R09

Code No: C7501, C5601

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY-2012
ADVANCED CONTROL SYSTEMS
(COMMON TO CONTROL SYSTEMS, POWER SYSTEMS (HIGH VOLTAGE))

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks

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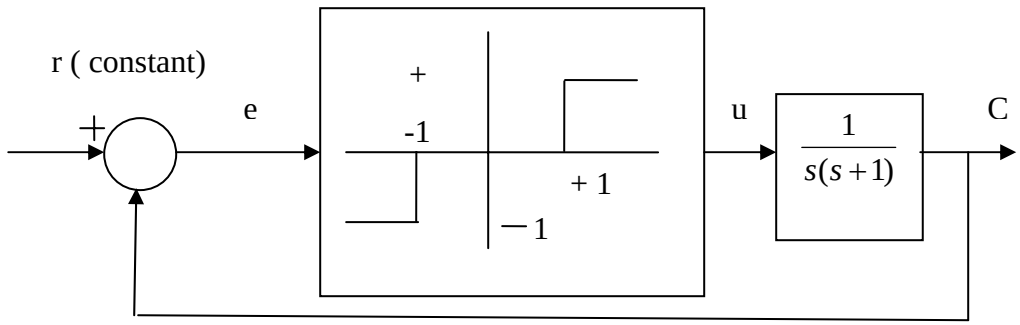
1. A unity feed back system has an open loop transfer function of G(s) =K/s(s+1)(s+5) Draw the root locus plot and determine the value of k to give a damping ratio of 0.3. A network having a transfer function of 10(1+10s)/(1+100s) is now introduced in tandem. Find the new value of K which gives the same damping ratio for closed loop response. Compare the velocity error constant and settling time of the original and compensated system.

2. A unity feed back system has an open loop transfer function G(s)=K/s(s+1)(0.2s+1), Design a phase lag compensation to achieve the following specifications. Velocity error constant K_v = 8;
   Phase margin = 40^o;
   Also compare the crossover frequency of compensated and uncompensated systems.

3. Explain how to find first order eigen value sensitivities with an example.

4. Explain the confluent eigen values associated with number of non distinct Jordan blocks.

5. Draw the phase trajectories for the non linear system shown below using isocline method.



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6. Write the procedure to find stability using variable gradient method and Check the stability of the following system using variable gradient method. Choose $a_{12}=x_1/x_2$, $a_{21}=x_2/x_1$

$$\dot{x}_1 = x_2$$

$$\dot{x}_2 = x_1 - b_1 x_2 - b_2 x_2^3 \quad ; \quad b_1, b_2 > 0$$

7.a) Explain different behaviors of non linear systems.

b) Write Lyapunov stability theorems.

8. Write short notes on

a) PID controllers

b) Krasovskii's method

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