

Code: 13A10601

B.Tech III Year II Semester (R13) Regular & Supplementary Examinations May/June 2017

**PROCESS CONTROL**

(Electronics & Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**  
(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Give the classification of the variables and define them.
  - What is degree of freedom? Briefly explain with examples.
  - Define actuator. Give two examples for electrical and pneumatic actuators.
  - Differentiate cavitation and flashing. Mention their importance in control valve sizing.
  - Write the equation for controller output of ON/OFF controller. What is neutral zone and why it is introduced in ON/OFF controller?
  - What are the advantages and disadvantages of proportional control mode?
  - Differentiate feedback and feed-forward controller. Give one process example for each.
  - What is a split range control? Give an example with flow sheet symbol.
  - Define RGA. Briefly discuss the need and applications of RGA.
  - Draw the instrument line symbols for the following signals:  
(i) Pneumatic signal. (ii) Electrical signal. (iii) Hydraulic signal. (iv) Capillary tubing.

**PART – B**  
(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

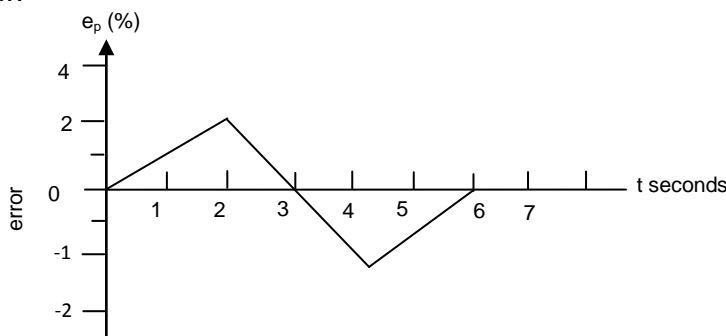
- 2 Discuss the basic requirements of chem process control for satisfactory operation and performance.
- OR
- 3 Define process. With a block diagram, explain the various elements of a process control.

**UNIT – II**

- 4 What are the standard range of values for current, voltage and pressure? With schematic diagrams, explain the working of I/P and P/I converter.
- OR
- 5 With neat diagrams, equations, characteristic graphs and applications, explain the different types of control valves used in process control.

**UNIT – III**

- 6 With necessary equations and graphs, explain the working of single speed and multi-speed floating controller.
- OR
- 7 A PD controller has  $K_p = 2.0$ ,  $K_D = 2s$ ,  $P_0 = 40\%$ . Plot the controller output for the error input shown below.



Contd. in page 2

Code: 13A10601

**UNIT – IV**

- 8 Define cascade control and explain the same with a block diagram. With a schematic diagram, explain cascade control system for water temperature control in a process tank.

**OR**

- 9 What is adaptive control? When adaptive controllers are applied? With a block diagram, discuss the general topology of direct adaptive control system.

**UNIT – V**

- 10 What is decoupler? Discuss the design of non-interacting control loop with an example.

**OR**

- 11 Define artificial intelligence. With block diagrams, explain the working of ANN based and Fuzzy Logic based process control loops.

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