Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

MAKE UP EXAMINATIONS, DEC 2015 /JAN 2016

SUBJECT: INDUSTRIAL AUTOMATION & CONTROL [ELE 437]

REVISED CREDIT SYSTEM

Time: 3 Hours | 01 January 2016 | MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** questions.
- Missing data may be suitably assumed.

1A. With neat block diagrams explain the various elements of industrial automation **(05)**

1B. Explain the types of production systems into which all the automated industries are categorized. **(05)**

2A. Explain open loop Ziegler Nicholas tuning method with necessary expressions and response curves. **(05)**

2B. Explain feed forward control with a block diagram. Design a feed forward control to control a gaseous flow inside a chemical tank reactor operating under controlled temperature **(05)**

3A. Develop a PLC program that will latch on an output B 20 seconds after input A has been turned on. After A is pushed, there will be a 10 second delay until A can have any effect again. After A has been pushed 3 times, B will be turned off. (Draw timing diagram also) **(04)**

3B. Write a ladder logic program that does what is described below. **(04)**

- When button *A* is pushed, a light will flash for 10 seconds.
- The flashing light will be on for 0.30 sec and off for 0.70 sec.
- If button *A* has been pushed 10 times the light will not flash until the system is reset.
- The system can be reset by pressing button *B*

3C. With neat waveforms, explain the working of an ON delay timer in process control applications. **(02)**

4A. A closed tank has an orifice 0.025m diameter in one of its vertical sides. The tank contains oil to a depth of 0.61m above the centre of the orifice and the pressure in the air space above the oil is maintained at 13780 N/m_2 above atmospheric. Determine the discharge from the orifice. (Coefficient of discharge of the orifice is 0.61, relative density of oil is 0.9). **(04)**

4B. A venturimeter with an entrance diameter of 0.3m and a throat diameter of 0.2m is used to measure the volume of gas flowing through a pipe. The discharge coefficient of the meter is 0.96. Assuming the specific weight of the gas to be constant at 19.62 N/m^3, calculate the volume flowing when the pressure difference between the entrance and throat is measured as 0.06m on a water filled U tube manometer. Let the heights of entrance and throat from the datum be 2.5m and 3m respectively. **(04)**

4C. Differentiate electro-magnetic and ultrasonic flow meters with respect to their principle of operation **(02)**

5A. Explain the difference between scheduled and unscheduled communication initiated by the Link active scheduler of Fieldbus **(04)**

5B. What is an RTU? Explain the role of RTU on a SCADA system **(04)**

5C. List the advantages and disadvantages of a CNC machine. **(02)**

6A. What is a Wireless Sensor Network? For an industrial scenario of your choice, with suitable diagrams, explain its working. **(05)**

6B. With neat diagrams, explain the working of MODBUS protocol used in industrial automation. **(05)**