Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VIII.EXAMINATION – WINTER 2016

Subject Code: 182001 **Date: 22/10/2016**

Subject Name: Programmable Logic Controllers

Time: 02:30 PM to 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	List and explain various factors which are to be considered at the time of PLC purchase.	**07**
	(b)	Draw detailed architectural diagram of PLC and explain the same in details.	**07**
Q.2	**(a)**	Explain digital AC input card of PLC using suitable diagrams.	**07**
	(b)	Explain SFC programming method used for PLC programming in details with suitable example.	**07**
		OR	
	(b)	Explain Functional Block Diagram (FBD) programming method used for PLC programming in details with suitable example.	**07**
Q.3	**(a)**	List and explain various JUMP instructions used in PLC programming.	**07**
	(b)	Explain analog input card of PLC using suitable diagrams.	**07**
		OR	
Q.3	**(a)**	List and explain various number comparison instructions used in PLC programming.	**07**
	(b)	List and explain various arithmetic instructions used in PLC programming.	**07**
Q.4	**(a)**	Develop and draw PLC Functional Block Diagram (FBD) program for the following system: In a system there are three normally open (NO) push button switches SW1, SW2 and SW3 and a normally closed (NC) STOP push button are given. Three outputs Q1, Q2 and Q3 of the system are to be controlled as per following requirements. - When SW1 is pressed, Q1 will turn ON and Q3 will turn OFF. - When SW2 is pressed and if Q1 is ON, Q2 will turn ON. But if when SW2 is pressed and Q1 is OFF Q3 will turn ON. - When SW3 is pressed and if Q1 is ON, Q2 will turn OFF. - When SW3 is pressed and if Q3 is ON, Q2 will turn ON. - When a STOP pushbutton is pressed, all the outputs will turn OFF immediately.	**07**
	(b)	A flash light operation is to be controlled by PLC. When start pushbutton is pressed, the flash light will operate for total of 50 seconds in which on time is 2 seconds and off time is 3 seconds. If stop is pressed at any time flash light operation will be stopped. Design and draw PLC ladder diagram to operate this sequence correctly.	**07**
		OR	

Q.4	**(a)**	There are two machines M1 and M2. Each machine has a separate start push button. There is one master stop push button. The system can be started only by starting of M1. While the system is running, start of one motor will stop the other running motor (that means only one motor will run at a time).When master stop push button is pressed, both the motors will stop. Develop and draw PLC Functional Block Diagram (FBD) program.	**07**
	(b)	When start pushbutton is pressed, a pulse output will operate. The output will remain on for 4 seconds and off for 4 seconds. This on and off sequence will continue until stop pushbutton is pressed. Develop and draw PLC ladder diagram to operate this sequence correctly.	**07**
Q.5	**(a)**	Two feeder conveyors (F1 and F2) feed parts to main conveyor (M). At the end of both F1 and F2, proximity sensors are connected to sense parts. When start pushbutton is pressed, both F1 and F2 will turn on. F1 will turn off automatically after feeding 5 parts and F2 will turn off after feeding 10 parts. Thereafter waiting for 5 seconds, M will start automatically and will remain on for 50 seconds. If stop pushbutton is pressed in-between at any time, all feeders will stop. Develop and draw PLC ladder diagram to operate this sequence correctly.	**07**
	(b)	Explain closed loop control of a system using PLC with suitable diagrams.	**07**
		OR	
Q.5	**(a)**	A temperature control system of a liquid is to be controlled using PLC. When heater is on, temperature of the liquid will increase and when the heater is off, the liquid will get cooled naturally. If the temperature of the liquid is below 50°C, heater should turn on and when the temperature reaches 80°C, the heater should turn off. The heater should remain in off condition until temperature falls below 50°C. Design and draw PLC ladder diagram. Assume suitable temperature sensor and other interlocks.	**07**
	(b)	List various fault detection techniques in PLCs and explain any one of them in details.	**07**

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