SARDAR PATEL UNIVERSITY
M. Sc. Instrumentation (III Semester) Examination
Wednesday, 5th December 2012
2.30 p.m. to 5.30 p.m.
PS03CINS03 : Programmable Logic Controllers & DCS

Total Marks : 70

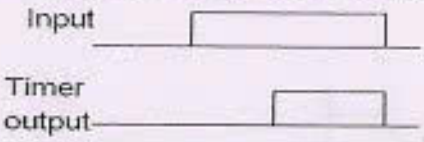
Instructions: 1. Figure to the right indicates full marks.
2. Draw neat and clean figure wherever required.
3. Assume suitable data if necessary.

Q.1 Select the most correct option from given multiple options. **[08]**

A. In a DC output card of PLC, which of the following device can be used as a switching device?
(a) power transistor (b) SCR (c) Electromechanical relay (d) All of these

B. The scan time of the PLC is the time taken for :
(a) reading all the inputs by the PLC (b) updating the outputs by the PLC
(c) solving the used logic by the PLC (d) none of these

C. Identify the timer from the following diagram



(a) Ketentive ON delay timer (b) ON delay timer (c) OFF delay timer (d) pulse timer

D. For which of the following timer, RESET is not compulsory?
(a) Retentive ON delay timer (b) ON delay timer (c) OFF delay timer (d) none

E. In ladder logic diagram, contact and coil are
(a) both are inputs (b) both are outputs
(c) input and output respectively (d) output and input respectively

F. In FBD programming for LOGO family of Simens PLC, if direction input is 1 for the counter, the counter will work as
(a) up counter (b) down counter (c) both a & b (d) it will not work as counter

G. Which of the following shows end of ladder diagram rung?
(a) NO contact (b) NC contact (c) coil (d)None of these

H. Full name of DCS is
(a) designed control system (b) directed control system
(c)distributed control system (d)None of these

Q.2 Answer the following questions **(ANY SEVEN).** **[14]**

A. Explain JUMP instruction in PLC.
B. Write a short note on scan time.
C. What are the advantages of remote I/O connections of PLC?
D. Draw and explain timing diagram for OFF delay timer.
E. Explain latching relay instruction in PLC.
F. Is reset must for all the timers? Justify your answer with suitable examples.
G. What is micro PLC?
H. Draw the block diagram of PLC.
I. List the advantages of DCS.

Q.3

A Draw and explain internal architecture of PLC. **[06]**
B Draw and explain DC input card for PLC. **[06]**

OR

B Draw and explain AC output card for PLC.

Q.4

A A solenoid S is to go on when count C goes up to 22, and when count D goes down from 37 to 0, and when count E goes up to 8. Furthermore, if count F goes down from 17 to 0 at any time, the solenoid is to be kept from operating. One stop button resets the entire process, including the solenoid's being off. The entire process will operate only if the start button has been pressed. The start button is 'NO' and stop button is 'NC'. Solenoid operates on 230 V, 1-phase, AC supply and the operating supply of PLC is 24 V DC. The outputs of the PLC are relay contacts. Design a PLC FBD for the entire process and also show the connection diagram. **[06]**

B Design ladder diagram networks for the following Boolean logics. **[06]**
(a) OR (b) AND (c) NOT (d) EX-OR (e) EX-NOR (f) NAND

OR

B. A handicap door opener has a button that will open two doors. When the button is pushed (momentarily) the first door will start to open immediately, the second door will start to open 2 seconds later. The first door power will stay open for a total of 10 seconds, and the second door power will stay on for 14 seconds. Design a ladder diagram to execute this sequence correctly.

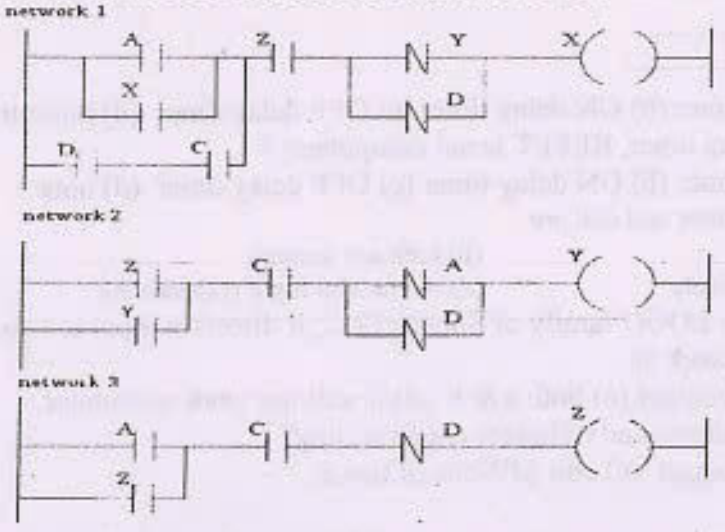
Q.5

A. Explain analog I/O processing in PLC and also explain about analog I/O modules of PLC. **[06]**

B. Explain all the number comparison instructions in ladder diagram. **[06]**

OR

B. Convert the following ladder diagram in FBD.



Q.6

A. In a temperature control system, two heaters (H1 and H2) and two temperature sensors are used. Suppose reading of temperature sensor 1 is X and reading of temperature sensor 2 is Y. For $X > \sqrt{Y^2 + 2Y} + sinY$, H1 should remain in ON condition, otherwise H2 should remain in ON condition. Design a PLC ladder logic diagram for this system. **[06]**

B. List and explain different features of EFMS field monitoring system. **[06]**

OR

B. Explain MCU monitoring station control unit with suitable diagram.

----------**BEST OF LUCK**----------