

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE – SEMESTER–VIII • EXAMINATION – WINTER • 2014****Subject Code: 182001****Date: 04-12-2014****Subject Name: Programmable Logic Controllers****Time: 02:30 pm - 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) Draw and explain detailed architecture of PLC. **07**  
 (b) Explain single channel DC output card for PLC with suitable diagram. **07**
- Q.2** (a) Explain advantages using adaption of PLC based control system. **07**  
 (b) Enlist different languages used in PLC programming and explain any one in details. **07**
- OR**
- (b) Write a detailed note about PLC I/O. **07**
- Q.3** (a) With suitable example and timing diagram, explain ON delay timer used in PLC programming. **07**  
 (b) Explain different JUMP operations using PLC ladder diagram. **07**
- OR**
- Q.3** (a) Enlist different counter instructions used in PLC programming and explain any one of them using suitable example. **07**  
 (b) Write a detailed note on 'arithmetic functions using PLC'. **07**
- Q.4** (a) The following devices/instruments are to be connected with PLC for a system control. Draw the interfacing/connection diagram showing the connection of these devices with PLC **07**  
 (i) a temperature sensor  
 (ii) a heater  
 (iii) a DC motor which is to be used in forward and reverse direction  
 (iv) a normally opened pushbutton  
 (v) a normally closed pushbutton  
 (vi) a 3-phase squirrel cage induction motor  
 (vii) a limit switch  
 (b) Convert the FBD given in figure 1 to Instruction List (IL) programming. **07**
- OR**
- Q.4** (a) A handicap door opener has a button that will open two doors. When the button is pushed (momentarily) the first door will start to open immediately, the second door will start to open 2 seconds later. The first door power will stay open for a total of 10 seconds, and the second door power will stay on for 14 seconds. Design and draw a PLC ladder diagram to execute this sequence correctly. **07**  
 (b) Convert the FBD given in figure 1 to ladder diagram. **07**
- Q.5** (a) Explain different fault finding techniques for a system which is controlled by PLC. **07**  
 (b) Design and draw a ladder diagram for the control of the following system. **07**  
 When digital input A is high and the value of analog output X is between 100 to 500, a digital output B will turn on. The value of x will vary as per following equation  

$$X = y + 2(y + y^2)$$
, where y is an analog input.

**OR**

- Q.5** (a) Explain closed loop control using PLC using suitable block diagram. **07**  
 (b) In a temperature control system, two heaters (H1 and H2) and two temperature sensors are used. Suppose reading of temperature sensor 1 is X and reading of temperature sensor 2 is Y. For  $X > \sqrt{Y^2 + 2Y} + \sin Y$ , H1 should remain in ON condition, otherwise H2 should remain in ON condition. Design a PLC ladder logic diagram for this system. **07**

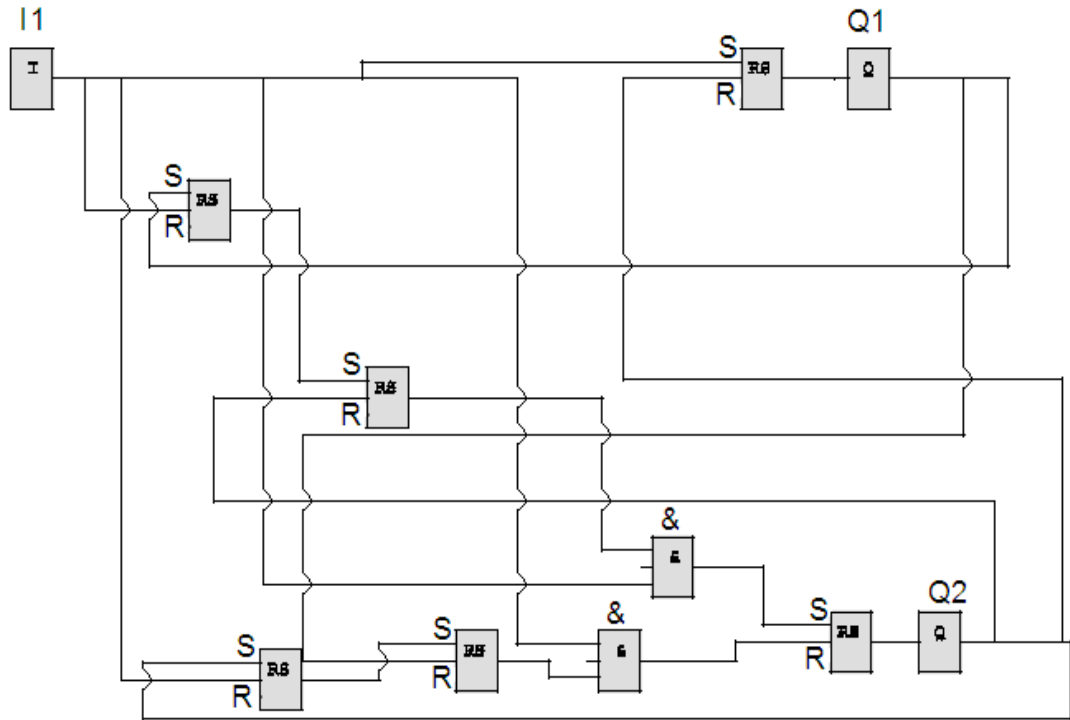


Figure 1for Q.4(b)

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