

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
B.Tech. Winter 2022 - 23 Examination

Semester: 7
Subject Code: 203106448
Subject Name: Industrial Automation

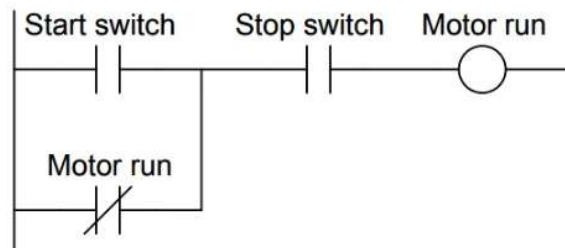
Date: 11/10/2022
Time: 10:30 am to 01:00 pm
Total Marks: 60

Instructions:

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (Fill in the blanks, one word answer, MCQ-not more than Five in case (15) of MCQ) (All are compulsory) (Each of one mark)

1. Ladder logic programming consists primarily of:
 - A. Virtual relay contacts and coils
 - B. Function blocks with connecting lines
 - C. Text-based code
 - D. Hieroglyphics
2. In a PLC, the scan time refers to the amount of time in which
 - A. the technician enters the program
 - B. timers and counters are indexed by
 - C. the entire program takes to execute
 - D. transmitted data communications must finish
3. In PLC programming, a retentive function is one that:
 - A. Defaults to the "on" state
 - B. Comes last in the program
 - C. Cannot be edited or deleted
 - D. Is not reset after a power cycle
4. An OR function implemented in ladder logic uses:
 - A. Normally-closed contacts in series
 - B. Normally-open contacts in series
 - C. Normally-open contacts in parallel
 - D. Normally-closed contacts in parallel
5. Identify the problem in this motor control PLC program:



- A. Start switch
 - B. Stop switch
 - C. Motor run
 - D. Coil
6. HMI means Machine Interface
 7. In ladder programming output can be used only in
 8. In ladder programming input address cannot be used as an output address but output address can be used as
 9. PLC operates on the signals.
 10. PLC are the devices that were invented basically to replace
 11. HMI is a user interface or dashboard connect a person to
 12. What is RTU in SCADA system?
 13. When we use push button for start then what is required to continues run motor even after releasing the push button?
 14. Which counter is called as bidirectional counter?

15. M0.0 is a memory area within PLC input then I0.0 is which input?

Q.2 Answer the following questions. (Attempt any three) (15)

A) What is SCADA? Give advantage and disadvantage of SCADA system.

B) Draw the ladder diagram for Motor Starter based on the following condition:

(a) Start and Stop push button for control motor running condition

(b) Motor has over current protection relay to stop motor automatically when signal coming from contactors

(c) Motor has limit switch to prevent motor from starting and can also stop the running motor

C) Give the difference between HMI and SCADA system.

D) Design the ladder logic for controlling the running state of the single phase motor by pressing START and STOP pushbuttons. We also have to check if the motor is running normally by pressing TEST pushbutton?

Q.3 A) Discuss on-delay timer, off-delay timer and retentive on-delay timer. Also, draw a ladder diagram for the application used in the industry based on the mentioned timer. (07)

B) Draw the ladder diagram for the automatic bottle filling system based on the following conditions: (08)

(a) Conveyer belt continues to move when there is no bottle

(b) When the bottle is sensed by the proximity sensor conveyer belt stop moving and the filler or solenoid valve will open for 5 seconds and fill the bottle

(c) After filling this bottle for 5 seconds filler will off and the conveyer start again until the next bottle or object is sensed by the proximity sensor

(d) The above process should continue for 3 bottles

OR

B) Give a comparison between the relay system and the PLC system. Also, discuss the advantage of PLC over the relay system. (08)

Q.4 A) Draw the block diagram and detail architecture of PLC and discuss rules for making the PLC ladder program with diagrams. (07)

OR

A) Draw the ladder diagram for the multiple pumps control for fill and drain the tank based on the following conditions: (07)

(a) There are three pumps in which two are the tank filler pump (one is lemon liquid and one is sugar water) and one is the drainer pump

(b) There are two sensors – A low-level sensor and a High-level sensor

(c) When a low-level sensor detects that the tank is empty then pump 1 will start for 3 fillings or 3 liters. After that pump 1 will be off and pump 2 will be on for 3 fillings or 3 liters. In this period pump 3 which is the draining pump is not operating.

(d) Tank has a capacity of 6 liters. When pump 2 is filled the tank high-level sensor gives the signal to pump 3 to drain the mixture of lemon juice.

B) Discuss different types of PLC timers used in industry. Also, draw the ladder diagram for following situation: (08)

(a) There is parking lot which have capacity of 5 cars and sign board which shows status of parking.

(b) Green signal shows in sign board when there is parking is not full.

(c) Red signal shows in sign board when there is parking is full.