GANPAT UNIVERSITY

B.Tech Semester VI, Electronics & Communication Engineering
CBCS Regular Examination May-June 2014
2EC606 Industrial Instrumentation

Max. Time: 3 Hrs.]   [Max. Marks: 70

Instructions:
1. Attempt all questions.
2. Answers to the two sections must be written in separate answer books.
3. Figures to the right indicate full marks.
4. Assume suitable data, if necessary.

SECTION-I

Que-1 (A) Compare the PLC and PC with regard to: 6
           a. Physical hardware differences   c. Operating environment
           b. Method of programming   d. Execution of program

    (B) How Analog I/O Modules are different from discrete I/O modules? Explain in   6
        detail discrete I/O modules.

OR

    (A) Write a short explanation for each of the following analog I/O module   6
        specifications:
           a. Channels per module   d. Nominal input voltage
           b. Nominal current per input   e. Resolution
           c. Electrical isolation   f. Input threshold voltages

    (B) Explain in detail different addressing format of Allen-Bradley PLC-5, SLC-500 and 6
        Logix5000 controllers.

Que-2 (A) Write the Boolean expression and draw the gate logic diagram and typical PLC   6
        ladder 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

    (B) Explain operation of OTL and OTU instruction using suitable example.   5

OR

    (A) Draw block diagram of PLC processor module. Describe three typical modes of   6
        operation that can be selected by the key switch of a processor.

    (B) Compare the operation of the reflective type and through-beam photoelectric   5
        sensors.

Que-3 (A) Draw and explain PLC program scan cycle.   4
    (B) Explain counter file and bit data file in brief.   4
    (C) Express each of the following equations as a ladder logic program: 4
        a. $Y = (A + B)\, CD$ b. $Y = [(\overline{A} + \overline{B})\, C] + DE$

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SECTION-II

Que-1 (A) Draw the symbol and explain the operation of each of the following timed contacts **6** of a mechanical timing relay with suitable example:

    a. On-delay timer-NOTC contact   b. Off-delay timer-NOTO contact

(B) Prepare typical I/O connection diagram and ladder logic program for the following **6** counter specifications:

1. Counts the number of times a pushbutton is closed.
2. Decrements the accumulated value of the counter each time a second pushbutton is closed.
3. Turns on a light any time the accumulated value of the counter is less than 20.
4. Turns on a second light when the accumulated value of the counter is equal to or greater than 20.
5. Resets the counter to 0 when a selector switch is closed.

OR

(A) What determines the maximum speed of transitions that a PLC counter can count? **6** Why? And Describe the basic programming process involved in the cascading of two counters using suitable example.

(B) When the lights are turned off in a building, an exit door light is to remain on for an **6** additional 2 min, and the parking lot lights are to remain on for an additional 3 min after the door light goes out. Write a program to implement this process.

Que-2 (A) What types of instructions are not normally included inside the jumped section of a **6** program? Why? Explain with suitable example.

(B) Prepare PLC ladder logic program for following sequence (only use one timer). **5**

- When the momentary start pushbutton is pressed solenoid A is energized immediately.
- Solenoid B is energized 5sec later than solenoid A.
- Solenoid C is energized 10sec later than solenoid A.
- Solenoid D is energized 15sec later than solenoid A.

OR

(A) A main conveyor has two conveyors, A and B, feeding it. Feeder conveyor A puts six-packs of canned soda on the main conveyor. Feeder conveyor B puts eight-packs of canned soda on the main conveyor. Both feeder conveyors have counters that count the number of packs leaving them. Construct a PLC program to give a total can count on the main conveyor.

(B) State how the status of the output devices within the fenced zone will be affected **5** when the MCR instruction makes a false-to-true transition and true-to-false transition.

Que-3 (A) Compare continuous Processes and batch processes. **4**

(B) Explain the function of a sequencer input and sequencer compare instruction. What **4** is the difference between SQI and SQC instructions?

(C) Write a program that uses the FAL instruction to copy 20 words of data from the **4** integer data file, starting with N7:40, into the integer data file, starting with N7:80.

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