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**Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019**  
**Programmable Logic Controllers**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1
  - a. What are the advantages and disadvantages of PLC? (06 Marks)
  - b. Explain the working principle of directional control valves. (08 Marks)
  - c. Explain with relevant diagrams, three basic forms of Networks which is used in automation. (06 Marks)
  
- 2
  - a. Explain the conventions to be followed while drawing the ladder diagram. (08 Marks)
  - b. Express half subtractor using ladder diagram and functional block diagram. (06 Marks)
  - c. Develop a functional block diagram and ladder diagram for an application in which a pump is required to be activated and pump liquid into a tank when the start switch is closed, the level of liquid in the tank is below the required level and there is liquid in the reservoir from which it is to be pumped. (06 Marks)
  
- 3
  - a. Explain how branching and convergence is represented by an sequential functional chart. (06 Marks)
  - b. Draw the logic diagram, ladder diagram and instruction list (IL) programming for the following logic functions:
    - i) XOR      ii) NOR      iii) NAND      iv) TWO BRANCHED AND Gates. (08 Marks)
  - c. Draw the equivalent ladder diagram for the instructions shown below:
 

i) LDI X400	ii) LD X400
AND X401	OUT Y430
LDI X402	LD X401
ORB	ANI Y430
OUT Y430	OUT Y431
LD X403	LD X402
AND Y430	ORI Y431
LDI X404	LD X403
ORB	AND
OUT Y431	OUT Y432

 (06 Marks)
  
- 4
  - a. Explain with example, the conditional and iterative statements used in structured text programming language. (06 Marks)
  - b. Develop a ladder diagram and instruction list program for the following applications:
    - i) Output 'D' to be on when pushbutton 'A' is on, or either 'B' or 'C' on.
    - ii) Car engine will not starts only when the car door is open, the seat belt is not done up and the ignition power must not be applied (key). (08 Marks)
  - c. Implement the operation of 4:1 multiplexer using ladder diagram. (06 Marks)

**PART – B**

- 5 a. Explain how internal relays are represented in PLC. Discuss the resetting of latch circuit with internal relay. (08 Marks)
- b. Explain the principle of operation of master control relay. (06 Marks)
- c. Explain the working of battery backed relays. (06 Marks)
- 6 a. Explain three different forms of timers with timing diagram and how cascaded timers are used to produce a delay 1099 sec. (08 Marks)
- b. Explain with ladder diagram the usage of timer for flashing the lights on and off as long as there is an output occurring. (06 Marks)
- c. Write a note on drum sequencer and PLC sequencer. (06 Marks)
- 7 a. Write a note on up-down counting with necessary ladder diagram. (06 Marks)
- b. Explain with ladder diagram and timing diagram the operation of pulse timer that switches an output on for a predetermined time after the input ceases. (06 Marks)
- c. Explain with neat ladder diagram and instruction list how a machine to be controlled to direct 6-tins along one path for packing in a box and then 12 tins along another path for packing in another box. A deflector plate may be controlled by a photocell sensor that gives an output every time a tin passes it. (08 Marks)
- 8 a. Explain 4-bit shift register with neat ladder diagram and instruction list programming. (08 Marks)
- b. Explain the implementation of closed loop control system using PLC's. (06 Marks)
- c. Explain data comparison and arithmetic operations in PLC. (06 Marks)

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