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10EE752

Seventh Semester B.E. Degree Examination, June/July 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. (08 Marks)
- b. Explain the IEEE488 bus structure used in parallel communication. (06 Marks)
- c. Explain the relay, transistor and TRIAC types of PLC output channels. (06 Marks)

- 2 a. Explain the latch ladder diagram with the help of an example. (06 Marks)
- b. Draw a ladder logic diagram with the following condition :
 - i) When start push button is pressed Red and Green lights are ON.
 - ii) When push button is released green light goes off but Red light remains ON. (06 Marks)
- c. Convert the given PLC diagram in Fig. Q2(c) to gate diagram, write the Boolean equation for the same. Also give the functional block diagram. (08 Marks)

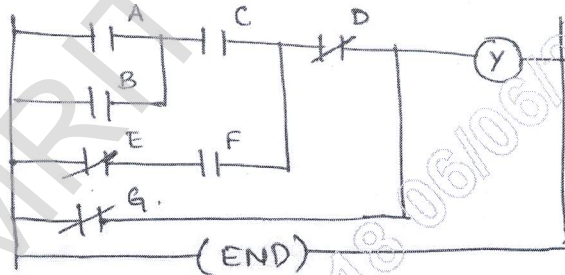


Fig.Q2(c)

- 3 a. Write a sequential function chart program for following the operation of a start switch, after which a tank is filled by opening valve 1 until a level switch 1 is triggered, then the tank is drained by opening drain valve 2 until level switch 2 is triggered, then the sequence is repeated. (06 Marks)
- b. Write a structured text program to set the temperature of an enclosure by switches to the values 40, 50, 60 and 70 and switch on fan 1 when the temperature is 60 and fan 2 when it is 70. (04 Marks)
- c. Explain the iteration statement used in structured text. (10 Marks)

- 4 a. Illustrate a process of requiring subroutine. Draw the required ladder logic diagram. (06 Marks)
- b. Write an instruction list 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. (08 Marks)
- c. Write the instruction list and ladder diagram for the following functions :
 - i) NOR
 - ii) XOR
 - iii) XNOR. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8=50, will be treated as malpractice.

PART - B

- 5 a. Explain the basic operating principle of internal relay. (06 Marks)
 b. Explain the working of master control relay with necessary ladder diagram and instruction list. (08 Marks)
 c. Explain response time in internal relay and Battery – Backed relays. (06 Marks)
- 6 a. Explain the three different forms of timers with timing diagram. (10 Marks)
 b. Draw a ladder diagram for a 3–motor system having the following conditions :
 Motor1(M1) starts as soon as the start switch is on, after 10 seconds, M1 goes off and M2 starts. After 5 seconds, M2 goes off and M3 comes on. After 10 seconds, M3 goes off and M2 comes on; and after 5 seconds, M2 goes off and M1 comes on, and the cycle is repeated. (10 Marks)
- 7 a. Explain the basic counter program with the help of ladder diagram and program instruction and wave forms. (10 Marks)
 b. Draw a ladder diagram for a box packaging system having the following conditions five boxes are stacked at a time and then bound with a wrapper. The i/p and o/p are as follows,
 i) Box present signal = I : 0/1
 ii) Wrapper machine relay = O : 0/1. (05 Marks)
 c. What is a sequence? Explain. (05 Marks)
- 8 a. Devise ladder programs for systems that will carry out the following tasks :
 i) Switch on a heater when the temperature is less than the set temperature
 ii) Turn on a lamp when a data source is not giving 100. (08 Marks)
 b. Consider a production – line problem involving a conveyor being used to transport bottles to a packaging unit, with the items being loaded onto the conveyor, checked to ensure they are full and capped and then the correct number of bottles (four) beings packed in a container. The required control actions are thus : If a bottle is not full, the conveyor is stopped; the capping machine is activated when a bottle is at the required position, the conveyor being stopped during this time, count four bottles and activate the packaging machine, with the conveyor stopped if another bottle comes to the packaging point at that time; and sound an alarm when the conveyor is stopped. (12 Marks)

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