



Name :

Roll No. :

Invigilator's Signature :

CS / M.TECH (EE)/ SEM-1 / CAM-102 / 2010-11

2010-11

INDUSTRIAL AUTOMATION AND CONTROL

Time Allotted : 3 Hours

Full Marks : 70

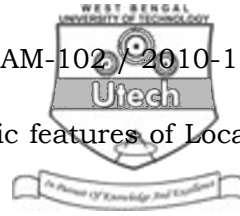
The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any five questions : $5 \times 14 = 70$

1. a) Draw a block diagram showing different hardware elements in a DDC unit.

b) Draw the flowchart of PID control algorithm implemented in DDC loop. 8 + 6
2. a) Draw a block diagram of DCS and explain. Explain briefly the principle of operation.



- b) Explain with proper diagram the basic features of Local controller Unit in DCS.

- c) What are the different protocols used in DCS ? Explain them. 7 + 4 + 3

3. a) What do you mean by tuning of a controller ?
- b) Explain Ziegler-Nichols closed loop tuning method and Harriot's Damped oscillation method for controller tuning. 2 + 7 + 5

4. a) Draw the block diagram of PLC and explain. Explain briefly the principle of operation.
- b) What are the differences between the Retentive and non-retentive timer in PLC ?
- c) Draw the Ladder diagram of the following equation.

$$O/P = (A + BC) (D + E).$$
7 + 3 + 4



5. a) Develop the ladder diagram to fulfill the following condition :

Start switch starts Motor 1, after 10 sec Motor 1 stops and Motor 2 will start. After 15 sec Motor 2 stops and Motor 3 starts. After 7 sec Motor 3 stops and Motor 1 starts. Repeat the process.

- b) Develop the ladder diagram to fulfill the following condition.

Start switch starts the conveyor belt through which boxes are passing. Count 10 boxes and wrap them by the wrapper machine. Wait 5 sec to wrap the 10 boxes.

Repeat the process. 7 + 7

6. a) Discuss the field bus architecture.
- b) Explain the performance aspects of industrial automation system. 7 + 7



7. a) Explain quality management in process industry.
- b) Explain with diagram the operation of star type DCS
and Ring type DCS. 4 + 5 + 5
8. Write short notes on any *two* of the following : 2 × 7
- a) Architectural levels and industrial control
- b) Servo motor
- c) Direct Digital Controller
- d) Stepper motor.

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