Reg. No. : | | | | | | | | | | |

Question Paper Code: 34603

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fourth Semester

Instrumentation and Control Engineering

01UIC403 - LINEAR CONTROL SYSTEMS

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. Distinguish between open loop and closed loop system.
2. State Mason's Gain Formula.
3. Define PID controller.
4. Compare P, I and D control modes.
5. List the frequency domain specifications.
6. Give the correlation between time domain and frequency domain specifications.
7. Define absolutely stability system.
8. Give Nyquist stability criterion.
9. Give the electrical network of lag-lead compensator.
10. What are the merits of Lag-Lead network?

PART - B (5 x 16 = 80 Marks)

11. (a) Find C(S) / R(S) for the system shown in Fig. 1. using Mason’s Gain formula.

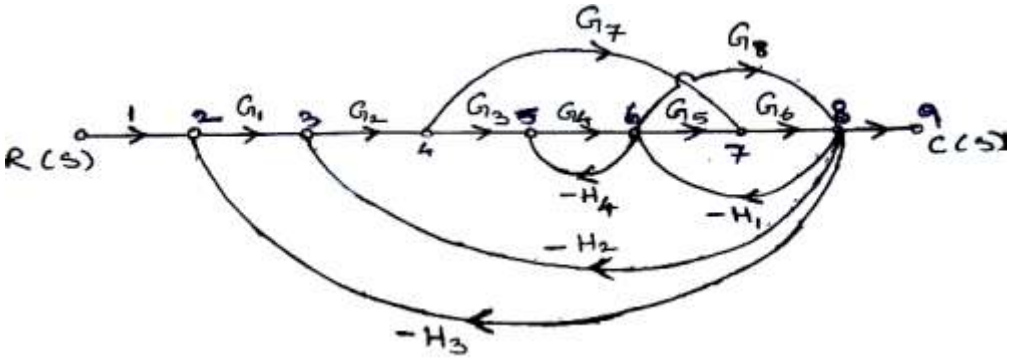
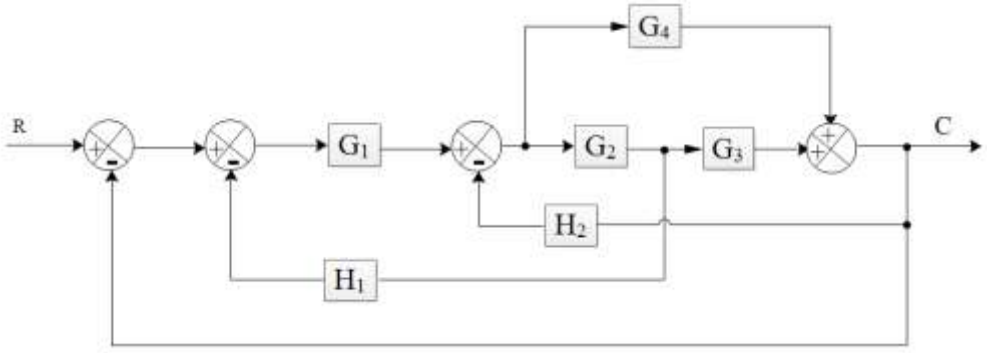


Fig. 1 (16)

Or

(b) Using Block diagram reduction technique evaluate the transfer function of the system whose block diagram is shown in figure. (16)



12. (a) A unity feedback control system has an open loop transfer function $G(S) = \frac{10}{s(s+2)}$ Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units. (16)

Or

(b) Develop the expression for under damped second order system when the input is unit step and plot the response of the system. (16)

13. (a) Calculate the magnitude and phase of closed loop transfer function with unity feedback and prove that it is in the form of circles for every value of *M* and *N*. (16)

Or

(b) Analyze the correlation between time and frequency response of a second order system. (16)

14. (a) Sketch the complete root locus for the system having $G(S)H(S) = \frac{K(s+7)}{(s+2)(s+6)}$ (16)

Or

(b) Construct the root locus of the system whose open loop transfer function $G(s) = \frac{K}{s(s+2)(s+4)}$. Determine the value of K so that the damping ratio of the closed loop system is *0.5*. (16)

15. (a) What is a lag compensator? Obtain the transfer function of lag compensator. Also explain the different steps to be followed for the design of lag compensator using Bode plot. (16)

Or

(b) A unity feedback system has an open loop transfer function $G(s) = \frac{K}{s(1+2s)}$. Design a suitable lag compensator so that phase margin is *40°* and steady state error for ramp input is less than or equal to *0.2*. (16)

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