Philadelphia University **Student Name:**

Faculty of Engineering **Student Number:**

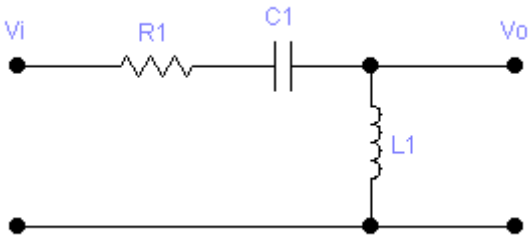
Dept. of Computer Engineering
First Exam, Second Semester: 2018/2019

Course Title: Control Systems – sec.1	**Date: 24/3/2019**
Course No: (610414+640344)	**Time Allowed: 50 minutes**
Lecturer: Dr. Mohammed Mahdi	**No. of Pages: 1**

Question 1: ***(50 Marks)***

Objectives: This question is about the electrical analogy RLC circuit.

Given the following RLC circuit.



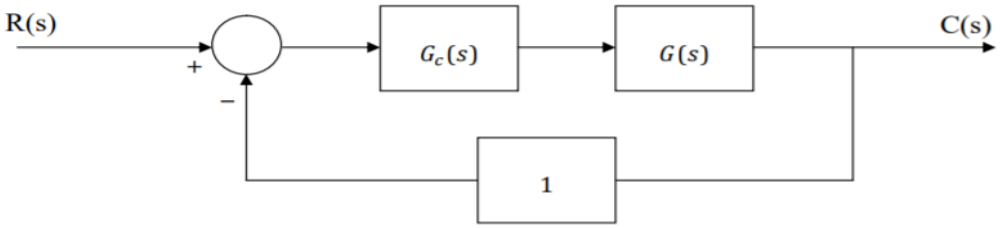
It is required to: -

1. Prove that the transfer function $\frac{Vo(s)}{Vi(s)} = \frac{s^2}{s^2+\frac{R}{L}s+\frac{1}{LC}}$ (20 marks)
2. Define circuit characteristics. (10 marks)
3. System differential equation. (10 marks)
4. Calculate Vo(0), Vo(∞) for Vi = unit impulse change in input. (10 marks)

Question 2: ***(50 Marks)***

Objectives: This question is about closed loop control system

Given the following general negative feedback control system block diagram.



If controller Gc(s) = k, feedback H(s) = 1, and process G(s) = $\frac{5}{s^2+10s+5}$, it is required to:-

1. Calculate closed loop transfer function. (10 Marks)
2. Show kinds of system's responses as a function of k. (10 Marks)
3. System's parameters for k = 4. (10 Marks)
4. C(t) for k = 4, and input is unit step change. (20 Marks)