



# COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Computer Control Engineering

Lecturer : Staff Group

Course : Automatic Control Systems

Course No. : EE 418T Marks : 40

Date : 13 / 1 / 2015 Time : 9 : 11

## FINAL Examination Paper

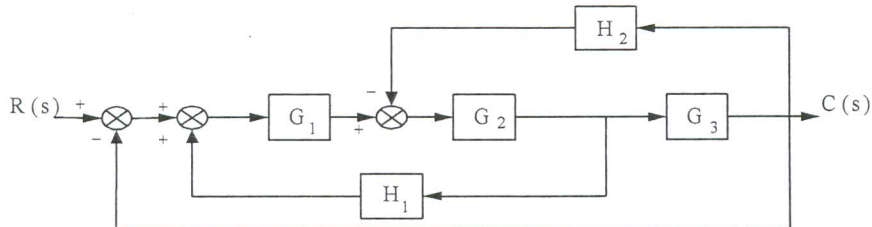
Answer the following questions:

### Question 1:

Find the closed loop transfer function block diagram  $\frac{C(s)}{R(s)}$  of the system represented by the

following block diagram using:

- Block diagram reduction Technique
- Signal flow graph



[10 Marks]

### Question 2:

For a system has the following open loop transfer function

$$KG(s) = \frac{K}{s(s^2 + 3s + 2)}$$

with a unity feedback,

- Sketch the root locus for the system, showing all details on the graph.
- Determine the intersection point of the loci with the imaginary axis and the corresponding values of the gain  $K$  and the value of  $\omega$ .
- Calculate the required value of the gain  $K$ , for the system to have a damping factor  $\xi=0.5$ .

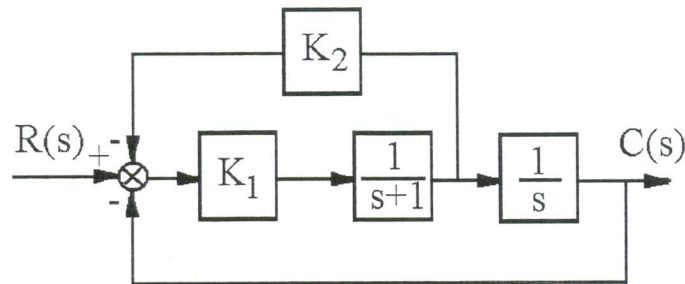
[10 Marks]

P.T.O

Members of Course Examination Committee:	Signature:	Date:
Lecturer: Staff	<i>m. masleff</i>	6/1/2015
Course Coordinator:	<i>[Signature]</i>	6/1/2015
Head of Department:	<i>Hamdy</i>	6/1/2015

**Question 3:**

For the control system shown in Fig.



- Obtain the overall transfer function.
- Calculate the values of  $K_1$  and  $K_2$ , so that the maximum overshoot for the unit step response is 0.2 and the peak time is 1 second.
- With these values of  $K_1$  and  $K_2$ , obtain the steady state error with respect to a ramp input function  $r(t) = 4t$ .

[10 Marks]

**Question 4:**

- Classify the control action; describe the Two-Step (ON – OFF) control, giving an example for this controller applicable in marine engineering.
- Illustrate in neat sketch, the bridge control of the main diesel engine in ship.

[10 Marks]

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