Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

SECOND SEMESTER M.TECH. (CONTROL SYSTEMS)

END SEMESTER EXAMINATIONS, JUNE 2017

SUBJECT: INDUSTRIAL AUTOMATION [ICE 5248]

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	What are the different types of production systems? Explain.	**4**
1B.	Explain different industrial control systems.	**3**
1C.	Describe the importance of information technology in industry.	**3**
2A.	What are the features of RS-422 and RS-423 standard for serial communication?	**5**
2B.	Explain the serial transmission modes of MODBUS networks.	**5**
3A.	Explain how cyclic and acyclic communication takes place in foundation fieldbus.	**4**
3B.	What are the three types of HART commands? Explain with examples.	**3**
3C.	Draw the input and output modules of a PLC.	**3**
4A.	A temperature control system consists of two temperature switches with a setting of 300 °C and 400 °C to activate a heating element. Develop an instruction list 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).	**2**
4B.	An input module, which is connected to a temperature transducer, has an A/D with a 10-bit resolution. When the temperature transducer receives a valid signal from the process (100 to 600°C), it provides, via a transmitter, a +1 to +5 VDC signal compatible with the analog input module. Find the equivalent voltage change for each count change (the voltage change per degree Celsius change) and the equivalent number of counts per degree Celsius, assuming that the input module transforms the data into a linear 0 to 4095 counts.	**4**
4C.	What is supervisory control? Explain with a neat diagram.	**4**
5A.	What are the elements of a Distributed Control Systems? Explain each.	**4**
5B.	Pressure from 50 to 400 psi is converted to voltage by the relation $V = 0.385[p]^{1/2} - 2.722$. This is input to an ADC with a 5.0-V reference, which provides 00H to FFH over the pressure range. An HLL uses an instruction DV = UDF(1) to input the data from the ADC as a base 10 number DV that varies from 0 to 255 over the pressure range. Develop a linearization equation to give a quantity, P, in the program that is equal to the actual pressure.	**3**
5C.	Draw the flow chart for PID control mode.	**3**