

Name :

Reg. No:

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, NOVEMBER 2012

AI 09 503 - CONTROL ENGINEERING

Time : Three Hours

Maximum : 70 Marks



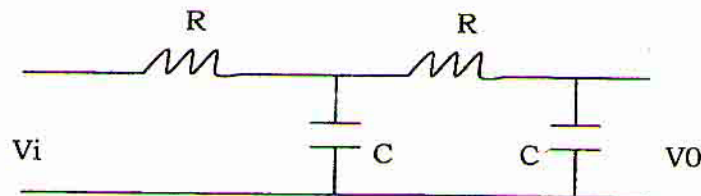
PART A

1. State the difference between open loop and closed loop control systems.
2. State Mason's Gain Formula.
3. State the difference between absolute stability and relative stability.
4. Define Gain Margin and Phase Margin.
5. Define Controllability and Observability.

(5x2=10 Marks)

PART - B

6. What is a transfer function? Derive the transfer function of the network shown in fig 1.



7. What Calculate the time response of the following system if the input $r(t)$ is an unit impulse

$$\frac{C(s)}{R(s)} = \frac{2}{s+3}$$

8. Write the Hurwitz determinant for the system given by the characteristic equation $4s^3 + 2s^2 + 5s + 7 = 0$
9. With neat sketch explain the under damped and overdamped second order systems.
10. Briefly explain minimum phase and non-minimum phase systems.
11. With a suitable example explain the canonical form representation.

(4x5=20 Marks)

PART C

12. (a) With a suitable example, Explain the transfer function of a simple electrical and electromechanical systems.

(Or)

- (b) Explain the rules for block diagram reduction.

13. (a) Discuss in detail about the various standard test signals.

(Or)

- (b) Sketch the root locus plot of a unity feedback system with an open loop transfer function

$$G(s) = \frac{K}{s(s+2)(s+4)}$$

Determine the value of K so that the dominant pair of complex poles of the system has a damping ratio of 0.5.

14. (a) The open loop transfer function of a unity feedback control system is

$$G(s) = \frac{K}{s(1+0.1s)(1+s)}$$

Draw the Bode diagram and analyze the stability of the system for $K=10$.

(Or)

- (b) Discuss in detail about Nyquist stability criterion.

15. (a) Explain (i) State variable (ii) State Vector (iii) State Space (iv) State diagram.

(Or)

- (b) Explain the computation of state transition matrix using (i) Laplace Transform and (ii) Cayley Hamilton theorem.

(4 x 10 = 40 Marks)
