Question Paper

Exam Date & Time: 20-Jun-2024 (02:30 PM - 05:30 PM)

Parts conveyer line

Marks: 50



MANIPAL ACADEMY OF HIGHER EDUCATION

INDUSTRIAL AUTOMATION [ICE 3252]

Duration: 180 mins.

Make up					
An	swer all the questions. Section Duration	n: 180 mii	ns		
1)	Develop a flow chart for the implementation of computer-based P+I+D controller and explain. [CO1, PO1, PO2, PO3, PO6, BL4]	(4)			
2)	Interpret the function of a data logger used in high level operator interface. [CO1, PO1, PO2, PO3, PO6, BL2]	(4)			
3)	Illustrate any four rules used to construct the ladder logic programming code with appropriate diagrams. [CO2, PO1, PO2, PO3, PO6, BL3]	(2)			
4)	Develop a program to implement the control for bottle filling station. The system operation is as follows: Master ON push button is pressed to turn ON the system. System is put in Auto mode by pressing the Auto mode push button. Conveyor starts to move. Conveyor stops if the bottle reaches the filling station. Bottle stays in filling station for 5 seconds. After 5 seconds conveyor starts to move. Bottle reaches the next station thus turning off the conveyor. Here bottle is sealed in 5 seconds. After 5 seconds conveyor starts to move. Operation continues. The master OFF push button is used to turn off the system.An emergency push button will reset the operation at any instant [CO3, PO1, PO2, PO3, PO6, BL5]	(4)			
5)	Develop a structured text and Instruction list for the dead man switch. Dead man switch consists of two push buttons (GO and STOP) and a motor. The GO button will start the motor, and the STOP button will stop it. If the STOP button was used to stop the motor, the GO button must be thrown twice to start the motor. When the motor is running, a light should be turned on. [CO2, PO1, PO2, PO3, PO6, BL3]	(4)			
6)	Identify and explain the electrical circuit used to protect PLC from surge currents. [CO1, PO1, PO2, PO3, PO6, BL4]	(2)			
7)	Develop a program to implement the process illustrated in the below Figure. An up-counter must be programmed for a batch- counting operation to sort parts automatically for quality control. The counter is installed to divert 1 part out of every 1000 for quality control or inspection purpose. The circuit operates as follows: A start/stop pushbutton station is used to turn the conveyor motor on and off. A proximity sensor counts the parts as they pass by on the conveyor. When a count of 1000 is reached, the counter's output activates the gate solenoid, diverting the part to the inspection line The gate solenoid is energized for 2 sec, which allows enough time for the part to continue to the quality control line. The gate returns to its normal position when the time period of 2 secs ends. The counter resets to 0 and continues to accumulate counts.A reset pushbutton is provided to reset the counter manually.	(4)		
	Quality control line				

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[CO3, PO1, PO2, PO3, PO6, BL5]

8)	Identify the appropriate instruction that can be used in product quality check and 2ifferentiate with other program flow control instructions. [CO3, PO1,PO2,PO6, BL4]	(3)
9)	Distinguish the LCU architectures used in Distributed Control System. [CO5, PO1, PO2, PO3, PO6, BL4]	(3)
10)	Generate LRC value for a data 11100111 11011101 00111001 10101001. At the receiver data is received as 11100111 11011101 00110011 10100011. Analyse whether the error is detected by LRC or not with justification. [CO4, PO1, PO2, PO3, PO6, BL5]	(4)
11)	Identify in which layer of OSI model schedules the start and stop of the communication activity. Explain all OSI layers. [CO3, PO1, PO2, PO3, PO6, BL4]	(3)
12)	Compare the architectures used in the evolution of industrial control technologies. [CO5, PO1, PO2, PO3, PO6, BL4]	(3)
13)	Consider a home automation system is built using PLC, several timers work together in PLC to meet the desired operation. A motor is to be run after 15 sec of delay when a particular input is given. A TON timer is used to meet the objective. When the accumulator count is 10 sec, there is a power failure. Contrast the operation of a motor with a timing diagram, if a TONR timer is used instead of a TON timer. [CO5, PO1, PO2, PO3, PO6, BL5]	(4)
14)	With the help of a block diagram explain all the communication paradigms in Fieldbus? [CO4, PO1, PO2, PO3, PO6, BL4]	(3)
15)	Defend the following statement with appropriate explanation, HART protocol can be used for analog and digital communication. [CO4, PO1, PO2, PO3, PO6, BL4]	(3)

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