Quiz Number:	Course Title:	Course Code:	Date:	Duration of Quiz:	Number of Questions:	Instructor:	University:	Department:
1	Systems and Control	ELEC 341	May 30, 2019	15 minutes	5	Siamak Najarian, Ph.D., P.Eng.	UBC	Electrical and Computer Engineering

Student First Name:

Student Last Name:

Student ID Number:

Please carefully read the following instructions and guidelines:

1. *Write your name and student ID number on Page 1 and Page 4.*
2. *This quiz is closed books/notes.*
3. *Cell phones and laptops are not allowed.*
4. *Regular non-graphing calculators are allowed but you cannot share your calculators.*
5. *Please do not detach the binding staple.*
6. *No need to show your detailed calculations. They will not be marked.*
7. *The answer sheet is on the last page (Page 4). Please **blacken** your answer choice.*
8. *Only the answer sheet will be marked.*
9. *You will not get a negative mark for choosing the incorrect answer.*
10. *If needed, you may use the formulas listed at the end of questions part (Page 4).*
11. *You may use Page 5 and 6 as scratch papers. They will not be marked.*

Please do not write in this table.

Question Number	Marks (out of 1)
1	
2	
3	
4	
5	
Total Grade (out of 5)	

Best of Luck!

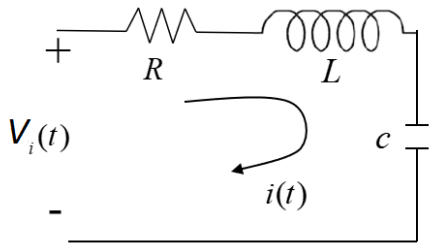
Question 1: The characteristic equation of an electromechanical system is given as:

$$Q(s) = s^4 + 3s^3 + 3s^2 + 3s + 2$$

This system is _____.

A) stable
B) marginally stable
C) unstable with one root in RHP
D) unstable with two roots in RHP

Question 2: In the following electric circuit, if all the initial conditions are zero, we can show that the Laplace transform of the current, i.e., $I(s)$ is _____. Assume R = 1 Ω, L = 1 H, C =1 F, and that a unit step voltage is applied, i.e., $V_i(t) = u(t)$.



A) $\frac{1}{s^2+s+1}$
B) $\frac{1}{s^2-s+1}$
C) $\frac{1}{s^2+2s+1}$
D) $\frac{1}{s^2-2s+1}$

Question 3: The forward transfer function in a negative feedback system is given as:

$$G(s) = \left(K_P + \frac{K_I}{s}\right)\left(\frac{1}{s(s+2)}\right)$$

When the system operates in a unity feedback configuration, the condition for the stability of the closed loop system is _____.

A) $2K_I > K_P$
B) $K_I > \frac{K_P}{2} > 0$
C) $K_P > \frac{K_I}{2} > 0$
D) $2K_I < K_P$

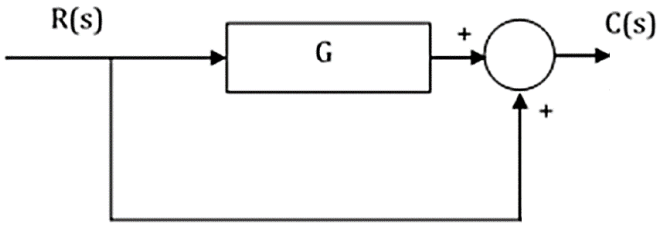
Question 4: If $f(t)$ is given as:

$$f(t) = L^{-1}\left[\frac{3s+1}{s^3+4s^2+(K-3)s}\right] \text{ and } \lim_{t\to\infty} f(t) = 1,$$

where L^{-1} is the inverse Laplace of the given $F(s)$, then the value of K is _____.

A) 1
B) 2
C) 3
D) 4

Question 5: In the following block diagram, the transfer function $C(s)/R(s)$ is _____.



A) $1 - G(s)$
B) $\frac{G(s)}{1+G(s)}$
C) $1 + G(s)$
D) $\frac{G(s)}{1-G(s)}$

End of Questions

Formula Sheet:

Final value theorem:

$$\lim_{t\to\infty} f(t) = \lim_{s\to 0} sF(s)$$

Answer Sheet:

Question Number	A	B	C	D
1				
2				
3				
4				
5				

Student First Name:

Student Last Name:

Student ID Number:

Scratch Paper (will not be marked)

Scratch Paper (will not be marked)

Answer Sheet:

Question Number	A	B	C	D
1		■		
2	■			
3			■	
4				■
5			■	