



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Staff Group

Course : Automatic Control Systems

Course Code: EE418

Date : 11 /1/ 2015

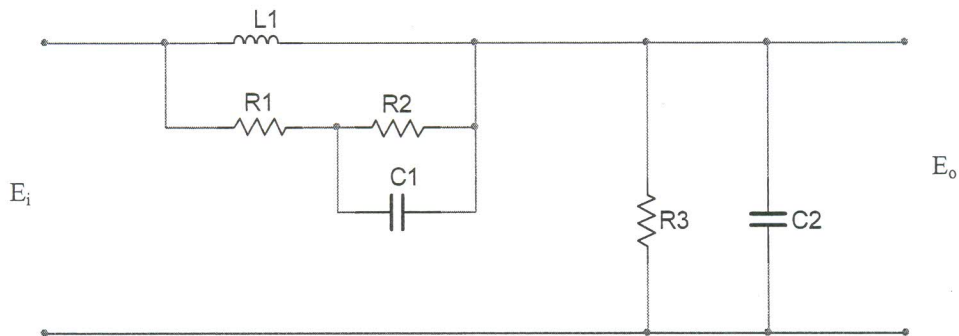
Marks : 40

Time : 2 hours

ANSWER FOUR QUESTIONS ONLY:

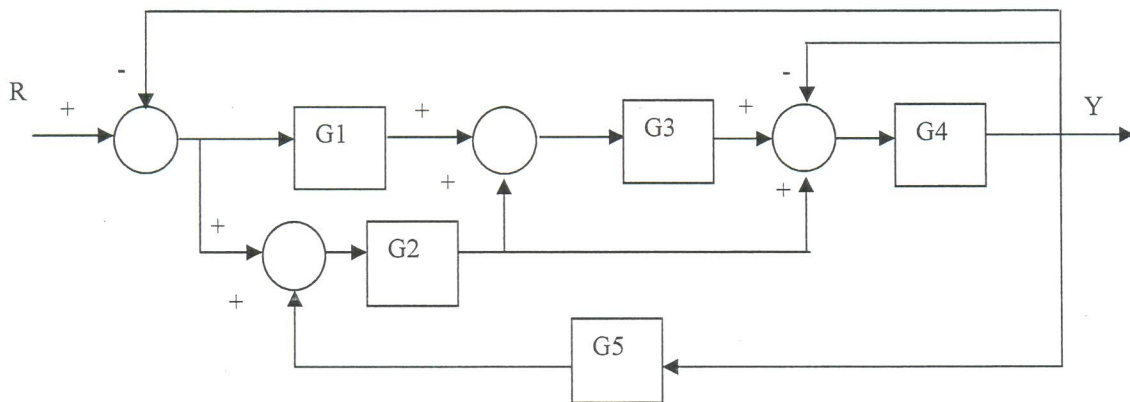
Question 1: (10 marks)

Obtain the transfer function $\frac{E_o}{E_i}$ for the circuit given below:



Question 2: (10 marks)

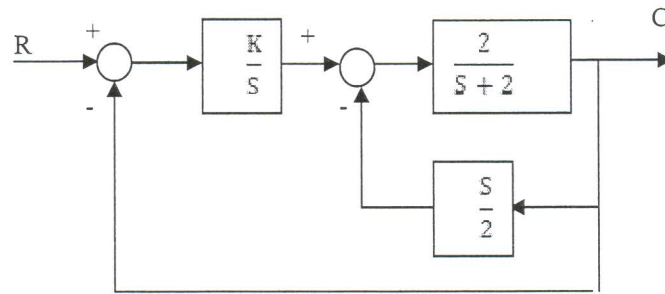
Find the overall transfer function $T(s)=Y(s)/R(s)$ using signal flow graph.



Members of course Examination Committee:	Signature:	Date:
Lecturer: Staff		3/12/2014
Course Coordinator : Dr. Ahmed El-Shenawy		3/12/2014
Head of Department: Prof Hamdy Ashour		3/12/2014

Question 3: (10 marks)

For the control system shown below,



- Find the gain K such that the damping ratio is 0.8.
- Calculate the rise time, peak time, settling time, and the peak overshoot when the system is subjected to a unit step input signal.
- Calculate the steady state error.

Solve ONE of the following two questions: (10 marks)

Question 4:

$$G(s) = \frac{k(s + 5)}{s(s^2 + 8s + 20)}$$

And unity feedback

- Roughly sketch the root locus.
- Find the angle of departure from the complex poles.
- Find the gain and frequency at the points of intersection between the root locus and the imaginary axis.
- Find the range of the gain K for which the system is stable.

Question 5:

A control system with unity feedback has the forward transfer function

$$G(s) = \frac{K_n}{s(1+0.015s)(1+0.025s)(1+s)}$$

- For $K_n=1$ Draw the log magnitude and phase diagram.
- For the same gain, check stability and find the Gain and Phase Margins.

Best Wishes

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