Code No: 125AD **R15**

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.

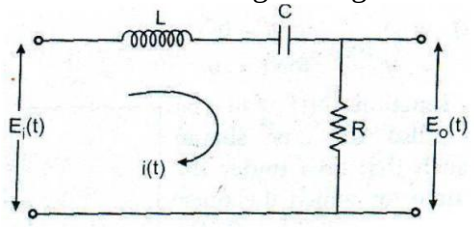

Figure 1

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]

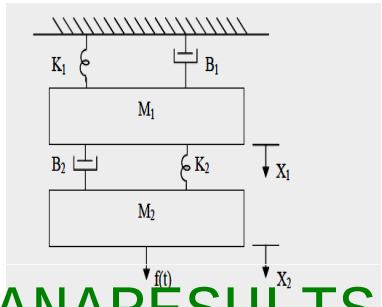

Figure 2

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).

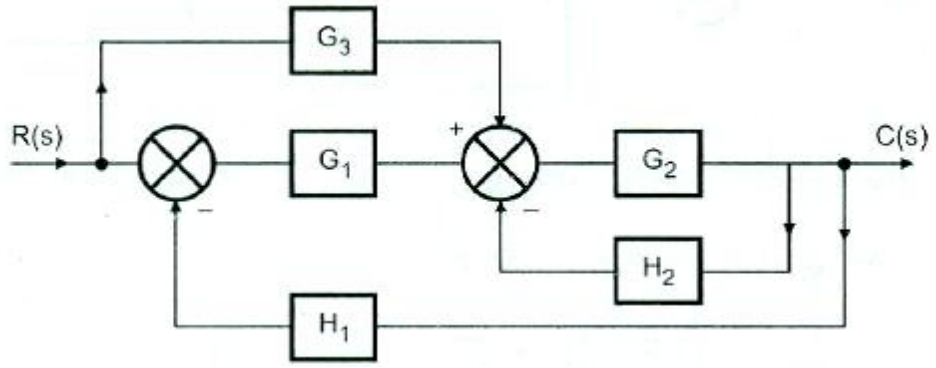

Figure 3

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]

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