CODE NO: RR 311004

2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

I II B.TECH I SEMESTER REGULAR EXAMINATIONS
PROCESS CONTROL INSTRUMENTATION
(ELECTRONICS & INSTRUMENTATION ENGINEERING AND INSTRUMENTATION & CONTROL ENGINEERING)
NOVEMBER 2005 TIME: 3 HOURS
MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

MARK [5*16]

1. (a) What are single capacity systems? Give one example and explain why it is called so?

(b) Write the dierential equation of this system and determine the transfer function.

(c) Study the response of this pure capacity system to a step change in input.

2. (a) Is the Thermometer Bulb and well arrangement a non-interacting system? Justify your answer.

(b) Write the dierential equations and determine the transfer function for Thermometer bulb and well arrangement.

3. (a) Explain with a neat sketch depicting the error vs controller output, the principle of a proportional controller action.

(b) With an example, explain how oset error in proportional controller occurs.Suggest a way to overcome the o set error.

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.

5. (a) What is a optimum - tuning control? What are its dierent approaches?

(b) How are the interactions in control being channelized to optimize the control action in a boiler?

6. (a) A 4-20mA control signal is loaded by a 100- resistor and must produce a 20-40 volt motor drive signal. Find an equation relating the input current to the output voltage.

(b) Explain with an example the need of signal conditioning system in the final control operation.

7. (a) Briefly explain valve sizing.

(b) A fully open valve passes 200gpm of water at a pressure di erential of 10.0psi calculate valve sizing.

8. Discuss the design techniques related to multiple input and multiple output (MIMO) control system?