

3/06/15

(1)

TE / BT / VI / CBGS / PCI / S.

sub: - Process control and Instrumentation
(3 Hours)

Q.P. Code : 5197

Total Marks : 80

(26)

Note:

1. Question No. 1 is compulsory.
2. Attempt any three questions out of remaining five questions.
3. Assume suitable data wherever necessary.
4. Figures to right indicate full marks.

Q. 1 Answer the following (Any four)

- a. Derive the closed loop transfer function for change in set point (Servo problem)
- b. Explain Bode stability criteria.
- c. What are the various input functions? Write their transforms.
- d. For a second order under damped system, explain the following terms with the help of neat sketch.

i. Overshoot

ii. Decay ratio

iii. Rise time

iv. Response time

e. What are the Important factors to be considered in the selection of a particular type of control system namely P, PI, PD and PID?

Q. 2 a. The open loop transfer function of a control system is given as $G(s) = \frac{K_c s}{(s+1)(0.1s+1)}$ 10

Sketch the asymptotic Bode plot for the control system.

b. Explain cascade control in detail. Explain cascade control in jacketed vessel. 10

Q.3 a. Derive the step response of interacting multi capacity control system. 10

b. Derive the expression for transfer function for mercury thermometer. 5

c. What is feed forward control? What are its limitations? 5

Q.4. a. Write a note on 10

- i. Air to open valve
- ii. Valve characteristics

b. Determine the overall transfer function $C(s)/R(s)$ for the block diagram shown in figure. 10

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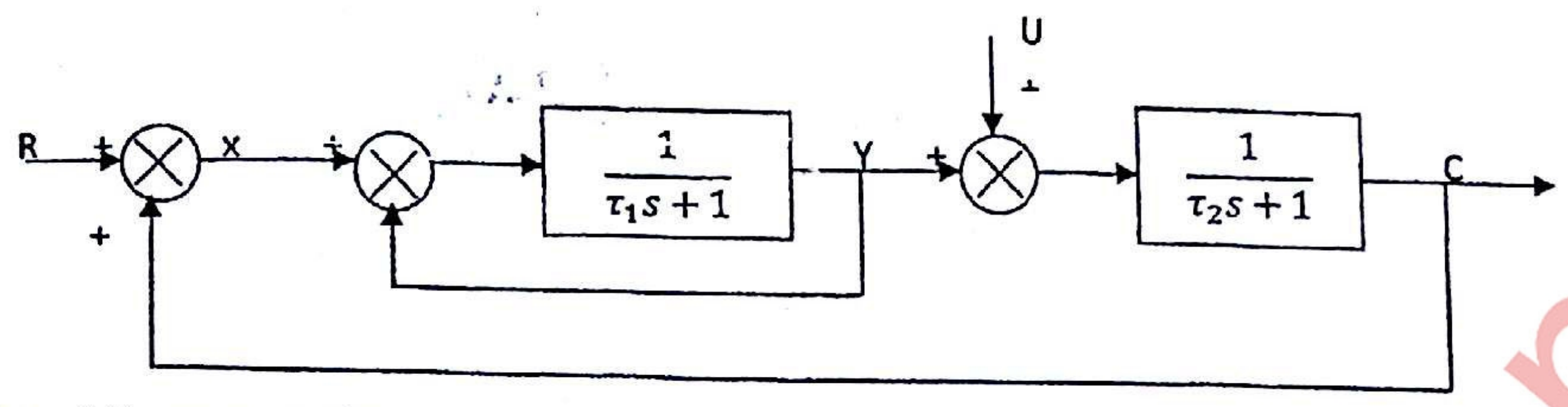
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Q.5 a. A thermometer having a time constant of 10 seconds is placed in a temperature bath. After the thermometer reaches steady state temperature of 30° C. It is suddenly placed into a hot fluid at 60° C. Sketch the response of the thermometer. 10

b. Explain Niquist stability criterion. 10

Q.6 a. The open loop transfer function of the control system is given by $G(s) = \frac{K_c}{s(s+1)(s+2)}$ 15

Sketch the root locus diagram of the system.

b. What is transportation lag? Write its transfer function. 5

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