

III B.Tech I Semester Supplementary Examinations, November 2006
PROCESS CONTROL INSTRUMENTATION
(Electronics & Instrumentation Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. In the following figure1, P_1, P_2 and P_3 refer to changes in the pressures upstream, in the tank and downstream respectively and the flows into and out of the tank are influenced by the tank pressure.

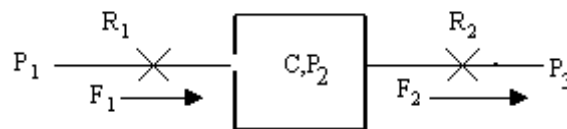


Figure 1

- (a) Write the differential equation for the above system and get the transfer function.
 - (b) What is the order of the above system? How will the order change if there are several inlets and outlets? [10+6]
2. (a) Give one example for Interacting first order elements in series.
- (b) Write the differential equation for this combination and determine the transfer function.
- (c) Comment on the transfer function. [3+10+3]
3. (a) Explain with analytic expression, the concept of a single controller mode which is anticipatory in nature. List its characteristics.
- (b) Why a pure derivative is not preferred? Draw the derivative controller output for the error given below figure3b. (Assume the relevant settings) [8+8]

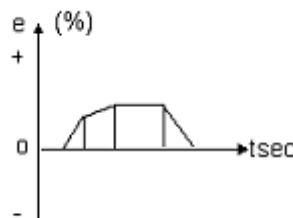


Figure 3b

4. (a) Explain in detail, the realization of proportional-integral action with the aid of bellows, flapper-nozzle etc.
- (b) Draw a three mode electronic controller and derive the expression for the output voltage. [8+8]

5. (a) Explain the following terms as applicable to system evaluation with necessary graphs.
 - i. Stability
 - ii. measure of quality .(b) Discuss the quarter - amplitude criterion to evaluate the response. [8+8]
6. (a) Explain the baffle - Nozzle system with the help of its characteristic curves.
(b) Explain the pneumatic booster and what is its need.
(c) Differentiate between direct and reverse action final control operation.[6+6+4]
7. (a) Briefly explain valve sizing.
(b) A fully open valve passes 200gpm of water at a pressure differential of 10.0psi calculate valve sizing. [8+8]
8. (a) State the necessity of split range control for a process.
(b) Explain the principles of split range control for multiple inputs by taking simple examples. [8+8]
