Code: R7311006 **R07**

B.Tech III Year I Semester (R07) Supplementary Examinations December 2015

PROCESS CONTROL INSTRUMENTATION

(Electronics & Instrumentation Engineering)

(For 2008 regular admitted batch only)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions

All questions carry equal marks

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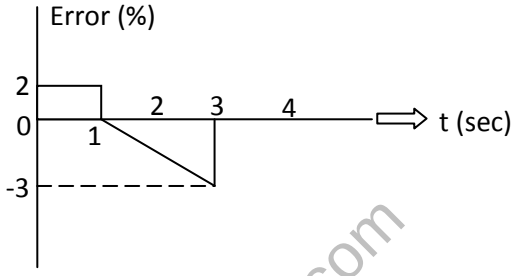
1 (a) Give one example for non-interacting first order elements in series.
(b) Write the differential equation for the above combination and determine the transfer function.

2 (a) Explain in detail, the realization of proportional-integral action with bellows and flapper-nozzle.
(b) What are the different types of controllers? Discuss their advantages and disadvantages.

3 (a) Draw a three mode electronic controller and derive the expressions for the output voltage.
(b) A proportional controller has a gain of 3. Plot the controller output for the error given below if P_0 = 50% (P_0 – controller output with no error)



4 (a) Write short note on the following errors:
(i) IEA.
(ii) ISE.
(iii) ITAE.
(b) A proportional-integral controller is used on a pure time-delay process. Calculate the response to a step change in load if the controller gain in half the maximum value and the reset time is half the time delay. Calculate the integral of the absolute error.

5 (a) Discuss process reaction method for control loop tuning.
(b) Distinguish between the continuous oscillation method and damped oscillation method for tuning.

6 (a) Briefly explain the P/I converter.
(b) Design a system by which a control signal of 4-20 mA is converted in to force of 200-1000 N. Use a pneumatic actuator and specify the required diaphragm area if the pressure output is to be in the range of 20 to 100 kPa. An I/P converter is available that converts 0-5 volts into 20 to 100 kPa.

7 (a) Distinguish different types of butterfly valves.
(b) Write about rotating shaft values.

8 (a) Explain the control of indirect bottom product in a distillation column.
(b) Explain the closed loop characterization of cascade control system.

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