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SEAT NO. \_\_\_\_\_

No. of printed pages: - 2

## SARDAR PATEL UNIVERSITY

Vallabh Vidyanagar – 388 120

M.Sc. (INSTRUMENTATION & CONTROL)

PS03CINC23 Programmable Logic Controllers & DCS-SCADA

Tuesday, 19-03-2019, Time: 2:00 pm to 5:00 pm

Max. Marks: 70

**Note:**

1. Assume suitable data if necessary.
2. Draw neat and clean diagrams to support your answer wherever necessary.
3. Figure to the right indicate full marks.

Q.1 Select appropriate answer from the given multiple choices.

[08]

- (1) Electromechanical relays can be used in  
(i) DC output card (ii) DC input card (iii) AC input card (iv) None of these
- (2) For sensing the temperature in any processing line, a temperature sensor can be connected with  
(i) Digital input card of PLC (ii) Digital output card of PLC (iii) Analog input card of PLC (iv) Analog output card of PLC
- (3) In which of the following PLC timer, output can be high (set) even if input (set) is removed?  
(i) ON delay timer (ii) OFF delay timer (iii) PULSE timer (iv) None of these
- (4) An AC output card of PLC contains \_\_\_\_\_ as a switching device.  
(i) SCR (ii) DIAC (iii) TRIAC (iv) None of these
- (5) In distributed control systems, each processor has its own  
(i) Local memory (ii) Clock (iii) Both (i) & (ii) (iv) None of these
- (6) A typical used of integer variable in a digital control system is  
(i) Counting discrete events (ii) Trigonometric math operation  
(iii) Representing power supply voltage (iv) None of these
- (7) In SCADA systems, a central host computer server/servers is/are called  
(i) MTU (ii) RTU (iii) DCS (iv) None of these
- (8) What is the full form of HMI?  
(i) Humanoid mechanical interface (ii) Human machine interface  
(iii) Heart machine interface (iv) Heart mechanical interface

Q.2 Answer the following questions (ANY SEVEN)

[14]

- A Why the inputs for the ladder diagrams are contacts and outputs are coil?
- B Explain need of using opto-isolation in PLC I/O modules.
- C Give the ladder diagram for two input NAND gate.
- D Explain remote I/O module of PLC.
- E Explain ON delay timer instruction used in PLC programming

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(P.T.O)

- F List various parts of DCS.
- G Explain HMI.
- H Give advantages of SCADA systems.
- I Give various functions of RTU.

Q.3

- A Write detail note about Functional Block Diagram (FBD) program used to program PLCs. [06]
  - B Using suitable diagram, explain architecture of PLC. [06]
- OR**
- B Using suitable diagram, explain DC input module of PLC. [06]

Q.4

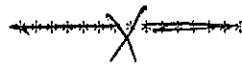
- A Draw FBD program for the following system. [06]  
When START push button is pressed momentarily, an output X will turn ON. If another push button is pressed momentarily while X is on, another output Y will turn ON. When STOP push button is pressed momentarily, only X will turn OFF. Y can be turned OFF by separate push button only if X is off.
  - B There are two machines M1 and M2. Each machine has a separate start push button. There is one master stop push button. The system can be started only by starting of M1. While the system is running, start of one motor will stop the other running motor (that means only one motor will run at a time). When master stop push button is pressed, both the motors will stop. Develop and draw ladder diagram for PLC to control this process. [06]
- OR**
- B List various arithmetic instructions in PLC and explain any two of them. [06]

Q.5

- A Write a detailed note on DCS. [06]
  - B Explain various functions of Field Monitoring Stations in DCS. [06]
- OR**
- B Using suitable diagram, explain analog to digital conversion in DCS systems. [06]

Q.6

- A Using suitable block diagram, explain various components of SCADA system. [06]
  - B Explain how analog signals are monitored by SCADA systems. [06]
- OR**
- B List various signals received by RTU and explain all of them. [06]



(2)