U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Institutional Elective **Duration: 3 hrs.**
Course Code: 19EE6OE1PS **Max Marks: 100**
Course: PLC and SCADA **Date: 07.07.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Explain the block diagram approach of a data acquisition system	*CO1*	*PO1*	**07**
	b)	Suggest a suitable block diagram to illustrate the concept of direct digital control (DDC) applied to an industrial process and justify the same.	*CO1*	*PO1*	**08**
	c)	What features of Supervisory Control and Data Acquisition system has made it quite popular in today's world.	*CO1*	*PO1*	**05**
		UNIT - II			
2	a)	Explain the basic architecture of PLC with relevant block diagram	*CO1*	*PO1*	**08**
	b)	What are the various languages adopted for programming the PLC as per IEC 61131 standards,	*CO2*	*PO2*	**05**
	c)	Propose a suitable circuit diagram for a PLC input module that supports different types of inputs, converts the inputs to digital signals, and interfaces the digital signals with the PLC.	*CO2*	*PO2*	**07**
		UNIT - III			
3	a)	Design a ladder logic circuit that will indicate when ten of product A and twelve of product B are on the conveyor belt. The circuit should only indicate when there are enough parts, and it should not indicate more than ten or twelve parts.	*CO4*	*PO3*	**07**
	b)	An oil tank takes 120 seconds to fill and is then moved to the sealing unit, during the filling process if the supply switch is turned off the process must resume once the switch is active again. Suggest a timer that can be used for the above operation and justify the timer operation with relevant timing and ladder diagram	*CO3*	*PO2*	**08**

		c)	Design a ladder logic program that will sound an alarm for 15 seconds after a machine is started. The alarm should stay on for 15 seconds, even if the input is turned off during the 15 second timing period. The machine could be coasting down. 1N004 must be opened to reset the system. Explain the operation of the ladder logic program using a timing diagram.	*CO4*	*PO3*	**05**
			OR			
	4	a)	Explain Up counter operation using ladder diagram and timing diagram	*CO2*	*PO2*	**07**
		b)	Design a ladder logic program that will control a lubricating pump to ensure that the main motor bearings are lubricated during motor coast-down. The lubricating pump should remain on for a time corresponding to coast down time (20 seconds). Explain the operation of the ladder logic program using a timing diagram.	*CO4*	*PO3*	**08**
		c)	Design the gate logic and PLC logic for a process fan that will run only when all of the following conditions are met: • Input 1 is off • Input 2 is on or input 3 is on, or both 2 and 3 are on. • Inputs 5 and 6 are both on • One or more of inputs 7, 8 or 9 is on.	*CO4*	*PO3*	**05**
			UNIT - IV			
	5	a)	An application requires to create variable preset counter values. 3 different products are run on a line. The storage rack has room for only 300 boxes of product A or 175 boxes of product B or 50 boxes of product C. Three momentary switches are used to select the desired preset depending on the product line (A, B or C) being manufactured. A reset button should be provided to reset the accumulated count to 0. A pilot lamp should indicate when the storage rack is full. Only one of the three switches will be closed at any one time. If more than one of the preset counter switches is closed, the last value is selected. Propose a suitable ladder program for the above operation.	*CO4*	*PO3*	**08**
		b)	What do you mean by program control instructions? Explain any three	*CO3*	*PO2*	**08**
		c)	Enumerate the different sequencer instructions along with their operation	*CO3*	*PO2*	**04**
			OR			
	6	a)	Explain the operation of the following instructions. i) MOV ii) MVM iii) MEQ iv) LIM	*CO3*	*PO2*	**08**
		b)	What is the advantage of using the file copy (COP) or fill file (FLL) instruction rather than the FAL instruction for the transfer of data?	*CO3*	*PO2*	**06**

		c)	Explain the operation of the following instructions 1. JSR 2. SBR 3. RET	*CO3*	*PO2*	**06**
			UNIT - V			
	7	a)	What are the different functional levels of DCS and how are they used in automation?	*CO2*	*PO1*	**10**
		b)	Explain the hierarchical database organization with a neat diagram.	*CO2*	*PO1*	**10**

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