VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
M.E. (EEE: CBCS) II-Semester Make Up Examinations, September-2017
(Power Systems & Power Electronics)
Programmable Logic Controllers and their Applications

Time: 3 hours

Max. Marks: **70**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from Part-B*

Part-A (10 × 2 = 20 Marks)

1. What is an Opto-isolator?

2. Sate the difference between Sink and Source devices.

3. Show PLC logic for Start-stop jog circuit.

4. What is the function of LSDD (Drill Down Limit Switch) in drill press operation?

5. Draw PLC Ladder Logic for the Boolean expression: $[(P+Q'+R).(U+V).W'.X]+(S+T).Y=Z$

6. Explain the function of Holding Register in PLC CPU.

7. What is a ONE SHOT operation?

8. State the difference in function of SKIP and MCR functions.

9. Explain (MSR) Multiple Shift Right function.

10. Explain the two types of PLC Analog Modules.

Part-B (5 × 10 = 50 Marks)

11. a) Mention 3 advantages and 3 disadvantages of a PLC over Relay logic circuits. [5]

    b) Explain the working of different blocks of PLC layout with connection diagram. [5]

12. a) There are two machines, each with its own start-stop buttons. Only one may run at a time. Construct a circuit / PLC ladder with appropriate interlocking. [4]

    b) Explain the Industrial process application of a Spray Process system with its layout diagram, algorithm and PLC ladder diagram. Show a tabular form listing the inputs and outputs used. [6]

13. a) Write a PLC ladder for the program: E and F are turned ON by a switch. When the switch is turned off, E goes OFF immediately. F remains ON for another 7 seconds and then goes OFF. [6]

    b) Explain the working, with a neat block diagram of the format for PLC Arithmetic functions: ADD, SUBTRACT, DIVIDE and SQUAREROOT. [4]

14. a) Describe the following Data Handling functions: FIFO, FAL, ONS and SWEEP. [4]

    b) Explain the control, working and PLC Ladder for a Basic Two Axis Robot with PLC Sequence control. [6]

15. a) Show PLC Ladder for analog PID operation explaining BCD in / Discrete out. The input is a BCD thumbwheel that counts up to 9999. If the input is 3750 or above, output 6 is to go ON. If the input is between 6200 and 8542, output 7 is to go ON. [5]

    b) Explain different methods of PID tuning. Also show the format of typical PID function block in PLC. [5]

16. a) Explain the working of PLC input module layout with a neat block diagram. [5]

    b) Construct a PLC Ladder for a process fan to run only when all the following conditions [5]
    are met:
    - input 1 is OFF.
    - input 2 is ON or input 3 is ON, or both 2 and 3 are ON.
    - inputs 5 and 6 both are ON.
    - one or more of inputs 7, 8 or 9 is ON.

17. Develop a PLC Ladder diagram for any *two* of the following logics:

    a) An output is to be ON if the count is between 34 and 41, the count includes 31 and 41. [5]

    b) A main conveyor has two conveyors feeding it. One feeder puts 6 packs on the main [5]
    conveyor, the other feeds 8 packs. Both feeder conveyors have counters that count the
    number of packs leaving them. Design a program to give a total count on the main
    conveyor.

    c) Two lights are to flash alternately one for 5 seconds and one for 8 seconds. [5]

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