Reg. No. | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

SECOND SEMESTER M.TECH. (CONTROL SYSTEMS)

END SEMESTER DEGREE EXAMINATION, APRIL/MAY - 2019

SUBJECT: INDUSTRIAL AUTOMATION [ICE 5248]

TIME: 3 HOURS MAX. MARKS: 50

Instructions to candidates :*Answer ALL questions and missing data may be suitably assumed.*

1A What are the functional elements of industrial automation? Explain with illustration.

1B Describe the different industrial control systems.

1C Explain the communication techniques used by RS-232, RS-422 and RS-485 with diagrams.

(2+3+5)

2A What are the two types of HART networks? Explain briefly.

2B Describe the ASCII transmission mode in Modbus with help of state diagram.

2C Illustrate the interaction between the layers in OSI model.

(4+4+2)

3A A temperature control system consists of two temperature switches with a setting of 300 °C and 400 °C to activate a heating element. Develop a PLC circuit so that the temperature should be maintained in between 300 to 400 °C (i.e. the heating element remain ON up to 400 °C in increasing mode and remain OFF up to 300 °C in decreasing mode).

3B In dangerous process it is common to use two palm buttons that require an operator to use both hands to start a process. To develop this, there are two inputs that must be turned on within 0.25 seconds of each other before a machine cycle may begin. Write a ladder logic program for this process.

3C What are the components used in the Fieldbus physical layer? Describe their functions.

(2+3+5)

4A A XY table of a drilling machine has to be moved from the point (1,1) to the point (6,3). Each axis can move at a velocity of 0.5”/sec, and the BLU is 0.0001”. Find the travel time and resolution.

4B A CNC milling machine has to cut a slot located between the points (0,0) and (4,3) on the XY-plane where the dimensions are in inches. If the speed along the slot is to be 0.1 in/sec, find the cutting time and axial velocities.

4C Draw the architecture of Honeywell DCS and explain its features.

(2+3+5)

5A What are the types of display technologies available in latest DCS? Explain briefly

5B What are the various types of alarm management systems in DCS?

5C In what ways does the DCS support the Enterprise Resource Planning (ERP) in an industry?

(2+3+5)

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