

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013****Subject code: 710305N****Date: 30-12-2013****Subject Name: Programmable Logic Controller****Time: 10.30 am – 01.00 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) Explain the advantages of PLC over relay logic panels. **07**  
(b) Explain sequencer function of PLC with the help of suitable example. **07**

- Q.2** (a) With the help of timing diagram explain TON and TOFF instruction of PLC. **07**  
(b) What is memory map? Draw PLC memory map for 2K X 2-byte memory and explain it. Show addresses in hexadecimal. **07**

**OR**

- (b) What is scan time? Explain complete PLC scan cycle with the help of suitable diagram. **07**

- Q.3** (a) Explain all possible data move instructions of PLC. **07**  
(b) Explain SKIP and MCR instruction of PLC. What are the differences between SKIP and MCR? **07**

**OR**

- Q.3** (a) Enlist various input analog devices and explain any one temperature sensing analog device. **07**  
(b) Discuss JUMP functions of PLC. **07**

- Q.4** (a) Explain arithmetic function of PLC. **07**  
(b) Explain analog operation of PLC. **07**

**OR**

- Q.4** (a) Explain the advantage of PLC matrix function over conventional coil-contact programming. Explain any one matrix function **07**  
(b) Explain number comparison functions of the PLC. **07**

- Q.5** (a) Draw schematic diagram, list the process hardware and construct ladder diagram for the following process. **07**

When the start push button is pressed, a stacker (S) starts stacking metal sheets at position A. When 15 sheets are stacked there is a pause of 2 seconds and then conveyor starts and sheet moves to position B. When stacked sheets reach at the position B, conveyor stops and paint is applied for 15.5 seconds through paint spray mechanism. After painting is complete there is a pause of 1 minute. Then again conveyor starts and transfers the metal sheets to position C from where stack is removed manually. Assume that only one stack is on conveyor at a time. Add emergency stop push button to stop the process immediately.

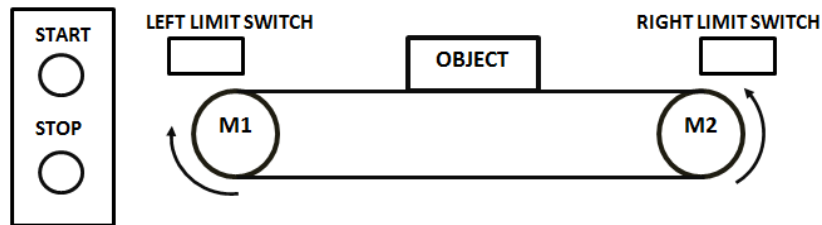
- (b) 1) Develop PLC ladder diagram to realize following Boolean function. **04**  
i.  $F = ((A'B + B) + (BC + B'C'))(A'B'C')$   
ii.  $F = (XYZ)(A+B+C) + ABZ$

2) Design a ladder diagram to find the scan time of PLC.

03

OR

- Q.5** (a) Design a ladder diagram to oscillate the object on to the conveyor belt as shown in below figure. Oscillation should start irrespective of the object position. Also show the list of inputs and outputs. 07



- (b) 1) Realize 3X8 decoder circuit using PLC ladder diagram. 04  
2) Design a ladder diagram to generate the square wave of frequency 5 Hz. 03  
Hz.

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