

2053
B.E. (Electrical and Electronics Engineering)
Sixth Semester
PE-EE-603: Programmable Logic Controllers

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

Q 1)

- List six distinct advantages that PLCs offer over conventional relay based control systems.
- What is the difference between open and proprietary PLC architecture?
- List the criteria by which PLCs are categorized.
- State four pieces of information usually associated with a PLC counter instruction.
- What is a seal-in circuit?

(5x2)

Section A

Q 2)

- Why is isolation required while connecting input or output devices to the PLC? Explain with suitable diagram how I/O devices can be isolated from PLC. (5)
- It is required to have a pilot light come on when all of the following circuit requirements are met:
All 4 circuit pressure switches must be closed.
At least 2 out of 3 circuit limit switches must be closed.
The reset switch must not be closed.
Using AND, OR, and NOT gates, design a logic circuit that will solve this problem. (5)

Q 3)

- Draw and explain the connection diagram and ladder program for motor control in forward and reverse direction with interlocking. (5)
- Design a PLC program and prepare a typical I/O connection diagram and ladder logic program for the following motor control specifications:
 - A motor must be started and stopped from any one of three start/stop pushbutton stations.
 - Each start/stop station contains one NO start pushbutton and one NC stop pushbutton.
 - Motor OL contacts are to be hardwired.

(5)

Q 4)

- Draw ladder logic and gate logic for the following condition:
A motor control circuit has two start/stop buttons. When either start button is pressed, the motor runs. Either stop button stops the motor when it is pressed. (5)

P.T.O.

(2)

b) Design a PLC program and prepare a typical I/O connection diagram and ladder logic program for the following motor control specifications:

- Three starters are to be wired so that each starter is operated from its own start/stop pushbutton station.
- A master stop station is to be included that will trip out all starters when pushed.
- Overload relay contacts are to be programmed so that an overload on any one of the starters will automatically drop all of the starters.
- All pushbuttons are to be wired using one set of NO contacts.

(5)

Section B

Q 5)

- Draw and explain the architecture of SCADA. (5)
- Write a program that will increment a counter's accumulated value 1 count every 60 s. A second counter's accumulated value will increment 1 count every time the first counter's accumulated value reaches 60. The first counter will reset when its accumulated value reaches 60, and the second counter will reset when its accumulated value reaches 12. (5)

Q 6)

- Design a process to remove 5 out of every 10 containers from a conveyor line using a solenoid. In what way would the operation of the program be affected if the output solenoid coil failed to open? (5)
- Write a program to indicate how many bottles pass a given process point per minute. (5)

Q 7)

- Write a program to operate a light according to the following sequence: • A momentary pushbutton is pressed to start the sequence. • The light is switched on and remains on for 2 s. • The light is then switched off and remains off for 2 s. • A counter is incremented by 1 after this sequence. • The sequence then repeats for a total of 4 counts. • After the fourth count, the sequence will stop and the counter will be reset to zero. (5)

- What is DCS. How does it differ from SCADA. Discuss the various levels of DCS. (5)