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EIC031

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

PAPER ID : 132851

Roll No.

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 α 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. **10×2=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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