

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

SIXTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.)

END SEMESTER EXAMINATIONS, APRIL/MAY 2017

SUBJECT: PROGRAMMABLE LOGIC CONTROLLERS [ICE 3282]

Time: 3 Hours

1 4

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.

E-stain the stars of an end in a signal in DI C to and from field

IA.	Explain the stages of processing signals in PLC to and from held.	4
1 B .	With a neat diagram, explain the need of PLCs used in boiler pressure control.	3
1C.	Write a ladder logic program and instruction list to implement the function (1). Turn Q0.0 if	3
	the result is greater than 100.5.	
	$X = LN(10 + A e^{(B * ACS(4C+5)))(1)}$	
	where, $A = MW0$, $B = MD2$, $C = MW2$, $X = MD4$	
2A.	With an example, explain analog PLC addition operation.	4
2B.	Explain the following:	3

i) Interlocking techniques of ladder logic

ii) Power supply of PLC.

- 2C. Use a karnaugh map to develop a simplified ladder logic and instruction list for the following 3 truth table shown in Fig. Q2C where A, B, C, and D are inputs, and X and Y are outputs.
- **3A.** With a neat block and timing diagram, explain negative edge triggered UP/DOWN counter. **2**
- **3B.** Taking an example, compare the following instructions
 - I. SKIP and MCR
 - II. Jump and Jump with return
- 3C. Create a ladder logic program that will start when input A is turned on and calculate the series 4 below. The value of n will start at 0 and with each scan of the ladder logic n will increase by 2 until n=20. While the sequence is being incremented, any change in A will be ignored.

X = 2*ASN(LN(n+20)/2)

4A. With neat diagrams, explain different types of redundant PLCs and mention their advantages 4 and disadvantages.

4

4B.	With neat diagram, Describe the architecture of Distributed control system.					
4C.	• Write a ladder logic program to implement the specified operations.					
	I. When button A is pushed, a light will flash for 5 seconds.					
II. The flashing light will be on for 0.25 sec and off for 0.75 sec.III. If button A has been pushed 5 times the light will not flash until the system is						
5A.	Illustrate ASCII transmission mode technique of Modbus protocol.					
5B.	With a neat flow chart, explain the Proportional plus Integral plus derivative controller.					
5C.	Explain reasons, why SCADA requires PLCs. Describe small facility SCADA system.					

А	в	С	D	\mathbf{x}	\mathbf{Y}		
0	0	0	0	0	0		
0	0	0	1	1	0		
0	0	1	0	0	0		
0	0	1	1	1	0		
0	1	0	0	0	0		
0	1	0	1	0	1		
0	1	1	0	0	1		
0	1	1	1	0	1		
1	0	0	0	0	0		
1	0	0	1	1	0		
1	0	1	0	0	0		
1	0	1	1	1	0		
1	1	0	0	0	0		
1	1	0	1	1	1		
1	1	1	0	0	1		
1	1	1	1	1	1		
Fig. Q2C							