GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2182001   **Date: 26/11/2018**

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)**	Justify the statement: 'PLC is an industrial computer.'	**03**
	(b)	Explain remote I/O module for PLC. Also state advantages of remote I/O.	**04**
	(c)	Draw block diagram of PLC. Explain all the major components of PLC in detail.	**07**
Q.2	**(a)**	Give ladder diagrams for the following logic gates. (i) Two input AND gate (ii) Two input EX-OR gate (iii) Two input NOR gate	**03**
	(b)	Give FBD program for the following Boolean expression $$Y = \overline{A}C + \overline{B}\,(A + C) + D(B + C)$$ Where A,B,C and D are digital inputs and Y is digital output	**04**
	(c)	Using suitable diagrams, explain AC input card for PLC.	**07**

OR

	(c)	Draw the external wiring diagram and give ladder program for 3-phase induction motor control in forward and reverse direction.	**07**
Q.3	**(a)**	Explain latching relay instruction used in PLC programming.	**03**
	(b)	Give instruction list (IL) program for the following system. When START push button is pressed momentarily, an output X will turn ON. If another push button is pressed momentarily while X is on, another output Y will turn ON. When STOP push button is pressed momentarily, only X will turn OFF. Y can be turned OFF by separate push button only if X is off.	**04**
	(c)	When a system is controlled by PLC, explain safe STOP and non safe STOP for the system (failsafe operation). Explain using both hardware and PLC program	**07**

OR

Q.3	**(a)**	Using suitable diagram, explain UP counter instruction in PLC.	**03**
	(b)	There are three machines. Each machine has a separate start and stop pushbuttons. Only one machine should run at a time. Develop PLC FBD to control this operation.	**04**
	(c)	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**

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Q.4 **(a)** Using timing diagram, explain retentive on delay timer instruction in PLC. **03**

(b) Develop PLC ladder diagram to multiply two numbers stored in some PLC registers. Store the result in one of the PLC registers. **04**

(c) Write a short note on distributed control system using PLC. **07**

OR

Q.4 **(a)** Using timing diagram, explain off delay timer instruction in PLC. **03**

(b) Explain conditional JUMP operation in PLC. **04**

(c) Explain various arithmetic instructions in PLC. **07**

Q.5 **(a)** Explain data MOVE function in PLC. **03**

(b) Using ladder example, explain any two number comparison instructions in PLC. **04**

(c) Explain all the factors to be taken care while commissioning a PLC. **07**

OR

Q.5 **(a)** Explain SKIP function in PLC. **03**

(b) Explain various registers in PLC. **04**

(c) When a new PLC is required to be purchased to control a large system, which specifications are to be listed for the PLC order? Explain all of them in detail. **07**

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