Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2161709 **Date: 05/05/2017**

Subject Name: Programmable Logic Controller

Time: 10:30 AM to 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Assume necessary inputs and outputs if required**

			MARKS
Q.1		**Short Questions**	**14**
	1	What is full name of PLC?	
	2	List out the disadvantages of PLC?	
	3	What is reliability?	
	4	Compare PLC with Microcontroller.	
	5	What is meaning of sink module?	
	6	What do the abbreviations NO and NC represent when used to describe switch contacts?	
	7	What is the main advantage of the jump instruction?	
	8	Why are PLCs installed within an enclosure?	
	9	How does the inductive proximity sensor work?	
	10	How is PLC flexible?	
	11	List four I/O modules?	
	12	What is opto-coupler?	
	13	How do contactors differ from relays?	
	14	What is "Run Mode" in PLC?	
Q.2	**(a)**	Draw the block diagram of PLC.	**03**
	(b)	List four factors that enter into the length of the scan time and explain it.	**04**
	(c)	Express the following equation in ladder logic program: 1. 4 to 1 line multiplexer 2. F (a,b,c) = Σ (2,4,6,7)	**07**
		OR	
	(c)	Write a PLC ladder logic equivalent for NAND and NOR as universal gates.	**07**
Q.3	**(a)**	List preventive maintenance tasks that should be carried out on the PLC installation regularly.	**03**
	(b)	List eight different types of data files use by an SLC 500 controller.	**04**
	(c)	Design a PLC program and prepare a typical I/O connection diagram and ladder logic program for the following motor control specifications: • Three starters are to be wired so that each starter is operated from its own start/stop pushbutton station. • A master stop station is to be included that will trip out all starters when pushed. • Overload relay contacts are to be programmed so that an overload on any one of the starters will automatically drop all of the starters.	**07**
		OR	

Q.3	**(a)**	Describe the Input Module block diagram.	**03**
	(b)	Explain the various programming languages in PLC	**04**
	(c)	A pump is to be used to fill two storage tanks. The pump is manually started by the operator from a start/stop station. When the first tank is full, the control logic must be able to automatically stop flow to the first tank and direct flow to the second tank through the use of sensors and electric solenoid valves. When the second tank is full, the pump must shut down automatically. Indicator lamps are to be included to signal when each tank is full. **1.** Draw a sketch of the process. **2.** Prepare a typical PLC program for this control process.	**07**
Q.4	**(a)**	Name five pieces of information usually associated with a PLC timer instruction.	**03**
	(b)	Explain the ON-Delay timer.	**04**
	(c)	Two feeder conveyors (F1 and F2) feed a part onto one main conveyor (M). A proximity device is at the end of each feeder conveyor. The proximity device outputs are fed as pulses to counters. Each counter then shows the count of parts being put onto the main conveyor. In addition, another proximity device at the end of the conveyor in response to parts leaving and then sends the pulses to another counter. Develop a ladder program to have a single register showing the number counter of parts on the conveyor. Assume that the register is initially set the same count as the count of parts on conveyor.	**07**

OR

Q.4	**(a)**	Name the three forms of PLC counter instructions, and explain the basic operation of each.	**03**
	(b)	Set up a PLC program to obtain an output, P, in register OR0055. The output is to give a value based on two inputs, M and N. P equals the square of M plus the square root of N.	**04**
	(c)	When the lights are turned off in a building, an exit door light is to remain on for an additional 2 min, and the parking lot lights are to remain on for an additional 3 min after the door light goes out. Write a ladder program to implement this process.	**07**
Q.5	**(a)**	Describe various move instructions: BIT, BYTE, WORD DOUBLE WORD, REAL	**03**
	(b)	Explain the PID control in PLC.	**04**
	(c)	Two liner input signals of 0 to 5 volts are to be multiplied and the result put out on a linear output of 0 to 10 volts using analog modules. Trace the number if the inputs are 2.85 and 3.45 volts.	**07**

OR

Q.5	**(a)**	Describe the networking in PLC	**03**
	(b)	Explain: 1. Byte to integer conversion 2. ENI 3. Bit Operation: RS and SR 4. Read RTC	**04**
	(c)	Write the ladder logic program for stepper motor control with PLC for forward and reverse direction.	**07**

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