EE - 8302

B.E. VIII Semester

Examination, June 2016

Process Control

(Elective-III)

Time : Three Hours *Maximum Marks : 70*

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Define the single-time constant and multiple time-constant processes.
   b) What do you understand by second order process?
   c) What are the common techniques, used for the process control?
   d) With the help or block diagram, explain the room temperature control process.

OR

Explain with suitable diagram the working of heat exchanger feed forward control system.

Unit - II

2. a) Define the following terms:
      i) Control valve
      ii) Valve positioner
   b) Explain the working of pneumatic transmitters for process control.
   c) With the use of op-amp draw the circuit diagram of gain-limited integrator.

   d) Explain in detail the Ziegler-Nichols tuning method for second order oscillatory system.

OR

Explain the tuning process of PID controller with 'COHEN and COON' method.

Unit-III

3. a) Define the main features of cascade control system.
   b) Justify that 'Ratio control system in a special type of a feed-forward control system'.
   c) With the help of flow diagram explain the working of ratio control system
   d) A first order reaction is carried out in a stirred tank with a hold-up time of 1.6hr and a rate constant of 2 hr^{-1}. Show the effect of a sudden change in feed concentration from 0.5 to 0.48 $mole/ft^3$.

OR

Illustrate with neat sketch a cascade control system for stirred-tank heat exchanger temperature control.

Unit - IV

4. a) Explain in brief the control process of Reactors.
   b) What do you understand by mineral processing.
   c) Discuss the measuring devices (sensors) which are commonly used in process control system.
   d) With the help of suitable block diagram, explain the model predictive control approach.

OR

Explain in detail the different control schemes which are used for process optimization. Also discuss the artificial intelligent methods.

Unit - V

5. a) What is model reference adaptive control? Explain with block diagram.
   b) What do you understand by optimal control?
   c) Explain the advantages and disadvantages of implementing an expert system in computer aided process control.
   d) Explain with the help of suitable diagram, the Direct Digital Control (DDC) system for chemical reactor

OR

Discuss in detail the architecture of programmable logic controllers (PLC).

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