

Time: 3 Hours	Date: 17 May 2021	Max. Marks: 50	
✓ Answer ALL the qu✓ Missing data, if any	estions. , may be suitably assumed		
1A. Write the main differ	ence between PLC and relay-based controllers.	(2.5)	

1B. Mention and elaborate on the main tasks of a PLC controller.

1C. What are the data manipulator instruction? Draw the ladder logic using a manipulator. When the momentary start push button is pressed, solenoid A is energized immediately. Solenoid B is energized 5 s later than solenoid A. Solenoid C is energized 10 s later than solenoid A. Solenoid D is energized 15 s later than solenoid A. (5)

(2.5)

2A. What are the essential parts of the ladder diagram? Elaborate with an example of PLC Programming? (2.5)

2B. Draw the ladder and gate logic for the one limit switch connected in series with a normally closed push button and control a solenoid valve. This circuit is programmed so that the output solenoid will be turned ON when the limit switch is closed, and the push button is not pushed. (2.5)

2C. Explain the wiring diagram of sourcing and sinking input module with respect to sourcing and sinking device? (5)

3A. What are the types of PLC Timer? List the advantages of PLC timers over mechanical timers. Then, develop a latch program on an output B, 20 seconds after input A has been turned ON. After A is pushed, there will be a 10-second delay until A can have any effect again. After A has been pushed three times, B will be turned OFF. (5)

3B. List out the advantages of PLC counters, and describe 'Up-Counter' using a timing diagram? (5)

4A. What is scan time? Elaborate the PLC scan cycle. (2.5)

4B. Explain with a block diagram the power section and logic section of the Input Module. (2.5)

4C. Material A and material B are collected in a tank. These materials will be mixed for a particular time, and then mixed product drained out through outlet valve for that, Draw the ladder logic for automatic mixing process shown in Fig.1. (5)



Fig.1. Automatic mixing process

- Identify the number of inputs and outputs used in the process.
- Once the main switch is 'ON,' inlet valve one is open till the level material A is sensed, and Inlet valve two is open (after the level material A'ON') till the level material B is sensed.
- The motor is on for 5 seconds to mix material A and material B.
- The outlet valve is open until the LLS sensor goes 'OFF,' and then the process has to repeat the cycle till the emergency stop switch is pressed.
- The buzzer notices the mixing (time)process

5A.	Identifv	the level	of c	communication use	ed industrial	system?	(3	3)
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5B. Illustrate the working architecture of the SCADA system. (3)

5C. The following calculation to be made when input I: 0.1/0 is true. The destination output stored in F8:20 is between 1 and 10, then the Output 0:0.2/0 (LED) to be turned ON. The mathematical operation to be implemented using PLC ladder logic for the value of y = 0.5.

$$F8:20 = 2^{y}\sqrt{2} + 10^{y} * y^{4}$$
(4)
