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06EE834

Eighth Semester B.E. Degree Examination, May/June 2010
Programmable Logic Controllers

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain internal architecture of PLC, with a neat block diagram. **(08 Marks)**

b. Write a note on remote input output connection to PLC. **(05 Marks)**

c. Explain principles of operation of encoder and motor. **(07 Marks)**

2 a. Write ladder diagrams for the following logic functions: **(08 Marks)**
i) AND ii) OR iii) NAND iv) NOR

b. Represent the following Boolean equation using functional block diagram and ladder diagram: **(06 Marks)**

$$(A \cdot B + C) \cdot \overline{D} \cdot E \cdot \overline{F} = Q$$

c. Convert given PLC ladder diagram, Fig.Q2(c), to gate diagram and write Boolean equation for the same. **(06 Marks)**

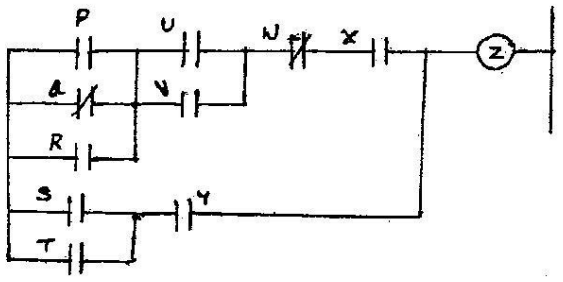

Fig.Q2(c)

3 a. Discuss location of stop and emergency stop switches in a safe system. **(06 Marks)**

b. Write ladder diagram and instruction list needed to implement a system in which for output H to be on, input A must be on and both inputs C and D must be off. In addition, one or more of inputs E, F and G must be off. **(08 Marks)**

c. Explain iteration statements used in structured text. **(06 Marks)**

4 a. Illustrate a process requiring subroutine. Draw the required ladder logic diagram. **(06 Marks)**

b. Explain how branching and convergence is realized using sequential function chart. **(08 Marks)**

c. Write a sequential function chart and ladder diagram to describe a valve which is to be operated to lift a load when a pump is running and either the lift switch is operated or a switch is operated indicating that the load has not already been lifted. **(06 Marks)**

PART – B

5 a. Explain the basic operating principle of internal relay. **(05 Marks)**

b. Device a ladder diagram which can be used to maintain an output on, even when the input ceases and when there is power failure. Explain the type of relay used. **(07 Marks)**

c. Explain the principle of operation of a master control relay with relevant ladder diagram and program instructions. **(08 Marks)**

6 a. Name and explain three different forms of timers with timing diagrams. **(08 Marks)**

b. Write a ladder diagram with program instructions to switch on a light 8 secs after receiving an input and keep it on for the duration of that input. **(06 Marks)**

c. Explain use of counter to extend the range of timer. **(06 Marks)**

7 a. Explain basic counter program with the help of ladder diagram and program instructions. **(06 Marks)**

b. Device a ladder program for a system that gives an output when the number of people in a store reaches 100, there continually being people entering and leaving the store. **(06 Marks)**

c. Explain how 4 bit shift register is represented in ladder diagram. Write the required program instructions. **(08 Marks)**

8 a. Write a ladder program for a system that switches on a pump when the water level in a tank rises above 1.2 m and switches it off when it falls below 1.0 m. Explain the data comparison unit used. **(06 Marks)**

b. Write a ladder diagram with instruction list for a production line problem involving a conveyor being used to transport bottles to a packaging unit, the items being loaded onto the conveyor, checked to ensure they are full, capped and then 4 of bottles packed in a container.

The required control actions are:

If a bottle is not full, the conveyor is stopped. Activation of the capping machine when a bottle is at the required position, the conveyor being stopped during this time, count four bottles and activate the packing machine, the conveyor being stopped if another bottle comes to the packing point at that time, sound an alarm when the conveyor is stopped.

(14 Marks)

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