



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 132851**

Roll No.

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## B. Tech.

### (SEM. VIII) THEORY EXAMINATION, 2014-15 COMPUTERIZED PROCESS CONTROL

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt all questions. All questions carry equal marks.

1 Attempt any four parts of the following. **5x4=20**

- (a) Explain the classification of computerized aided process control system. Which category of the classification is used most for the process control functions?
- (b) Give example of supervisory computer control processes. Draw a block diagram for the supervisory computer control of a furnace temperature control.
- (c) In which applications, batch processes are widely used? What are the different types of a batch process? Explain with an example, the working of a computer aided process control for a batch process.

- (d) Write the state equation and output equation in vector matrix form of the following

$$d^2y(t)/dt^2 + 7dy(t)/dt + y(t) = 6r(t)$$

- (e) List the advantages and disadvantages of a closed loop control system. Also explain the transfer function of negative and positive closed loop system.
- (f) State transition equation of the following equation is represented as-

$$\frac{dX(t)}{dt} = Ax(t) + Bu(t)$$

2 Attempt any two parts of the following : **10x2=20**

- (a) Determine the value(s) of  $\alpha$  so that the system is uncontrollable or unobservable for the following transfer function

$$\frac{Y(s)}{R(s)} = \frac{s + \alpha}{s^3 + 7s^2 + 14s + 8}$$

- (b) What is the real time clock needed for? How does it function? Why is it very difficult to use a computer for process control without a real time clock? Do you have any suggestion on how you can count time elapsed without a real time clock?

- (c) Draw a communication network hierarchy for a process industry showing different process control levels. Explain the function of each communication level.
- 3** Attempt any two parts of the following. **10x2=20**
- (a) Outline the steps that you should take during the development of a mathematical model for process control purposes.
- (b) Give example to demonstrate how a model of a process can be simplified by disregarding physical and chemical phenomenon with a limited impact on the behavior of the process.
- (c) What are the goals defined in modeling procedure? How the information is prepared and model formulation?
- 4** Attempt any two parts of the following. **10x2=20**
- (a) What are the adaptive control adjustments? Describe the functions of the adaptive control schemes. With block diagram explain the function of each of them.
- (b) What is an intelligent control for the process control and monitoring? How the control algorithm is developed in intelligent control.
- (c) What is a multiple loop (multivariable) control system? What are the multivariable predictive controller techniques that are popular in process controller application?

**5** Write short notes on any two of the following: **10x2=20**

- (a) Centralized and distributed control system.
  - (b) Electric oven temperature control with oven heat losses compensation.
  - (c) Predictive model.
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