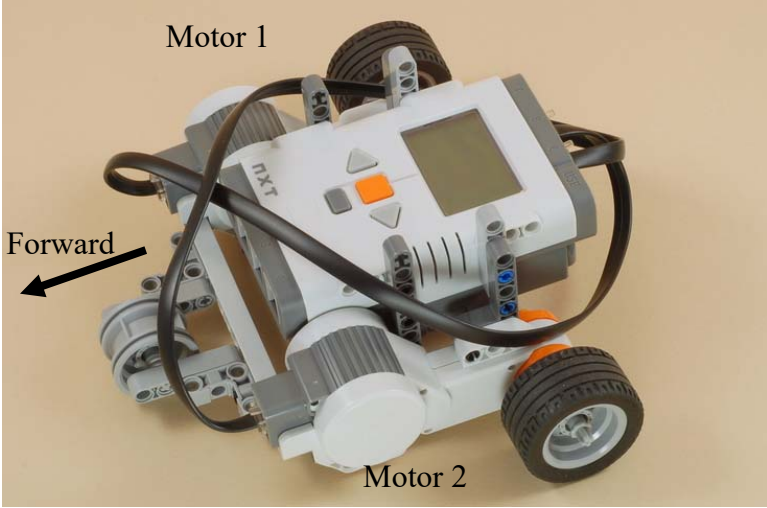


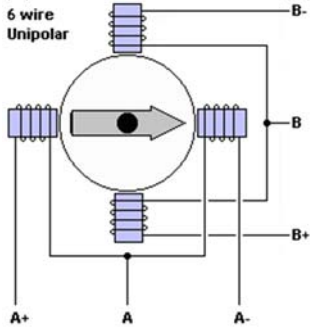
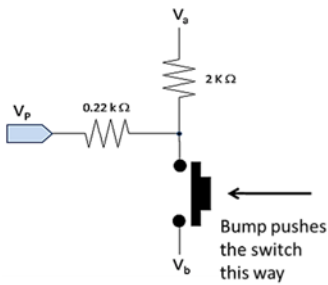
CMPE 483- Introduction to Robotics

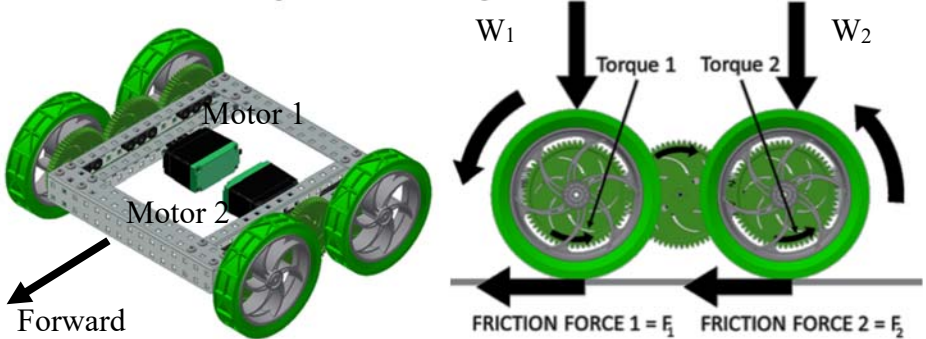

SAMPLE QUIZ

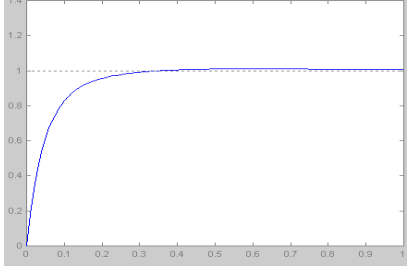
Student Name: _____ ID: _____

(PLEASE WRITE the correct answer's letter ONLY in the right hand column)

	<p>Consider the following NXT design from the basic rover designs provided with the kit, for Q# 1-4.</p>  <p>CW = Clockwise, CCW = Counter Clockwise, (for determining this, we look towards the moving 'orange' part of the motor from the side of wheel with the orientation of the motor as shown)</p>	
1	<p>This design is an example of _____ type of drive. (a) Steer (b) car (c) track (d) None of these.</p>	D
2	<p>If Motor 2 moves CCW to make the robot move forward, Motor 1 must _____ in order to make the robot move forward in straight line. (a) CW (b) CCW (c) NOT move (d) None of these</p>	A
3	<p>In order to turn RIGHT, Motor 2 must _____ (a) turn CW (b) turn CCW (c) NOT move (d) None of these</p>	B
4	<p>The front wheel (without the tire) must be turned _____ for the robot to turn RIGHT. (a) right (b) left (c) backwards (d) None of these.</p>	D
5	<p>Suppose the Follower gear of a gear train is connected to the shaft of the AC generator. This implies that the rotation frequency (RPS; revolutions per second) will also define the frequency of the sine-wave output from the generator. The Follower gear has 100 teeth and is connected to another gear with 50 teeth which is then connected to another gear similar to itself. This second gear is then connected to a bigger gear with 500 teeth which is being driven by a small diesel engine which can make it move at 2 RPS. What is the frequency of the output of the generator? All the gears are SPUR gears and are connected in normal parallel shaft method. (a) 50 (b) 10 (c) 5 (d) None of these</p>	B
6	<p>Following is NOT a device that can be connected to the NXT brick: (a) ultrasonic sensor (b) LDR (c) microphone (d) None of these.</p>	D
7	<p>Humanoid robots built using passive dynamics usually rely on _____ for _____</p>	B

