

Roll No

EI - 702

B.E. VII Semester

Examination, December 2015

Process Control

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.

1. a) Define process control.
b) Discuss the significance of mathematical modeling.
c) Define and classify the process variables with suitable examples.
d) Discuss the modeling of heat exchanger.

OR

Explain interactive and non-interactive type of system with examples.

2. a) Define control modes.
b) Discuss PI controller.

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- c) Compare PI and PID controllers.
- d) What is an ON-OFF controllers? Explain its working with a suitable example and also give its advantages, disadvantages and any two applications.

OR

Explain the Ziegler-Nichol's method of controllers tuning.

- 3. a) What is meant by 'offset'? How does it develop?
- b) Explain with figures 'degree of freedom' of controllers and role of each.
- c) Compare quick opening and equal percentage valve characteristics.
- d) Draw the neat diagram of pneumatic controller used in any process in an industry. Also compare the performance of pneumatic controller over hydraulic controller.

OR

Using operational amplifier realise a PID controller with separated P, I and D blocks. How the proportional, integral and derivative gains can be adjusted?

- 4. a) Define actuators.
- b) What are different types of control valves?
- c) Explain with neat figures, the difference between different types of selector control for protection of equipment.
- d) Derive the exact Transfer Function for an open (from top) liquid tank system, for change in level due to disturbance in flow, assuming quadratic relationship.

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OR

Explain the concept of cascade control by applying it to a CSTR for cooling the reactants to a desired level. Draw relevant control scheme and block diagram. How steady state error is affected, explain with necessary derivations.

- 5. a) What do you mean by advanced controller?
- b) Discuss plant wide control.
- c) Explain split range and auctioneering control.
- d) Explain with relevant figures, in clear steps the cascade control operation for reactor temperature in a CSTR.

OR

Explain the situation for effective use of feed-forward control. How it can be implemented for a distillation column? What are limitations of FFC?
