

Student Exam No: _____

GANPAT UNIVERSITY
B.TECH SEM.VI ELECTRONICS & COMMUNICATION ENGINEERING
CBCS REGULAR EXAMINATION, April - June 2015
2EC606 INDUSTRIAL INSTRUMENTATION

TIME: 3 Hrs.]

[TOTAL 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.

SECTION-I

- Que-1 (A) Explain logical rack and remote I/O rack. 6
(B) Which are the methods available to write a PLC program? Explain each one with suitable example. 6
- OR**
- Que-1 (A) Draw and Explain PLC block diagram and list advantages of PLC over PC. 6
(B) Explain the following instructions: 4
1. XIC 2. OTL 3. OTU 4. OTE
(C) Explain Remote mode in brief. 2
- Que-2 (A) The output lamp is ON only when pushbutton A or B is pressed, but not both. This circuit has been programmed using only the normally open A and B pushbutton contacts as the inputs to the program. Draw relay schematic, ladder logic and gate logic for this case. 3
(B) Compare discrete and analog I/O modules with respect to the type of input or output devices with which they can be used. 3
(C) List all data files related to PLC and explain control file and bit file in detail. 6
- OR**
- Que-2 (A) Write the Boolean expression and draw the gate logic diagram and typical PLC logic ladder diagram for a control system wherein a fan is to run only when all of the following conditions are met: 6
• 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) Compare the methods used to actuate inductive and capacitive proximity sensors. 3
(C) Draw the electrical symbol used to represent each of the following: 3
a. NO pressure switch
b. NO limit switch
c. NC temperature switch
- Que-3 (A) Implement AND, OR, NOT, XOR, NAND and NOR logic gates into ladder diagram. 4
(B) A temperature control system consists of four thermostats controlling three heating units. The thermostat contacts are set to close at 50°, 60°, 70°, and 80°F, respectively. The PLC ladder logic program is to be designed so that at a temperature below 50°F, three heaters are to be ON. Between 50° to 60°F, two heaters are to be ON. For 60° to 70°F, one heater is to be ON. Above 80°F, there is a safety shutoff for all three heaters in case one stays on because of a malfunction. A master switch is to be used to turn the system ON and OFF. Prepare a typical PLC program for this control process. 4
(C) Compare the operation of photovoltaic solar cell with that of photoconductive cell. 3

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SECTION-II

- Que-4 (A) Design a ladder logic program and prepare typical I/O connection diagram for the following counter specifications: 6
- Counts the number of times a pushbutton is closed.
 - Decrements the accumulated value of the counter each time a second pushbutton is closed.
 - Turns on a light any time the accumulated value of the counter is less than 20.
 - Turns on a second light when the accumulated value of the counter is equal to or greater than 20.
 - Resets the counter to 0 when a selector switch is dosed.
- (B) With help of suitable example explain the difference between the operation of a non-retentive timer and that of a retentive timer. And explain how the accumulated count of programmed retentive and non-retentive timers is reset to zero. 6
- OR
- Que-4 (A) Write a program to operate a light according to the following sequence: 6
- ↓ A momentary pushbutton is pressed to start the sequence.
 - ↓ The light is switched on and remains on for 2 sec.
 - ↓ The light is then switched off and remains off for 2 sec.
 - ↓ A counter is incremented by 1 after this sequence.
 - ↓ The sequence then repeats for a total of 4 counts.
 - ↓ After the fourth count, the sequence will stop and the counter will be reset to zero.
- (B) Design a program that will implement the following arithmetic operation: 6
- Use a MOV instruction and place the value 45 in N7:0 and 286 in N7:1.
 - Add the values together and store the result in N7:2.
 - Subtract the value in N7:2 from 785 and store the result in N7:3.
 - Multiply the value in N7:3 by 25 and store the result in N7:4.
 - Divide the value in N7:4 by 35 and store the result in F8:0.
- Que-5 (A) Write a program that only uses one timer. When an input A is turned on a light will be on for 10 sec. after that it will be off for two sec and then again on for 5sec. After that the light will not turn on again until the input A is turned off. 6
- (B) What types of instructions are not normally included inside the jumped section of a program? Why? Explain with example. 5
- OR
- Que-5 (A) List different applications of counters. What determines the maximum speed of transitions that a PLC counter can count? Why? Explain with example. 6
- (B) What does the forcing capability of a PLC allow the user to do? Outline two practical uses for forcing functions. Why should extreme care be exercised when using forcing functions? 5
- Que-6 (A) Compare continuous and batch processes. 4
- (B) State how the status of the output devices within the fenced zone will be affected when the MCR instruction makes a false-to-true and true-to-false transition. 4
- (C) Do as directed. 4
- Write a program that uses the mask move instruction to move only the upper 8 bits of the value stored at address I:1.0 to address O:2.1 and to ignore the lower 8 bits.
 - Write a program that uses the FAL instruction to copy 20 words of data from the integer data file, starting with N7:40, into the integer data file, starting with N7:80.

END OF PAPER