	(13)	BTL 4	Analyze
11.	How OPC Server object provides a way to access or communicate to a set of data sources.	(13)	BTL 4	Analyze
12.	Illustrate the applications of PLC with case studies.	(13)	BTL 3	Apply
13.	Explain the basic need of SCADA with case studies.	(13)	BTL 4	Analyze
14.	Describe about the safety PLC in detail.	(13)	BTL 4	Analyze
15.	With a neat sketch, explain street lighting system using IOT.	(13)	BTL 4	Analyze
16.	Draw and explain cloud computing architecture.	(13)	BTL 3	Apply
17.	Explain in any Case Study using SCADA, PLCs and Distributed Control Systems.	(13)	BTL 4	Analyze
PART C				
1.	Assess the recent trends and various characteristics of IOT.	(15)	BTL 5	Evaluate
2.	Create the automation strategy of thermal power plant used in DCS.	(15)	BTL 5	Evaluate
3.	Explain the basic architecture of the Internet Of Things.	(15)	BTL 6	Create
4.	Create the automation strategy of water treatment plant used in DCS.	(15)	BTL 6	Create
5.	With a neat sketch, explain smart parking system using IOT.	(15)	BTL 5	Evaluate

