# ME729 Advanced Robotics - Homework #5

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Sangsin Park, Ph.D.

Email me *a pdf file* by next Monday 6 p.m.

1. There is a DC motor's block diagram. V_i, R_a, L_a, K_t, T_L, J, B, and K_e are a input voltage, an armature resistance, an armature inductance, a torque constant, a load torque, a moment of inertia of the rotor, and a back-EMF constant, respectively. In addition, I_a, T_g, Ω, θ, and V_g are an armature current, a generated torque, the shaft angular velocity, the shaft angular position, and a generated voltage, respectively. [5]
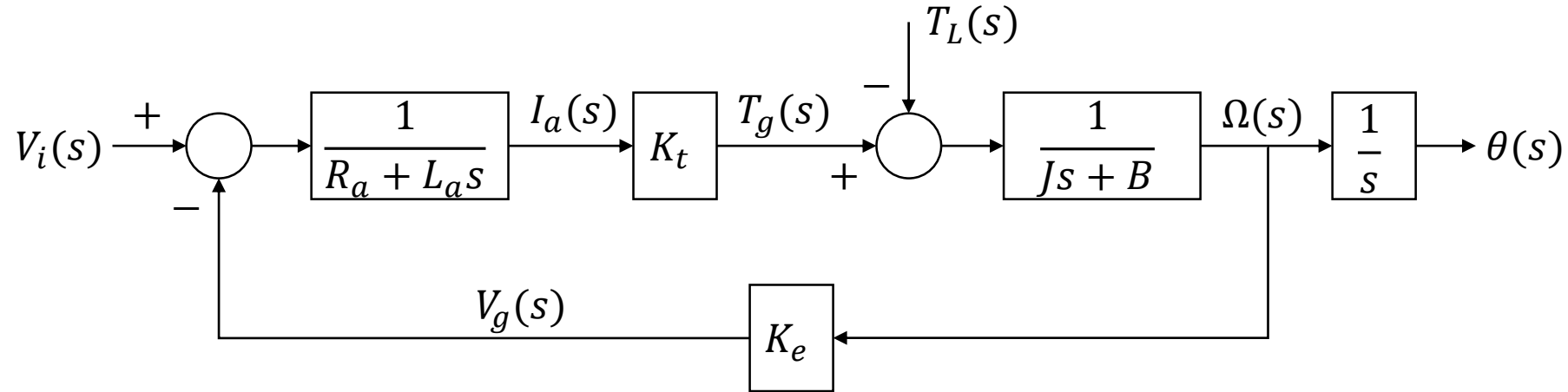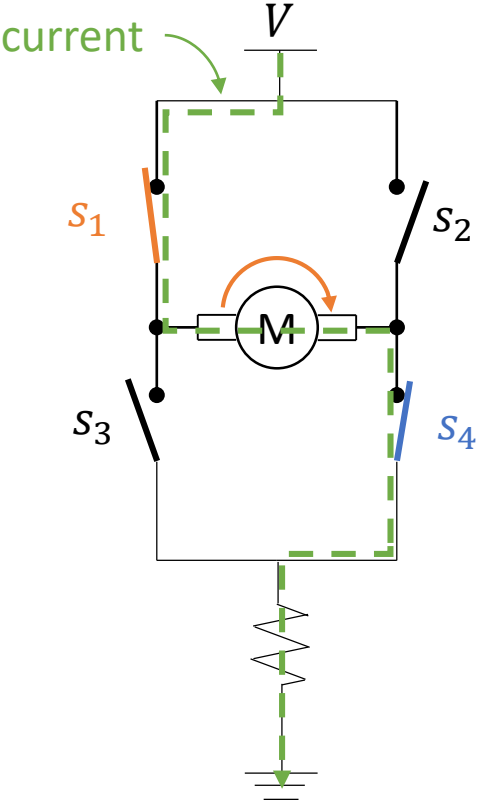

1) Calculate the following transfer function, if $T_L(s) = 0$. [3]

$$\frac{\theta(s)}{V_i(s)} = ?$$

2) Explain why is the V_g generated while the motor is running. [2]

2. A motor is rotating about clock-wise direction. If you want to stop the motor rotation, there are five combinations of the switches. Find out the combinations. [5]

[Clock-Wise rotation]

S_1	On
S_2	Off
S_3	Off
S_4	On

stop →

S_1	
S_2	
S_3	
S_4	

S_1	
S_2	
S_3	
S_4	

S_1	
S_2	
S_3	
S_4	

S_1	
S_2	
S_3	
S_4	

S_1	
S_2	
S_3	
S_4	