DEPT. OF ELECTRICAL ENGINEERINGGOVERNMENT POLYTECHNIC, MAYURBHANJ

QUESTION BANK

ON

TH2- CONTROL SYSTEMS ENGINEERING

SEMESTER & BRANCH : – 6TH SEM, ELECTRICAL ENGINEERING

2 MARKS QUESTIONS

1. What is control system
2. What are the the types of control system
3. What are the advantages of closed loop control system
4. Define Transfer function
5. What is pole & zeros
6. What is servomechanism
7. What is regulators
8. What is effect of feedback
9. Write down the advantages of transfer function
10. What is block diagram
11. Define SFG
12. State the masons gain formula
13. What is AC servomotor
14. What is potentiometer
15. Draw the diagram of closed loop control system
16. What are the different components of cs
17. What is meant by analogous System?
18. What are the basic properties of signal flow graph?
19. What is a Feedback In Control System?
20. What is Routh Hurwitz Stability Criterion?
21. What is gain margin ?
22. What is servo motor
23. What is settling time?
24. What is time response ?
25. What is rise time in control system ?
26. What is peak time ?
27. Define root loci.
28. Define stability.
29. Define transient response
30. What is Proportional control system ?
31. What happens when a derivative controller applied to a Control system ?
32. Wht is the need of root locus ini control system ?
33. What do you mean by Polar Plot ?
34. What do you mean by Bode Plot ?
35. What do you mean by Nyquist stability criterion ?
36. What do you mean by state variable?
37. How the state variable electrical circuit is represented?

5 MARKS QUESTIONS

1. Write down the differentiate between open loop and closed loop control system.
2. Write down the properties of Transfer Function
3. Explain the working of potentiometer.
4. Explain the working of AC Servo motor
5. Write down the different steps of block diagram reduction technique
6. Write down the steps for SFG with example.
7. What are the different type of input and derive steady state error for step, ramp and parabolic input.
8. Derivation of time response specification for delay time, rise time, peak time, setting time, peak over shoot of a second order system.
9. Sketch the polar plot for $G(s) = \dfrac{20}{s(s+1)(s+2)}$.
10. The open loop transfer function of a unity feedback system is given by

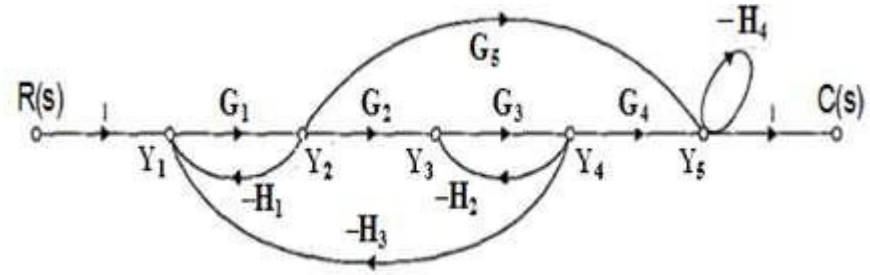
$$G(s) = \frac{108}{s(s+4)(s+3s+12)}$$

Find static error coefficient and steady state error of the system when subjected to an I/P is given by $r(t)= 2+5t+2t^2$.

11. The open loop transfer function of system with unity feedback is given by

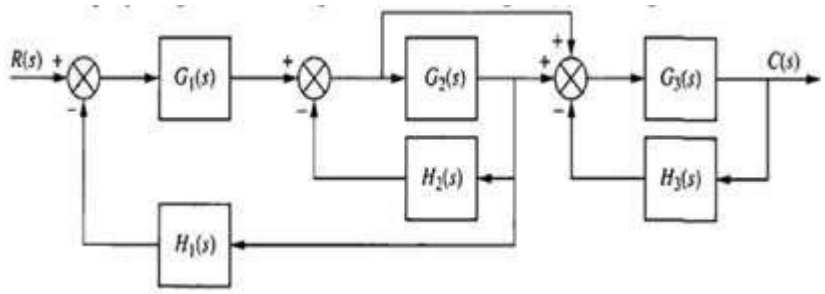
$G(s) = \dfrac{10}{(s+2)(s+5)}$. Determine damping ratio, undamped natural frequency of oscillation and maximum overshoot in its step response.

