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: 1. XIC 2. OTL 3.OTU 4.OTE	4
	(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: • 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	6
	(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: a. NO pressure switch b. NO limit switch c. NC temperature switch	3
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

PTO

Que-4 (A) Design a ladder logic program and prepare typical I/O connection diagram for the 6 following counter specifications:

    a. Counts the number of times a pushbutton is closed.

    b. Decrements the accumulated value of the counter each time a second pushbutton is closed.

    c. Turns on a light any time the accumulated value of the counter is less than 20.

    d. Turns on a second light when the accumulated value of the counter is equal to or greater than 20.

    e. Resets the counter to 0 when a selector switch is closed.

(B) With help of suitable example explain the difference between the operation of a non- 6 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.

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

    a. Use a MOV instruction and place the value 45 in N7:0 and 286 in N7:1.

    b. Add the values together and store the result in N7:2.

    c. Subtract the value in N7:2 from 785 and store the result in N7:3.

    d. Multiply the value in N7:3 by 25 and store the result in N7:4.

    e. 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 6 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.

(B) What types of instructions are not normally included inside the jumped section of a 5 program? Why? Explain with example.

OR

Que-5 (A) List different applications of counters. What determines the maximum speed of 6 transitions that a PLC counter can count? Why? Explain with example.

(B) What does the forcing capability of a PLC allow the user to do? Outline two practical 5 uses for forcing functions. Why should extreme care be exercised when using forcing functions?

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 4 the MCR instruction makes a false-to-true and true-to-false transition.

(C) Do as directed. 4

    a. 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.

    b. 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