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SE/IV/ INST/ Feedback Control Systems /23/11/15

QP Code : **5319**

(3 Hours) [Total Marks : 80

N.B.: (1) **Question no. 1** is compulsory
   (2) Attempt any **Three** from remaining five questions.
   (3) Assume suitable data it necessary.

1. Attempt **any four**   20
  a) Compare openloop and closeloop system with suitable example.
  b) State construction rules of root locus.
  c) Give correlation between time and frequency domain specifications.
  d) Comment on stability using bode plot.
  e) Explain the term relative stabiliy and conditional stability with suitable example.

2. a) Reduce the following block diagram using signal flow graph technique.   10
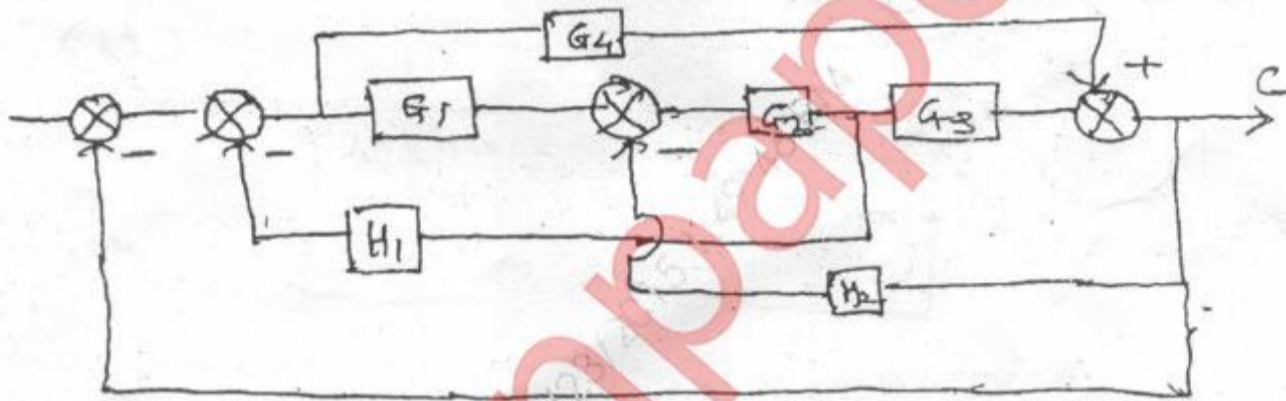
  b) Construct the bode plot for the system whose openloop trnasfer function is given by   10

$$G(s) = \frac{100}{s(s+0.5)(s+10)}$$

   Determine the gain margin and phase margin and comment on stability.

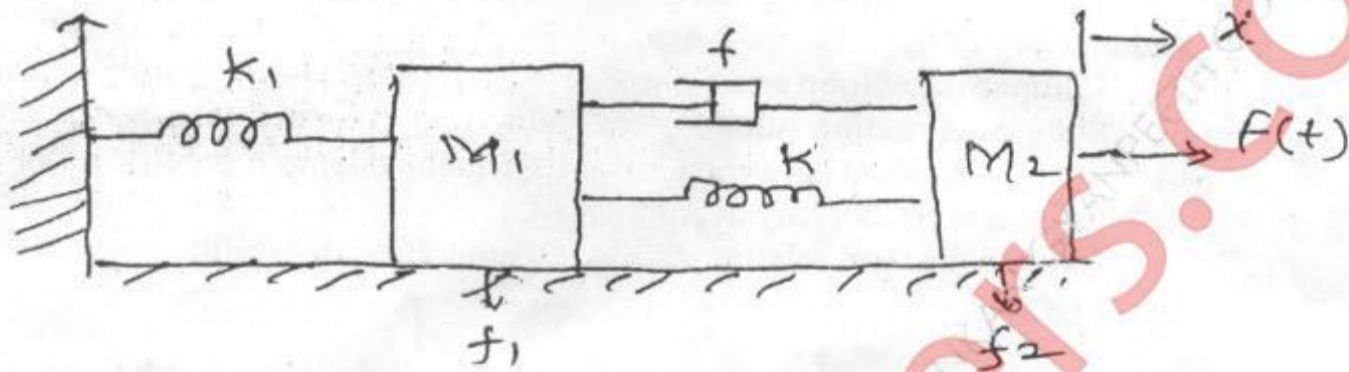3. a) Consider a system cassume that value of gain 'K' is non neative   10

$$G(s) = \frac{K}{s(s+1)(s+2)}$$

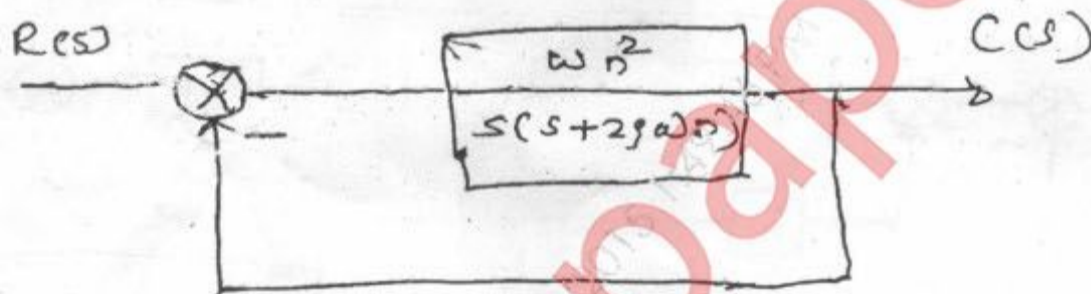   Draw the root locus for a given system.

  b) Derive the unit step response of a second order underdamed system.   10

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MD-Con. 8176-15.

4. a) Given $G(s)H(s) = \dfrac{K}{s(Ts+1)}$ Test the given system for absulute stability   10

   using Nyquist plot.

   b) Obtain a the transfer function of a Mechanical system shown below.   10

5. a) For the following system   10

   Where = 0.6 and wn = 5 rad/sec obtain (i) Rise time (ii) Peak time
   (iii) Maximum overshoot (iv) Settling Time. where the system is subjected
   to unit step input.

   b) Sketch the polar plot for a unity feed back closed loop system   10

   $$G(s) = \dfrac{1}{s(s+1)^2}$$

6. a) Obtain the static error coeffiicients for type 0, 1 & 2 systems if the input to   10
   the each system is step, ramp and parabolic.

   b) Determine the stability of the system having the charactristic equation.   10
   i) $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24 = 0$
   ii) $s^5 + 3s^4 + 10s^2 + s + 8 = 0$ $s^5 + 6s^4 + 15s^3 + 30s^2 + 44s + 24 = 0$