

2023

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. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

I. Attempt the following:-

- a) What is the difference between a unipolar and bipolar analog input module.
- b) Explain sourcing and sinking in PLC with appropriate diagrams.
- c) What is the memory capacity expressed in bits, for a PLC that uses 16-bit words and has an 8K word capacity?
- d) List 5 factors affecting the memory size needed for a PLC installation.
- e) Create a five digit code using SLC 500 rack/slot based addressing format for each of the following: (i) A pushbutton connected to terminal 5 of module group 2 located on rack 1. (ii) A lamp connected to terminal 3 of module group 0 located on rack 2. (5x2)

UNIT - I

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

- a) A motor must be started and stopped from any one of three start/stop pushbutton stations.
- b) Each start/stop station contains one NO start pushbutton and one NC stop pushbutton.
- c) Motor OL contacts are to be hardwired. (10)

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

- a) Three starters are to be wired so that each starter is operated from its own start/stop pushbutton station.
- b) A master stop station is to be included that will trip out all starters when pushed.
- c) Overload relay contacts are to be programmed so that an overload on any one of the starters will automatically drop all of the starters.
- d) All pushbuttons are to be wired using one set of NO contacts. (10)

P.T.O.

(2)

- IV. Write the Boolean expression and draw the gate logic diagram for a control system wherein a fan is to run only when all of the following conditions are met:
- Input A is OFF
 - Input B is ON or input C is ON, or both B and C are ON
 - Inputs D and E are both ON
 - One or more of inputs F, G, or H are ON
- (10)

UNIT - II

- V. a) Explain network topology of DCS.
b) Describe the functions of each level of DCS. (2x5)
- VI. a) Draw ladder diagram for the following process
A machine M is to be turned On either when count A goes upto 11 or when count B goes upto 16. One stop button or switch resets the entire process.
b) How can we give a delay of 1 hour to start of a counting process? Explain with appropriate diagrams. (2x5)
- VII. a) 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.
b) Design a ladder logic for a process such that after a count of 20 from a sensor, a paint spray is to run for 30 seconds. (2x5)