Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKEUP EXAMINATIONS, DECEMBER 2019

INDUSTRIAL AUTOMATION & CONTROL [ELE 4015]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 02 January 2020** **Max. Marks: 50**

Instructions to Candidates:

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

1A. Discuss briefly, the role of automation in industry. With suitable examples, explain the different types of automation employed in industries. ***(05)***

1B. With suitable block diagrams, explain the architecture of industrial automation systems ***(05)***

2A. Explain with an example the feedback system that measures the disturbance and maintains a desired ratio at the process output. ***(05)***

2B. With timing and block diagram, explain the working of PLC Up/Down counter and Non-rententive ON delay timer. ***(05)***

3A. Draw a ladder diagram for a 3 motor system having the following conditions. Motor1 (M1) starts as soon as the start switch is on. After 10 seconds, M1 goes off and Motor2 (M2) starts. After 5 seconds, M2 goes off, and Motor3 (M3) starts. After 10 seconds, M3 goes off and M2 goes on. After 5 seconds, M2 goes off and M1 comes on, and the cycle is repeated. ***(05)***

3B. A motor will be connected to a PLC and controlled by two switches. The GO switch will start the motor, and the STOP switch will stop it.

(i) If the motor is running, and the GO switch is pressed again then for this condition the motor will stop.

(ii) If the STOP switch was used to stop the motor, the GO switch must be pressed twice to start the motor again.

(iii) When the motor is running, a small lamp will be used for indication.

Consider GO switch as push button ***(05)***

4A. Explain the three types of flow characteristics in control valve with suitable plots. Also specify one example process for each. ***(05)***

4B. With a neat diagram, explain the various elements of a Distributed control system (DCS). Also list out the advantages of using DCS for process control. ***(05)***

5A. Explain the different system architectures of SCADA with neat block diagrams. Also list the merits and demerits of each. ***(05)***

5B. With suitable diagrams, explain the concept of Frequency Shift Keying used to transmit data via the HART protocol. Explain the Point-to-Point as well as Multi-Drop modes of operations of the HART protocol. ***(05)***