12. Define gain margin, phase margin, gain cross over frequency & phase cross over frequency in a polar plot .
13. What is the effect of feedback on overall gain and stability?
14. State different type of controller with block diagram and represent them mathematically.
15. Examine stability of the following system given by B(s) = s 5 + 2s 4 + 2s 3 + 4s 2 + 4s + 8 using Routh-Hurwitz stability criterion
16. Write down the rules for constructing a root locus ?
17. State the rules for plotting a polar plot?
18. Write down the procedure to draw a bode plot ?
19. What is the need of a Nyquist plot , Explain with a suitable example
20. Explain the properties, advantages ,and disadvantages of transfer function ?
21. Explain the properties of signal flow graph ?
22. Explain the effect of feedback on control system ?
23. Using Mason's gain formula, obtain the transfer function of a system whose signal flow graph is given in Figure

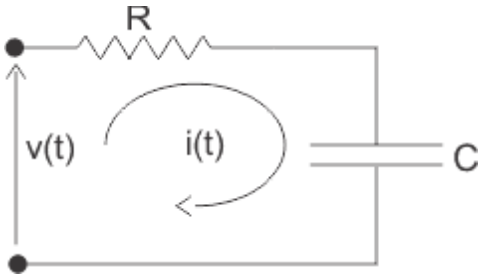


24. Represent the block diagram of Figure by its SFG.

25. Simplify the given block diagram as shown in Figure to a single block and obtain its transfer function



26. Find the transfer function of the following network.



27. Plot the poles and zeros of given transfer function of control system.

$$G(s) = \frac{(s+1)(s+2)}{(s+3)(s+4)(s+5)(s+2-4j)(s+2+4j)}$$

28. Find the gain factor K of a transfer function whose value is 2 at s = 2 and the transfer function is given as

$$G(s) = K \times \frac{(s+4)(s+2)}{(s+3)(s+1)s}$$

29. Realize a PI controller using OPAMP and write its features.

30. Define the standard test signals used in control system. Write their laplace Transform

31. A network is described by the state model as

$$x_1 = 2x_1 - x_2 + 3u$$
$$x_2 = -4x_2 - u$$
$$y = 3x_1 - 2x_2$$

Find the transfer function H(S) = $\frac{Y(S)}{U(S)}$

10 MARKS QUESTIONS

1. Sketch the root locus plot of a unity feedback system with

$$G(s) = \frac{k}{s(s+1)(S+4s+5)}$$

2. What do you mean by PID controller and explain the time response with PID controller.

3. Apply Nyquist stability criterion to the system with open loop transfer function is given by $G(s)\,H(s) = \frac{1}{s(1+2s)(1+s)}$

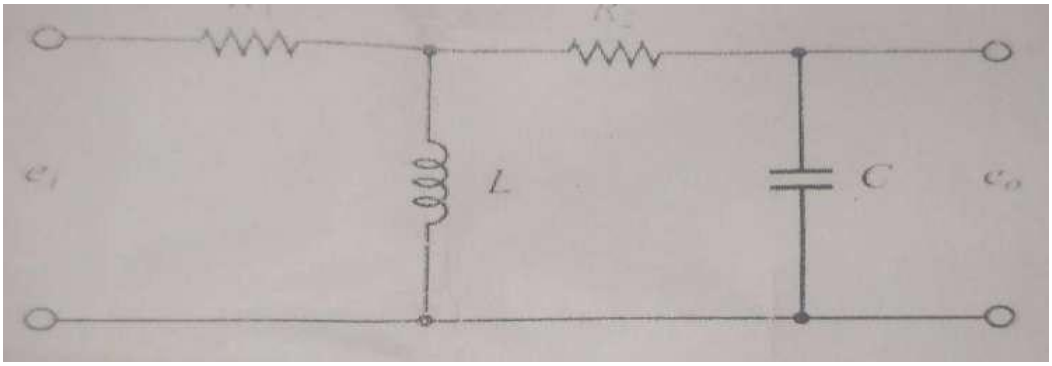
4. Obtain bode plot for the following function.

$$G(s) = \frac{1000}{s(1+0.1s)(1+0.001s)}$$

5. Determine the gain margin & phase margin of the system and also comment on the stability.
6. Explain constant M& N circle.

7. Examine stability of the following system given byB(s) = s 4 + 5s 3 + 2s 2 + 3s + 1 using Routh-Hurwitz stability criterion. Find the number of roots in the right half of the s-plane

8. Find the transfer function of the following network.



9. The loop transfer function of asystem is given by $G(S) = \frac{K}{S(1+S)(1+2S)}$
   I. Draw the Nyquist plot for $-\infty < \omega < \infty$
   II. Comment on closed loop stability of the system.

10. For unity feedback system, the loop transfer function is given by
    $G(S) = \frac{K}{S(S+1)(S+2)}$
    I. Plot the root locus for $0 < K < \infty$
    II. Comment on closed loop stability of the system.