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Bengaluru

Mid Term Examinations - October 2026

Date: 05/10/2026 **Time:** 11:45 AM - 01:15 PM

Course Code: EEE3015 **Course Name:** Industrial Automation with PLC and SCADA

Semester: Seventh Semester **Max. Marks:** 50 **Weightage:** 50%

CO - Levels	CO1	CO2
Marks	16	74

PART A: Answer Following Questions. 10 M

Q.N.	Questions	M	CO	BT
1	Advantages: 1. Reliability: PLCs are designed to operate in harsh environments, making them highly dependable for continuous industrial use. 2. Flexibility: PLCs can be easily reprogrammed to accommodate changes in processes or production needs. 3. Ease of Maintenance: Troubleshooting and reprogramming PLCs is relatively simple, often using graphical interfaces or ladder logic. Disadvantages: 1. High Initial Cost: The upfront investment in PLC hardware and setup can be expensive, especially for smaller operations. 2. Limited Processing Power: PLCs may not be suitable for very complex tasks or intensive data processing. Specialized Skills Required: Programming and maintaining PLCs requires technical expertise, which can limit the availability of qualified personnel.	2	CO1	BT2
2	· Sourcing: A "sourcing" I/O module provides power to the field device. When a device is connected to a sourcing output, the PLC supplies the voltage or current to the device. The external device (e.g., a sensor or actuator) is connected to ground, and when the PLC output is active, it completes the circuit, causing the device to operate. · Sinking: A "sinking" I/O module works in the opposite way. It receives current from the external device. In this case, the external device is connected to the power supply, and when the PLC input is activated, it sinks current from the external device to ground, completing the circuit.	2	CO1	BT2
3	Ladder Diagram construction	2	CO1	BT3
4	An On-Delay Timer (TON) starts timing when its input condition becomes ON. After the preset time is reached, the timer output becomes ON, thereby activating the required output. Example: A motor can be programmed to start 5 seconds after a START signal is received.	2	CO2	BT2

ANSWER KEY

PTO (Please Turn Over)

5	1. Count Up (CTU): ◦ Function: Increments the count value by 1 each time the input signal turns ON. ◦ Operation: When the accumulated count reaches the preset value, the output (Q) turns ON. ◦ Use: Counting items, parts, or operations in an increasing order. 1. Count Down (CTD): ◦ Function: Decrements the count value by 1 each time the input signal turns ON. ◦ Operation: The counter output turns ON when the accumulated count reaches zero. ◦ Use: Used when counting down from a preset number (e.g., remaining parts). 1. Up/Down Counter (CTUD): ◦ Function: Can count up or down using separate input signals (one for up, one for down). ◦ Operation: Keeps track of both increasing and decreasing events within the same counter. Use: Applications requiring bidirectional counting, such as reversible motion tracking.	2	CO2	BT2

PART B : Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
6	Main PLC Programming Languages: 1. Ladder Diagram (LD): ◦ Graphical language resembling electrical relay logic. ◦ Uses symbols like contacts and coils. ◦ Easy to understand for electricians and technicians. 2. Function Block Diagram (FBD): ◦ Represents logic using interconnected function blocks. ◦ Each block performs a specific operation (e.g., AND, OR, timer). ◦ Suitable for process and analog control. 3. Structured Text (ST): ◦ High-level, text-based language similar to Pascal or C. ◦ Used for complex mathematical and data-processing tasks. 4. Instruction List (IL): *(Now deprecated)* ◦ Low-level, text-based language similar to assembly. ◦ Executes instructions step-by-step. 5. Sequential Function Chart (SFC): ◦ Represents processes as steps and transitions. ◦ Ideal for sequential or batch operations.	10	CO2	BT3
7	Ladder diagram (a) 2 marks (b) 2 marks (3) 3 marks (4) 3 marks.	10	CO1	BT2

PART C: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
8	Ladder diagram – 5 marks Gate diagram – 5 marks	10	CO2	BT3
9	Ladder diagram - 6 Marks Explanation - 4Marks	10	CO2	BT3

PART D: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
10	Development of ladder diagram	10	CO2	BT3
11	Ladder diagram 6 Marks Explanation - 4marks	10	CO2	BT2

ANSWER KEY

PART E: Answer Any 1 Following Questions. 10 M				
Q.N.	**Questions**	**M**	**CO**	**BT**
12	Development of Ladder Diagram – 6 MARKS EXPLNATION - 4 Marks	10	CO2	BT2
13	Ladder Diagram - 6 Makrs Explanation - 4 Marks	10	CO2	BT2

ANSWER KEY