PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 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	Show the primary function of a PLC. a) Networking b) Process automation c) Autonomous vehicle control d) Data storage and analysis	K2	CO1
2	3	Which language is commonly used for PLC programming? a) JavaScript b) Ladder Logic c) C++ d) Python	K1	CO2
	4	Infer which programming language, apart from ladder logic, is commonly used for PLCs? a) Structured Text b) Python c) C++ d) JavaScript	K2	CO2
3	5	In a 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 common use of a counter in Ladder Logic. a) To incrementally increase voltage b) To reset the PLC manually c) To track the number of cycles d) To decrease the scan time	K2	CO3
4	7	Which type of sensor is commonly used to detect the presence of an object in a PLC-controlled system? a) Pressure transducer b) Thermocouple c) Flow meter d) Proximity sensor	K1	CO4
	8	Infer that which industrial automation component is used to convert electrical energy into mechanical energy? a) Sensor b) Motor c) Generator d) Relay	K2	CO4
5	9	What does the abbreviation SCADA stand for in relation to PLC systems? a) Secure Control and Data Access b) System Control and Data Acquisition c) Supervisory Control and Digital Acquisition d) Supervisory Control and Data Acquisition	K1	CO5
	10	Relate the purpose of a PLC's HMI (Human-Machine Interface). a) Software development b) Data analysis c) User interaction with the PLC system d) Network management	K2	CO5

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.	Apply the concept of switch control to explain how the on-off operation and direction of a D.C. motor can be managed.	K3	CO1
		(OR)		
	11.b.	Apply the working principle of a photoelectric transmissive switch to explain how it detects a signal and produces the corresponding output.		
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 ON delay and OFF delay timer was utilized in a PLC system.	K3	CO3
		(OR)		
	13.b.	Build the ladder diagram to solve a sequence of operations using a combination of Up and Down Counters.		
4	14.a.	Analyze the key tasks performed during the commissioning of a PLC system and explain how they ensure the system operates as intended.	K4	CO4
		(OR)		
	14.b.	Analyze a PLC-based temperature control system and identify possible safety risks if incorrect programming is implemented.		
5	15.a.	Explain the functions of RTU and MTU in a SCADA system.	K5	CO5
		(OR)		
	15.b.	Describe the basic components and working principle of a SCADA system. Explain how data acquisition and control are performed from remote locations.		

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	Compare internal relay and battery-backed relay. Discuss their roles in maintaining program functionality.	K4	CO2
3	18	Compare pulse timers and retentive timers in terms of functionality, application, and behavior during power interruptions.	K4	CO3
4	19	Design a basic PLC program (ladder logic or functional block diagram) to control a conveyor system with start, stop, and emergency buttons. Explain the logic.	K5	CO4
5	20	Explain the High-Level Data Link Control (HDLC) protocol used in SCADA communication. Discuss its frame structure and how it ensures reliable data transfer.	K5	CO5

Z-Z-Z   END