Seventh Semester B.E. Degree Examination, Dec.2017/Jan.2018
Programmable Logic Controllers

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Explain the internal Architecture of PLC, with a neat block diagram.   **(10 Marks)**
    b.   What are proximity switches? Explain different types of proximity switches.   **(06 Marks)**
    c.   Mention any two advantages and disadvantages of PLC.   **(04 Marks)**

2   a.   Write the Ladder diagram for following gates with 2 inputs A and B, O/P C.
         i) AND   ii) OR   iii) NOT   iv) NAND   v) NOR   vi) XOR.   **(06 Marks)**
    b.   Represent the following boolean equation using function block diagram and ladder diagram.
         i) $Q = (A \cdot B + C)\overline{D} \cdot E \cdot \overline{F}$ ii) $Y = AB + \overline{A}\,\overline{B}$ **(08 Marks)**
    c.   Write a note on the configuration of multiple outputs.   **(06 Marks)**

3   a.   Convert the given ladder diagram in Fig. Q3(a) to function block diagram and write the
         boolean expression   **(06 Marks)**
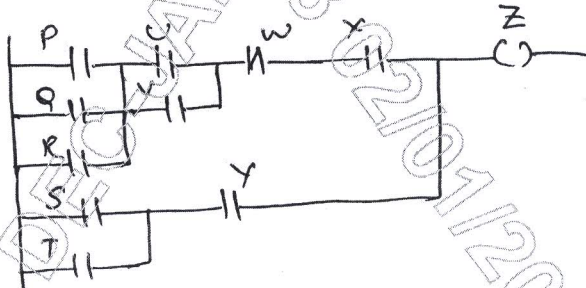

Fig Q3(a)

    b.   Write short note on iteration statement used in structured text.   **(06 Marks)**
    c.   Explain how branching and convergence is realized in sequential function chart.   **(08 Marks)**

4   a.   Write ladder diagram and instruction list needed to implement a system in which, for output
         H to be ON, Input A must be ON both inputs C and D must be off. In addition one or more
         of inputs E, F and G must be off.   **(08 Marks)**
    b.   Explain Jump with jump operation with suitable example ladder.   **(06 Marks)**
    c.   For the instruction list below, draw the corresponding ladder diagram.

         (i)   LD   X400   (ii)   LD   A
               OR   X402   AND   B
               LD   X401   LD   C
               OR   X403   ORB
               ANB
               OUT   Y430   OUT   Z
               END   END

                                                                                      (06 Marks)

PART – B

5 a. Explain the principle of operation of a master control relay with relevant ladder diagram and programming instructions. **(08 Marks)**
   b. Explain the working of battery backed relays with relevant ladder diagram. **(06 Marks)**
   c. Write short note on one-shot operation with relevant ladder diagram. **(06 Marks)**

6 a. Name and explain three different forms of timers with timing diagram. **(08 Marks)**
   b. Explain with the ladder diagram usage of Timers for flashing of light on and off as long as there is an output occurring. **(06 Marks)**
   c. Write a ladder diagram with programming instructors to switch on a light 8secs after receiving an input and keep it on for the duration of that input. **(06 Marks)**

7 a. Explain the operation of pulse timer with relevant ladder diagram. **(06 Marks)**
   b. Explain the use of counter to extend the range of timer. **(06 Marks)**
   c. Write an instruction list program and ladder diagram for a counter to control a machine which is required to direct 6 tins along one path for packaging in a box and then 12 tins for packaging in another box. A deflector plate might be controlled by a photocell sensors that gives an output every time a tin passes and also draw the ladder diagram. **(08 Marks)**

8 a. Write a ladder program that switches on a pump when the water level in a tank rises above 1.2m and switches it off when it falls below 1.0m. Explain the data comparison unit used. **(08 Marks)**
   b. Explain the implementation of closed loop control system using PLC's. **(06 Marks)**
   c. Explain with ladder diagram and the sequence signals of a 4-bit shift register. **(06 Marks)**

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