

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– VIII (New) EXAMINATION – WINTER 2019****Subject Code: 2182001****Date: 27/11/2019****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.

		MARKS
Q.1	(a) Explain scan cycle of PLC.	03
	(b) Why isolation is needed between plant and PLC CPU? Also explain how this isolation is provided?	04
	(c) Using suitable diagram, explain single channel DC input card for PLC.	07
Q.2	(a) Design and draw PLC ladder diagram for the following Boolean Expression. $X=AB(C+D)(E+F)$ Where, X= digital output and A,B,C,D,E and F are digital inputs.	03
	(b) Give FBD programs for the following (i) Two input NOR gate (ii) Two input NAND gate	04
	(c) Write PLC Instruction List (IL) program to control following system operation: When momentary START (NO) pushbutton is pressed, and output X will turn on. If another pushbutton A (NO) is pressed momentary, another output Y will turn only if X is in ON condition. If X is not in ON condition, output Z will turn when A is pressed. Furthermore, if pushbutton C (NC) is pressed momentary, output P will turn ON if Y is on and output F will turn ON if Z is on. All the outputs will turn OFF if STOP (NC) pushbutton is pressed momentary and a LED will turn ON when the STOP is pressed. The LED will turn OFF when the START is pressed again.	07
	OR	
	(c) Write a detailed note on SFC programming of PLC with suitable programming example.	07
Q.3	(a) What is MCR in PLC programming? Explain need of MCR.	03
	(b) Explain latching relay used in PLC FBD programming.	04
	(c) Using timing diagram and programming example, explain Retentive ON Delay timer used in PLC ladder diagrams.	07
	OR	
Q.3	(a) Why latching is needed in ladder diagrams? How it is done?	03
	(b) Explain OFF delay timer instructions in PLC using timing diagram.	04
	(c) Explain various counter functions used in PLC ladder diagrams.	07
Q.4	(a) Design and draw PLC FBD for the following requirement: When input I1 is available momentarily, outputs Q1, Q2 and Q3 will turn ON and will remain in ON condition even if I1 go off. If input I2 is available, outputs Q1 and Q2 will turn OFF. If input I3 is available, outputs Q3 will turn OFF.	03

- (b) Develop and draw ladder diagram for the following system: **04**
An output X will turn ON when 10 parts are sensed at position A or when 20 parts are sensed at position B. Add system START and STOP inputs of your choice and clearly mention them.
- (c) Using suitable diagram, explain analog output module in PLC. **07**
- OR**
- Q.4** (a) Design and draw PLC ladder program for systems that will carry out the following tasks: **03**
Switch on an output A 10 seconds after pressing a pushbutton (NO) momentary and keep the output on for the duration of 20 seconds. If a stop (NC) input is given at any time, switch off the outputs if on
- (b) Design and draw PLC ladder diagram for the following: **04**
A flash light will start operating (ON time is 10 seconds and OFF time is 20 seconds) when a pushbutton A (NO) is pressed momentarily. The flash light will continue operating until a pushbutton B (NC) is pressed momentarily.
- (c) Write a detailed note on arithmetic functions in PLC. **07**
- Q.5** (a) Explain unconditional JUMP operation in PLC programming. **03**
- (b) Design and draw PLC ladder diagram for the following equation. **04**
 $X = (A + B)(C + D)$
Where, X is analog output and A, B, C, D are analog inputs.
- (c) Explain various data comparison functions in PLC. **07**
- OR**
- Q.5** (a) Develop PLC ladder diagram to multiply two numbers stored in some PLC registers. Store the result in one of the PLC registers. **03**
- (b) Using suitable diagrams, explain Jump within Jump operation in PLC ladder diagram. **04**
- (c) Write a detailed note about commissioning of PLCs. **07**
