Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII • EXAMINATION – SUMMER • 2015**

**Subject code: 182001** **Date:15/05/2015**

**Subject Name: Programmable Logic Controllers**

**Time:10.30AM-01.00PM** **Total Marks: 70**

**Instructions:**

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

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|---|---|---|---|
| **Q.1** | **(a)** | Explain the difference between data processing computer and PLC with suitable block diagrams. | **07** |
| | **(b)** | Explain single channel AC output card using suitable diagram. | **07** |
| **Q.2** | **(a)** | Explain PULSE TIMER instruction in PLC with timing diagram and suitable example. | **07** |
| | **(b)** | Write a detailed note on FBD programming used to program PLCs. | **07** |
| | | **OR** | |
| | **(b)** | Write a detailed note on Sequential Function Chart (SFC) programming used to program PLCs with suitable example. | **07** |
| **Q.3** | **(a)** | Explain different JUMP operations in PLC ladder logic diagrams. | **07** |
| | **(b)** | List and explain different data comparisons in PLC programming. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain in details: Counters in PLC. | **07** |
| | **(b)** | Explain analog input module of PLC using suitable diagram. | **07** |
| **Q.4** | **(a)** | An output X will turn ON when push button A is pressed. Another output Y can be turn ON after 15 second by pressing another pushbutton B only if A is in ON condition. Output X can be turned OFF by a push button C only if Y is not ON. If Y is ON output X can be turned OFF only after 30 seconds by pressing push button C. Output Y will be turned OFF automatically (if running) after 20 seconds of X been turned OFF. Develop and draw PLC FBD to control the system. | **07** |
| | **(b)** | Four outputs (Q, W, E and R) will be started when a push button A is pressed. When a push button B is pressed, Q and W will be stopped. If B is pressed 20 seconds after A was pressed, then E will remain on for 5 seconds(and then will be turned OFF) after stoppage of Q and R will remain on until another push button C is pressed (only if Q is not ON) . If B is pressed 50 seconds after A was pressed, E will remain on until another push button D is pressed and R will be stopped immediately when Q is stopped. Develop and draw PLC ladder diagram to control the system. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Develop and write Instruction List (IL) program for PLC for the following:<br>(i) Two input EX-OR gate and (ii) Two input EX-NOR gate. | **07** |
| | **(b)** | In a moderate traffic light signal, when a toggle switch is ON, first Green light should remain ON for 16 seconds, then Yellow light should remain ON for 4 seconds when Green light go OFF then Red light should remain ON for 10 seconds when yellow light go OFF. This | **07** |

sequence of lights should be repeated until the toggle switch is opened. Develop and draw PLC ladder diagram to control the system.

**Q.5** **(a)** Write detailed note on : Commissioning of PLCs. **07**

**(b)** Develop and draw PLC ladder diagram for analog output X which is varied as per following equation, where A, B and C are analog inputs. **07**

$$X = \frac{A}{B} + \ln B + \sin C$$

**OR**

**Q.5** **(a)** Explain various techniques used for fault finding in PLC based systems. **07**

**(b)** Two potentiometers are connected to PLC inputs. The range of both the potentiometer output is 0 to 10 V DC. When both the potentiometer outputs are equal and more than 50%, a DC motor will be in ON condition; otherwise the motor will be in OFF condition. Furthermore if first potentiometer output is high, a GREEN lamp will be in ON condition and if second potentiometer output is high, a RED lamp will be in ON condition. Design and draw a ladder diagram to execute the sequence correctly. **07**

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