Université d'Ottawa
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University of Ottawa
Faculty of Engineering

School of Electrical Engineering
and Computer Science

**ELG4157 Modern Control Engineering: Midterm 1 February 13, 2018**

**Name:** **Number:**

You are given an inductor, $L =$ mH, a capacitor, $C =$ mF, and a resistance, $R =$ Ω, a diode switch with PWM duty cycle of % to design and implement a Buck DC to DC converter.

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| Q1/2 | Draw the circuit diagram of the buck converter with idealized waveform and the related equivalent circuits. |

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| Q2/1 | Write the differential equations of the Buck converter. |
| Q3/2 | Model the Buck converter in the state variable form by averaging. |

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| Q4/1 | Obtain the transfer function of the system in the frequency domain. |
| Q5/2 | Design the state feedback gains to obtain OS of ( ) and settling time of ( ). |

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| Q6/2 | Realize and draw the state feedback gains as estimated from Q5. |