ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : MAY / JUNE 2010

REGULATIONS : 2007

FIFTH SEMESTER : ECE

070280007 - CONTROL SYSTEMS

TIME : 3 Hours Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

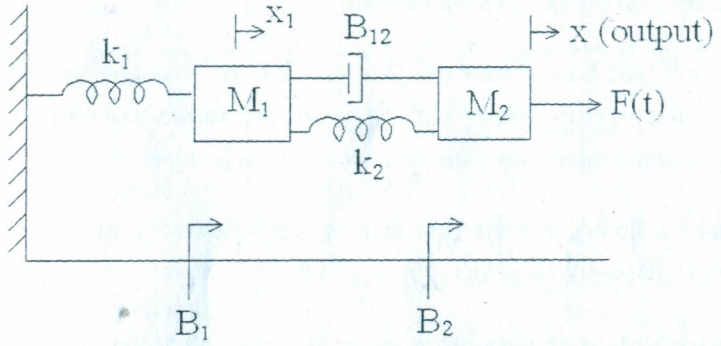
1. List out the advantages of closed loop transfer function
2. What is servo mechanism?
3. What are Synchros?
4. What are the different types of stepper motors?
5. Define settling time
6. What is peak overshoot?
7. What is the difference between type and order of a system?
8. Enumerate the advantages of generalized error coefficients.
9. Define resonant frequency and resonant peak.
10. Define "Bandwidth"
11. Define :Gain Margin"
12. What is phase crossover frequency?
13. What is BIBO stability?
14. What are breakaway points in root locus?
15. What is the nature of response if the poles are complex?
16. What is Nyquist stability criterion
17. What are state variables?
18. What are the properties of STM?
19. List out the advantages of phase variable method?
20. What are Eigen values?

PART – B

(5 x 12 = 60 MARKS)

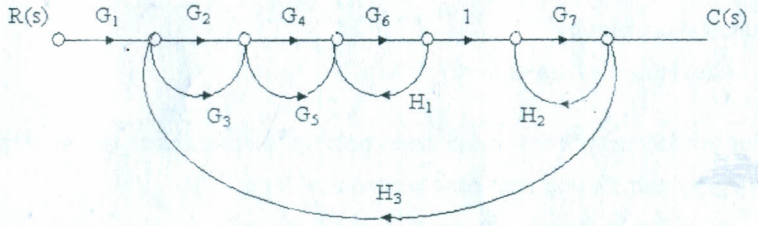
ANSWER ANY FIVE QUESTIONS

21. (a) Obtain the transfer function of the mechanical system shown below. 6



(b) Discuss the mathematical modelling of AC servomotors 6

22. For the given signal flow graph find C(s) / R(s) using Mason's gain formula



23. (a) Derive the unit step response of the second order system for the under damped case 6

(b) Obtain the unit step response and unit impulse response of the following system $C(s) / R(s) = 10 / (s^2+2s+10)$ 6

24. An unity feed back system has $G(s) = 1 / s(1+2s)$. The input to the system is described by $r(t)= 2+4t+6t^2+2t^3$. determine the generalized error coefficients and express the steady state error as a function of time.

25. Draw the Bode plot of the open loop transfer function
$G(s) = 200(s+10) / s(s+5)(s+20)$

26. For each of the characteristics equation of feed back control system given, determine the range of k for stability. Determine the value of k so that the system is marginally stable and the frequency of sustained oscillations

(i) $s^4+25s^3+15s^2+20s+k=0$

(ii) $s^4+ks^3+s^2+s+1=0$

27. Sketch the root locus of a feed back system whose open loop transfer function is given by

$G(s) H(s) = k / s(s+2)(s+3)$

28. For the following transfer functions obtain the state space representation of these systems using controllable canonical form

(i) $T(s) = 2 / s3+2s2+4s+8$

(ii) $T(s) = 10(s+4) / s(s+1)(s+3)$

*****THE END*****