	<p>their motion.</p> <p>(a) many motors (b) balanced symmetric movable structure (c) very rigid structure (d) None of these</p>	
8	<p>Main advantage of using hydraulic actuation over motor based actuation is:</p> <p>(a) it produces smoother motion (b) it can transmit force in any direction not circular only (c) it can lift heavier weights (d) None of these.</p>	
9	<p>Consider A DC motor whose full speed is achieved with a 10 volts DC input. If this 10 volts input is now replaced with a pulse train with 60% Duty Cycle, then the speed will:</p> <p>(a) Reduced by 40% (b) increased by 60% (c) reduced by 60% (d) None of these.</p>	
10	<p>For a 6-wire stepper motor (shown below diagrammatically), _____ must be used as the drive circuit.</p> <p>(a) H-bridge (b) 6 Relays (c) 6 NPN transistors (d) None of these.</p> 	
11	<p>A suitable sensor to continuously monitor the speed of a NXT robot could be:</p> <p>(a) ultrasonic sensor (b) restricted rotation potentiometer (c) a DC Motor (d) None of these.</p>	
12	<p>Following sensor Can Not be used as obstacle detector for the NXT robot:</p> <p>(a) Ping sensor (b) Bumpers (c) IR Sensor (d) None of these.</p>	
13	<p>In an oil-based hydraulic system, the force multiplication takes place due to:</p> <p>(a) different lengths of pipes (b) larger diameter cylinders for load (c) smaller diameter cylinders for load (d) None of these.</p>	B
14	<p>Consider a bump switch as connected on the NXT as shown in the following circuit:</p>  <p>If $V_a = 5$ volts and $V_b = \text{Ground}$, then the Port voltage V_p should be read as Logic _____ when the robot bumps into an obstacle.</p> <p>(a) 0 (b) 1 (c) not defined (d) None of these.</p>	
15	<p>Repeat Q#14 for $V_a = \text{GND}$ volts and $V_b = 5$ volts.</p>	

	(a) 0 (b) 1 (c) not defined (d) None of these.	
16	When the first pulse is given to the Ultrasonic sensor it _____ (a) starts the pulse whose width corresponds to the obstacle distance (b) starts the ultrasonic burst (c) turns ON the sensor (d) None of these.	
	<p>Consider the following robot with Four equally distributed wheels and two DC motors connected to the wheels using simple spur gears. One side of this connection is shown magnified on the right side below.</p>  <p>The robot is moving towards LEFT. Each gear is a Spur type gear with 60 teeth. Use this figure for Q#17-19.</p>	
17	If the total weight of the robot (excluding the wheels) is 2 Kg, then W_1 should be: (a) 2 Kg (b) $\frac{1}{2}$ Kg (c) 1 Kg (d) None of these	B
18	The motor is driving the central gear at 10 RPM. The speed at which the wheels should be rotating is _____ RPM. (a) 10 (b) 20 (c) 5 (d) None of these	A
19	If the radius of each wheel is 1 inch, then the ground speed of this robot is _____ inches per minute (approximately). (a) 31.4 (b) 62.8 (c) 10 (d) None of these	B
20	Following is Not a reason to use Optical Wheel Encoding patterns: (a) Speed measurement (b) Wheel's Direction of motion (c) Alignment of wheels (d) None of these.	
	<p>Consider the following gear train with the numbers of teeth shown for Q#21-24:</p> 	
21	Most probably the driver gear is: (a) 75 teeth gear (b) 25 teeth gear (c) Worm Gear (d) None of these	C
22	Most probably the follower gear is:	A

	(a) 75 teeth gear (b) 25 teeth gear (c) Worm Gear (d) None of these	
23	This gear train will result in: (a) Gearing up (b) Gearing down (c) 1:1 speed (d) None of these	B
24	The gear ratio between the 15 teeth gear and the 25 teeth gear is: (a) 1:2 (b) 1:4 (c) 3:5 (d) None of these	D
25	 <p>When the DC input is turned ON (at $t = 0$ seconds), the DC motor turns on to finally reach its maximum speed with the behavior curve shown on the left (x-axis \Rightarrow Time, y-axis \Rightarrow Speed). This behavior is primarily due to _____</p> <p>(a) inductive back EMF (b) ohm's law for resistors (c) motor inertia (d) None of these.</p>	