

Code No: 115AD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, November/December - 2017

CONTROL SYSTEMS

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

- 1.a) Why is negative feedback invariably preferred in a closed loop system? [2]
- b) Distinguish between open loop and closed loop system. [3]
- c) What are the applications of synchro? [2]
- d) Write the importance of SFG in control systems. [3]
- e) Define peak overshoot. [2]
- f) What is the effect of P, PI controller on the system performance? [3]
- g) How will you find root locus on real axis? [2]
- h) Write the drawbacks of RH criteria. [3]
- i) What are frequency domain specifications? [2]
- j) Define Gain margin and Phase margin. [3]

PART - B

(50 Marks)

- 2.a) Find the transfer function of the network given figure 1.

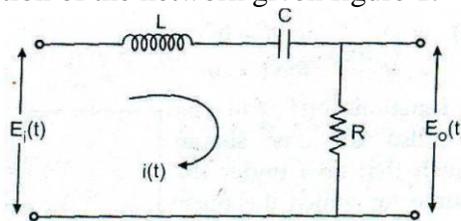


Figure 1

- b) Explain translatory and rotary elements of mechanical systems. [5+5]

OR

- 3.a) What is feed back? Explain the effects of feedback.
- b) Obtain the transfer function $X_1(s)/F(s)$ for the mechanical system shown figure 2. [5+5]

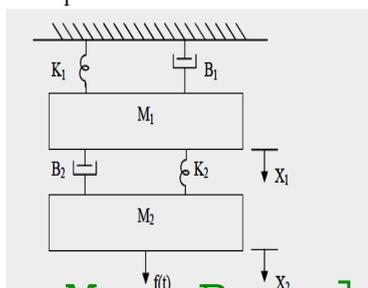


Figure 2

- 4.a) Explain the rules for block diagram reduction technique.
 b) Derive the transfer function for armature controlled DC Servomotor. [5+5]

OR

- 5.a) Reduce the given block diagram and hence obtain the transfer function (figure 3).

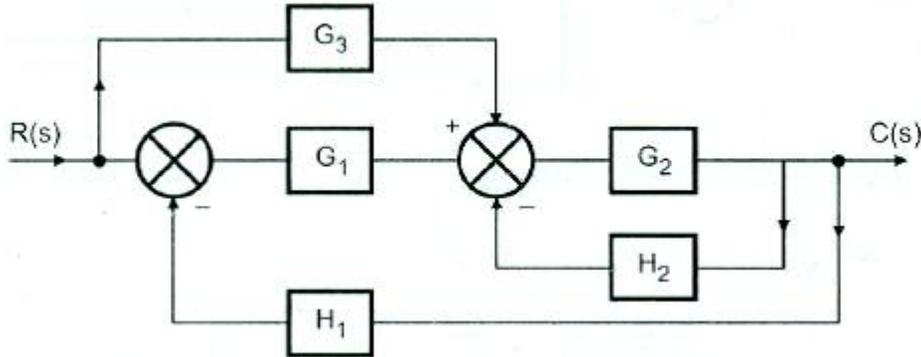


Figure 3

- b) Write the applications AC servomotor. [5+5]
- 6.a) Determine the error coefficients and static error for $G(s) = \frac{1}{s(s+1)(s+10)}$, $H(s) = s + 2$
 b) Find out the output of the undamped second order system when the input applied to the system is unit step input. [5+5]

OR

- 7.a) The open-loop transfer function of a unity feedback system is given by $G(s) = \frac{500}{s(1+0.1s)}$. Find the peak overshoot and time peak overshoot. If peak overshoot is to be reduced by 20%, what is the change in the gain?
 b) Explain effects of proportional derivative and proportional integral controllers in system performance. [5+5]

- 8.a) How RH Stability criterion can be used to study the relative stability?
 b) Explain the effects of adding poles and zeros to $G(s)H(s)$ on the root loci by considering one the example. [5+5]

OR

9. Sketch the root locus plot of a unity feedback system whose open loop T.F is $G(s) = \frac{K(s^2 - 2s + 2)}{(s+2)(s+3)(s+4)}$. [10]

- 10.a) Define
 i) Minimum phase transfer function
 ii) Non minimum phase transfer function.
 b) Enlist the steps for the construction of Bode plots. [5+5]

OR

11. Sketch the Bode plots for a system $G(s) = \frac{15(s+5)}{s(s^2+16s+100)}$. Hence determine the stability of the system. [10]