COLLEGE OF ENGINEERING & TECHNOLOGY

Department : **Electrical & Control Engineering.**
Lecturer : **Prof.Ezz Eldien Zakzouk.**
Course : **Control S\systems I**
Course Code : **EE411** **Time** : **2 hours**
Date : **16/1/2016** **Marks: 40**

Final Examination Paper

Q1- For the circuit shown in Fig.1, Find the T.F $\frac{V_o(s)}{V_i(s)}$, then: **(10 marks)**

- Place the pole and zero in s-plane. **(A-15, B-2, B-5, C-1)**
- If $s_d = -2 \pm 2j$ (dominant poles of a system):
  - Find the angle contribution of this circuit to a control system if it is connected to the feed forward T.F. of the system in series.
  - Find the maximum phase of this circuit in Bode plot and the frequency at which this phase is attained.

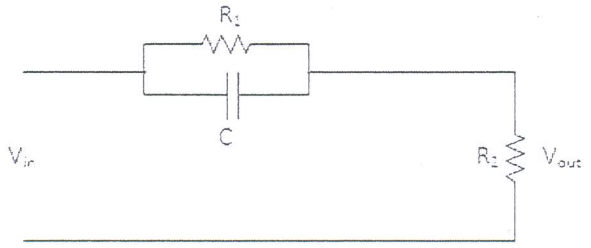

Fig. 1
$R_1 = 1\ M\Omega$, $R_2 = 1\ M\Omega$, $C = 1\ \mu F$

Q2- Consider the system shown in Fig. 2: **(15 marks)**
(A-5, B-2, B-5, C-1)

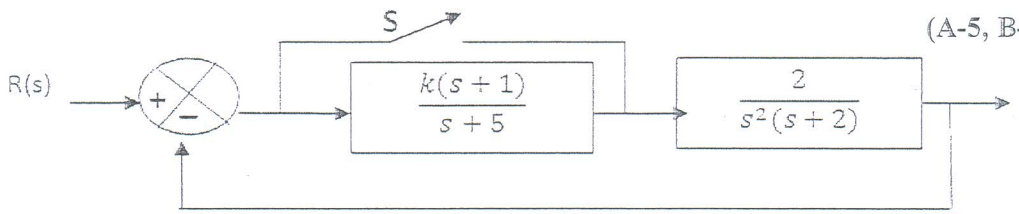

Fig. 2

The switch **S** was initially closed. Draw the R.L and find the corresponding characteristic roots. Is the system stable?
The switch s is now opened, draw the Nyquist plot and discuss the system stability. Verify your answer using Bode plot.

Members of course Examination Committee	Signature	Date
Lecturer: Prof.Ezz Eldien Zakzouk.		5/11/2016
Course Coordinator: Dr. Ahmed El Shenawy		5/11/2016
Head of Department: Prof.Hamdy Ashour.	Hamdy	5/11/2016

Q3- Consider the control system shown in Fig. 3: **(15 marks)**

(A-2, B-3, C-1)

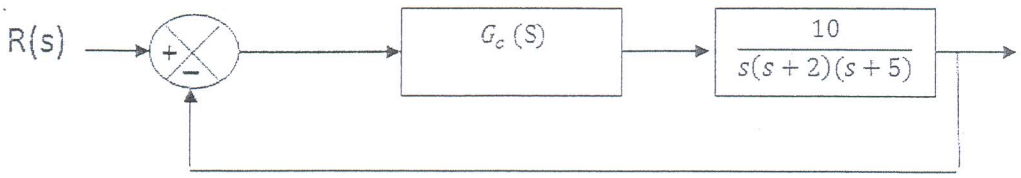

Fig. 3

Design a compensator such that the dominant closed loop poles are located at $s = -1 \pm \sqrt{3}j$ and the static velocity error constant is 10sec^{-1}. Find maximum overshoot, settling time and steady state error for unit step input.

Good Luck

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