



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



(3)

SEVENTH SEMESTER B.TECH (INSTRUMENTATION AND CONTROL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: LOGIC AND DISTRIBUTED CONTROL SYSTEMS (ICE-413)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- ✤ Missing data may be suitably assumed.
- 1A. Explain how computer supervisory process control operations are used in an analog (5) process control loop.
- **1B.** Write a ladder logic program for implementing the function given below. Turn the output at Q0.0 ON, if X is greater than 100.5.
 - $X = LN(10 + A * e^{(B ACS(4C+5))})$ where, A = MW0B = MD2
 - $\mathbf{D} = \mathbf{M}\mathbf{D}\mathbf{2}$ $\mathbf{C} = \mathbf{M}\mathbf{W}\mathbf{2}$
 - X = MD4

1C. Explain PID instruction of Allen Bradley PLC.(2)

- 2A. Design a ladder logic that uses normal timers and counters to measure minutes, hours (3) and days of 10 days.
- **2B.** With a neat diagram, explain the Less than compare function used in PLC. (5)
- 2C. Draw the typical PLC input and output symbols for following devices. (i)Mushroom (2) Head. (ii) Wobble Stick. (iii) Bell. (iv) Buzzer.
- **3A.** Explain with the help of the ladder diagram for 8 lines MCR function PLC (3) Operation.
- **3B.** Explain all five general levels in control system of an industrial factory using PLC. (4)
- **3C.** Draw and explain electrical wiring diagram of a 2 phase AC motor and draw ladder (3) logic to change the direction of a motor.
- **4A.** Explain in details about the types of blocks used in a user application in field bus . (5)
- 4B Why the SCADA system requires PLCs? Explain different types communication (5) networks which are used in HART Protocol and mention their advantages and disadvantages
- 5A. With a neat diagram, explain the ten outputs controlled by ten register bits in PLC. (4)
- **5B.** Write the differences between smart transmitter and analog transmitter and explain (4) hart smart transmitters.
- **5C.** List the advantages of direct digital controllers over the analog controllers. (2)

6A.	Explain in details about the Hierarchy for DCS systems.	(4)
6B.	With a neat flow chart, explain the discrete PI controller in process.	(4)
6C.	With neat timing and block diagrams explain Siemen's Up Down counter.	(2)
