TIME : 3 Hours   Max.Marks : 100
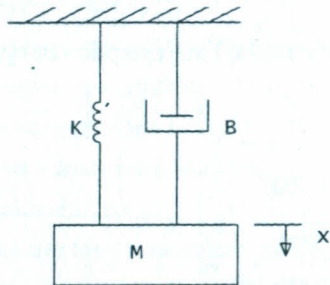
PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. Write differential equation of the system shown below.

2. Write the mason's gain formula.

3. List examples of the closed loop system.

4. Define transfer function.

5. Write the standard test input signals.

6. Find the order, poles, zeros of the system. $G(s) = \dfrac{s^2 + 4s + 4}{s^2 + 6s + 9}$

7. Write the transfer function of PID controller.

8. Write the step response of the first order system and plot it.

9. Define gain and phase margin.

10. Write the relation between resonant peak and peak overshoot.

11. What is the band width of the low pass filter?

12. Find the gain and angle of the system of the following transfer function.

$$G(s) = \frac{1}{(s + 2)(s^2 + 4s + 4)}$$

13. What is the effect of adding a pole to the system?

14. List the conditions for the system to be stable.

15. State the nyquist stability criterion.

16. Find the following system is stable or not?

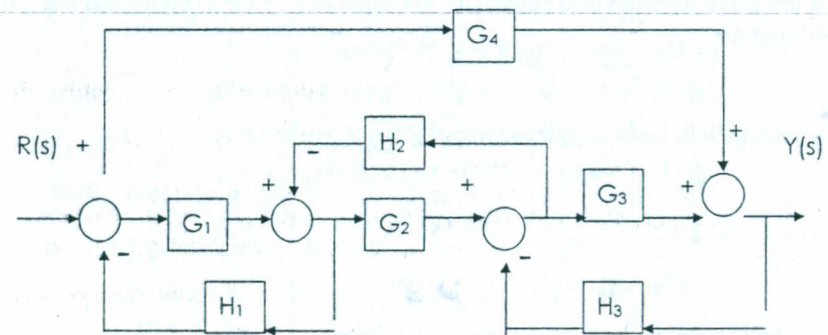$$s^4 + 2s^3 + 8s^2 + 4s + 3 = 0$$

17. What is the generalized error series?

18. When should the lag compensator used?

19. Draw the circuit diagram of lead-lag network.

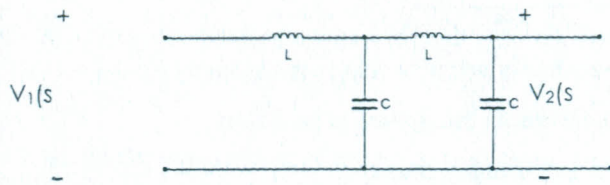20. Give applications of Ac servomotors.

PART - B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. a) Find the transfer function using signal flow graph for the following system. (8)

b) Find the transfer function $V_2(S)/V_1(S)$ of electrical system shown below. (4)

22. A feedback system with negative unity feedback system has a plant

$$G(S) = \frac{2(S+8)}{S(S+4)}$$

a) Find the time response Y(t) for a step input r(t)=A for t>0. (4)

b) Find the steady state error (4)

c) Determine the closed loop transfer function. (4)

23. The system has an open loop transfer function

$$G(S) = \frac{K(S+3)}{S(S+1)(S+5)}$$

Plot the Bode diagram and determine the value of K, so that the phase margin is 40 degree

24. The system with open loop transfer function

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

Draw Root locus and find the range of K for system to be stable.

25.

$$G(S) = \frac{20}{S(1+0.1S)(1+0.05S)}$$

Select a compensator so that phase margin is greater than 40 degree.

26. Derive the expressions of Rise time, peak time, peak overshoot, settling time for 2nd order system.

27. With a neat diagram, explain the operation of synchros.

28.

$$G(S) = \frac{300(S+100)}{S(S+10)(S+40)}$$

Find the gain margin and Phase margin.

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