22ELP423N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2025
(Fourth Semester)

Branch – **APPLIED ELECTRONICS**

PROGRAMMABLE LOGIC CONTROLLER

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What does PLC stand for? a) Process Logic Controller b) Programmable Logic Controller c) Programmed Logic Computer d) Programmable Logical Container	K1	CO1
	2	Infer which of the following is an example of an input device in a PLC system? a) Relay b) Sensor c) Actuator d) Motor	K2	CO1
2	3	Which language is commonly used for PLC programming? a) JavaScript b) Ladder Logic c) C++ d) Python	K1	CO2
	4	Show an example of a discrete input device for a PLC. a) Flow meter b) Proximity switch c) Pressure sensor d) Thermocouple	K2	CO2
3	5	In PLC, what is the function of a "timer"? a) Measure and control time intervals b) Store program data c) Convert analog signals to digital d) Control the execution speed	K1	CO3
	6	Show the type of counter in a PLC system which can be programmed to both increment and decrement? a) Up Counter b) Down Counter c) Up/Down Counter d) Universal Counter	K2	CO3
4	7	Which of the following is an example of an actuator used in temperature control? a) Thermocouple b) Pressure sensor c) Electric heater d) Proportional controller	K1	CO4
	8	In a valve sequencing system, infer what triggers the activation of subsequent valves in the sequence? a) Time delay b) Pressure changes c) Signal from the controller d) Fluid flow measurement	K2	CO4
5	9	What does SCADA stand for? a) Supervisory Control and Data Acquisition b) Standard Control and Data Analysis c) System Control and Data Analysis d) System Control and Data Acquisition	K1	CO5
	10	Show the main function of the Master Terminal Unit (MTU) in SCADA? a) Collecting data from RTUs b) Processing data from PLCs c) Displaying data on HMI screens d) Controlling field devices directly	K2	CO5

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Identify and describe the different types of input devices commonly used in PLC systems.	K3	CO1
		(OR)		
	11.b.	Interpret the various output devices are utilized in PLC-controlled systems.		
2	12.a.	List the structured text operators and explain how they are applied in iteration and conditional statements.	K4	CO2
		(OR)		
	12.b.	Define a Master Control Relay (MCR) in PLC programming. Explain its function in controlling the execution of multiple relay circuits within a program.		
3	13.a.	Describe how the retentive timer was utilized in a PLC system. Identify how does it retain its accumulated time even after a power cycle?	K3	CO3
		(OR)		
	13.b.	Build the ladder diagram to solve a sequence of operations using a combination of Up and Down Counters. What are the advantages of such a programming approach?		
4	14.a.	Inspect the importance of fault finding in automated control systems. How would you develop a fault detection and diagnostic program for a temperature control system to identify and correct potential issues in real-time?	K4	CO4
		(OR)		
	14.b.	Simplify the process of commissioning a PLC-controlled system. What steps are involved from initial setup to final system testing?		
5	15.a.	Explain the role of Remote Terminal Units (RTUs) and Master Terminal Units (MTUs) in a SCADA system.	K5	CO5
		(OR)		
	15.b.	Interpret the different types of HDLC frames used in SCADA Communication Protocol.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Draw the PLC architecture showing the main functional items and how buses link them, explain the functions of each block.	K4	CO1
2	17	Simplify the concept of a Ladder Diagram (LD) in PLC programming. Discuss its structure and how it represents electrical control circuits.	K4	CO2
3	18	Examine the process of configuring a sequencer in PLC programming. How do sequencers automate complex control tasks that involve multiple steps?	K4	CO3
4	19	Explain the key principles of designing safe systems in industrial automation. How can redundancy, interlocks, and emergency stops be implemented to ensure system safety?	K5	CO4
5	20	Explain how secure communication protocols, firewalls, encryption, and other security measures can protect SCADA systems from unauthorized access and potential attacks.	K5	CO5

Z-Z-Z END