BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI

K.K Birla Goa Campus

Semester I, 2009-10

Course: AAOC C 321 (CONTROL SYSTEMS)

ONLINE TEST **SET 1 , Batch:_____** **Date: 24-04-2010**

Weightage: 20% **Student ID :_____** **Max. Marks: 60**

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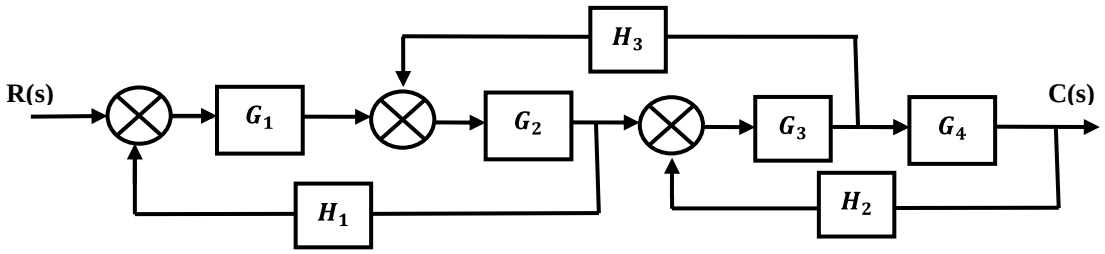
[1] Find the transfer function for the block diagram shown in Fig Q1. below using block diagram reduction technique. Also find the roots of the transfer function.

Take $G_1 = \left(\frac{s^2+3s+5}{s+2}\right), G_2 = \left(\frac{1}{s^2+2s+3}\right), G_3 = \left(\frac{1}{s+1}\right),$ $G_4 = \left(\frac{s+7}{s+3}\right), H_1 = (s+4),$

$H_2 = \left(\frac{1}{s+5}\right)$ and $H_3 = (6)$



[20]

Fig Q1

[2] **Fig Q2** shows a position control system.

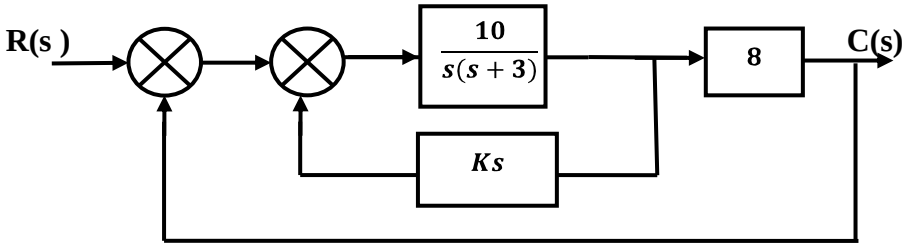


Fig Q2

(a) Obtain the transfer function when K=0 using block diagram reduction methods in MATLAB. Also obtain the unit step response and then find the peak time, maximum peak overshoot and settling time at 2% tolerance from the plot **[10]**

(b) Obtain the transfer functions when K=0.15 using block diagram reduction methods in MATLAB. Also obtain the unit step response and then find the peak time, maximum peak overshoot and settling time at 2% tolerance from the plot **[10]**

[3] The open loop transfer function of a control system is

$$G(s) = \frac{20}{s(s+2)(s+10)}$$

(a) Obtain the Bode plot. Find the gain margin, phase margin from the Bode plot. **[10]**

(b) Determine the values of gain to be increased such that the system may have a gain margin of 6 dB. Also obtain the Bode plot at this gain. **[10]**