2062

B.E. (Electrical and Electronics Engineering)
Sixth Semester
EE-611: Programmable Logic Controller and Distributed Control System

Time allowed: 3 Hours

Max. Marks: 50

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

x-x-x

Q 1)   (5x2)

a) State four pieces of information usually associated with a PLC counter instruction.
b) List out the different types of PLC programming languages.
c) List different network topology used for DCS.
d) Define Scan type of PLC.
e) What is a seal-in circuit?.

Section A

Q 2)

a) Explain in detail the factors responsible for difficulties encountered in implementation of process control.   (5)
b) 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)

a) Compare discrete and analog I/O modules with respect to the type of input or output devices with which they can be used.   (5)

b) 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)

a) Draw and explain the connection diagram and ladder program for a motor control in forward and reverse direction with interlocking.   (5)
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.

P.T.O.

- 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)

a) Draw and explain the hierarchy of DCS.

(5)

b) 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)

a) Two part conveyor lines, A and B, feed a main conveyor line M. A third conveyor line, R, removes rejected parts a short distance away from the main conveyor. Conveyors A, B, and R have parts counters connected to them. Construct a PLC program to obtain the total parts output of main conveyor M.

(5)

b) There are three machines, each with its own start stop buttons. Only one may run at a time. Construct a ladder diagram with appropriate interlocking.

(5)

Q 7)

a) 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)

b) Differentiate between data logging and data acquisition.

(5)

x--x-x