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) A flow head equation has the equation q = hn. Calculate the resistance.

(b) A liquid storage device is spherical in shape. Calculate the capacitance as a function of head.

(c) If the outflow at a vessel is proportional to the square root of head, what shape vessel resultsin

i. a steady change in head

ii. a rate of change of head proportional to head?

2. (a) Say whether heated tank and an immersed thermometer with negligible interaction is interacting or non-interacting. Justify your answer.

(b) Write the di erential equations and determine the transfer functions individually for heated tank and thermometer.

(c) Determine the overall transfer function of this combination. How is this transfer function related with the individual transfer function?

3. (a) Discuss the eects of an integral controller on the closed loop response of first order process.

(b) With neat sketches, explain the principle of derivative control action. Summarize it characteristics.

4. (a) Describe with a neat sketch, the principle of a force type pneumatic PD controller. Mention the merits of pneumatic controller.

(b) Explain with relevant equations, the implementation of the single mode control action with electronic circuits.

5. (a) What is meant by process tuning and list the various methods of tuning of PID parameters.

(b) Discuss process reaction method for control loop tuning.

6. Explain the principle of a direct and reverse pneumatic actuator.

7. Write steps followed in choosing a valve for better control of flow and should be cost e ective.

8. (a) Explain the principles of cascade controller tuning.

(b) State the fundamental dierence feed forward and conventional feed back control.

(c) Why is a process model required for feed forward controller?