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Question Paper Code : X 60448

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Fourth Semester
Electronics and Communication Engineering
EC 2255/EC 46/EE 1256 A/10144 EC 406/080290023 – CONTROL SYSTEMS
(Regulations 2008/2010)

Time : Three Hours

Maximum : 100 Marks

Graph sheet and Semi-log sheet are to be provided
Answer ALL questions

PART – A

(10×2=20 Marks)

1. Name any two dynamic models used to represent control systems.
2. Write the Mason's gain formula of signal flow graph.
3. Mention few applications of Bode plot.
4. State Routh-Hurwitz criterion.
5. What is the use of Nichol's chart ?
6. List the advantages and disadvantages of phase lag network.
7. State any two limitations of Routh-stability criterion.
8. State the advantages of Nyquist stability criterion over that of Routh's criterion.
9. Define state equation.
10. Give the concept of controllability.

PART – B

(5×16=80 Marks)

11. a) i) Explain the functional blocks of closed loop feedback control system. (6)



ii) Derive the transfer function of system shown in fig. 1.

(10)

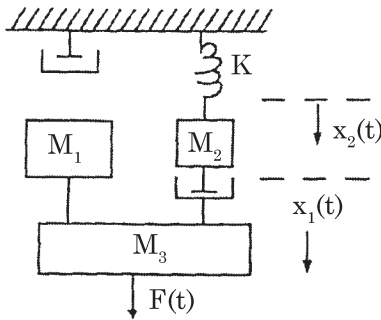


Fig. 1

(OR)

b) Find the transfer function of the system shown in fig. 2 using block diagram reduction technique and signal flow graph technique.

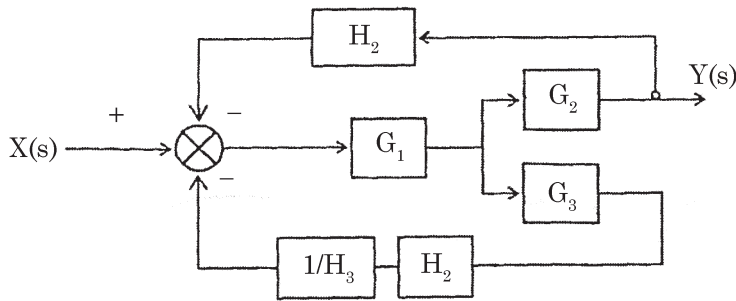


Fig. 2

12. a) Consider a second order model $\frac{Y(s)}{R(s)} = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$; $0 < \zeta < 1$. Find the response $y(t)$ to a input of unit step function.

(OR)

b) The unit impulse response of a unit feedback control system is given by $c(t) = -te^{-t} + 2e^{-t}$, ($t \geq 0$) find the open loop transfer function.

13. a) For the following transfer function draw bode plot and obtain gain cross – over frequency.

$$G(s) = \frac{20}{s(1 + 3s)(1 + 4s)}$$

(OR)

b) Discuss in detail about lead and lag networks.



14. a) i) Determine the range of K for stability of unity feedback system whose open loop transfer function is $G(s) = \frac{K}{s(s+1)(s+2)}$ using Routh stability criterion. (6)

ii) Draw the approximate root locus diagram for a closed loop system whose loop transfer function is given by $G(s)H(s) = \frac{K}{s(s+5)(s+10)}$. Comment on the stability. (10)

(OR)

b) Sketch the Nyquist plot for a system with open loop transfer function

$G(s)H(s) = \frac{K(1+0.4s)(s+1)}{(1+8s)(s-1)}$ and determine the range of K for which the system is stable. (16)

15. a) Explain how controllability and observability for a system can be tested, with an example.

(OR)

b) Write the explanatory notes on open loop and closed loop sampled data systems.
