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B.Tech. (ECE/Electronics and Electrical) (Electrical and Electronic)/(EE)/ (Electronics & Computer Engg.)/(ETE) (Sem. - 4th)

LINEAR CONTROL SYSTEMS

SUBJECT CODE : BTEE - 402 (2011 Batch)

Paper ID : [A1188]

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is compulsory consisting of ten questions carrying two marks each.
2) Section - B contains five questions carrying five marks each and students has to attempt any four questions.
3) Section - C contains three questions carrying ten marks each and students has to attempt any two questions.

Section - A

Q1)

a) What are the basic elements of a closed loop control system?

b) Feedback can improve stability or be harmful to stability. Comment.

c) Differentiate between the time and frequency domain analysis.

d) What do mean by the steady state error.

e) Differentiate between the continuous and sampled data control system.

f) What do you mean by the pole of a control system?

g) What can be said about the stability of a closed loop system having three poles and no zero?

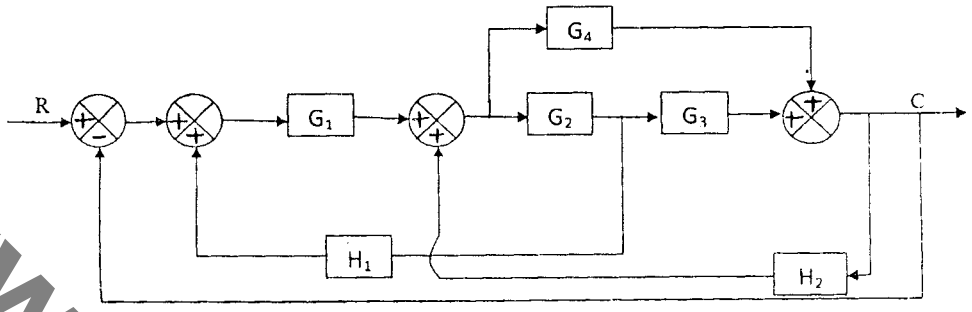
h) Define the bandwidth of a closed loop control system.

i) What are the limitations of a phase lead controller?

j) What is servomechanism?

Section - B

Q2) Using Mason's gain formula, determine the C/R ratio for the system given below



Q3) Determine the unit step response of a system having closed loop transfer function given below $\frac{C(s)}{R(s)} = \frac{1}{(s+1)(s^2+1)}$

Q4) Using the Routh's criterion, determine the stability of the closed loop control system, which has the following characteristics equation

$s^5 + 4s^4 + 8s^3 + 8s^2 + 7s + 4 = 0$

Q5) Construct Nyquist plot for a unity feedback control system whose open loop transfer function is

$$G(s)H(s) = \frac{K}{s(s^2+2s+2)}$$

Find maximum value of K for which the system is stable.

Q6) What are the steady state magnitude and phase of the output from a system when subjected to a sinusoidal input of $\theta_i = 2\sin(3t + 60°)$ if it has a transfer function of $G(s) = \frac{4}{s+1}$

Section - C

Q7) Draw the root locus for a system having open loop transfer function as

$$G(s)\,H(s) = \frac{K}{s(s+1)(s+3)}$$

If K = 5 determine

a) Gain margin

b) phase margin

Q8) The open loop transfer function of a certain unity feedback system is

$$G(s) = \frac{K}{s(s+2)(s+10)}$$

Construct Bode plot and determine the

a) limiting value K for the system to be stable

b) value of K for the 10 db gain margin

c) value of K for the phase margin to be 50 degree.

Q9) a) What is compensation? Explain the phase-lead and phase-lag compensation networks.

b) Explain AC position control system in detail.

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