MEEE 210 ELECTRICAL MACHINES – Laboratory 2

Group # :	Name-Surname: Student ID #:	Point:

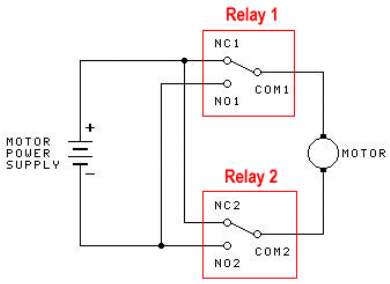
LABORATORY CONTENT: Driving a DC motor using relay and transistor

EQUIPMENT REQUIRED: (students should bring electtronics components)

Qty	Description
1	DC motor (less than 0.5 A)
1	Function Generator (will be ready at Lab)
1	Multimeter
1	Breadboard
4	2N2222 transistor
4	1N4001 diode
4	150 ohm resistor
-	Wiring equipments (jumper cables, crocodiles, etc.)

INTRODUCTION:

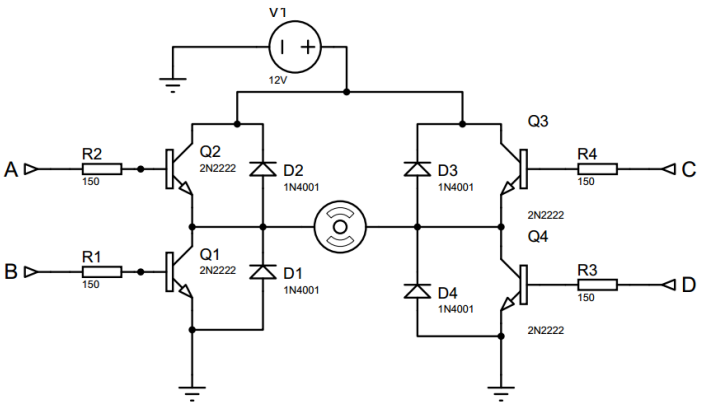
For two-way DC motor control, the primitive idea is that the terminals of the motor should be swapped to change the current direction flowing through the motor. On the right side, a basic model is given using two relays, which is already used in daily life and industrial applications. Latching each relay in proper variation solves the problem. By using semi-conductors, this task is accomplished basically by using H-bridge. Furthermore, the terminal voltage can be set, so does its torque.



PRELIMINARY QUESTIONS:

1) Read the exercise steps carefully. Investigate about driving a DC motor with a PWM signal and the bridge circuit given in the following figure.

EXERCISE STEPS:



1) Test your motor if the motor is working properly or not. To do this, between the motor terminals, using the voltage supply, directly apply a voltage with equal or less than the voltage value typed on the motor. Be careful that the motor may slip from your hand or the desk when the rotor starts rotating.

2) Set up the circuit on the right side.

3) Set the function generator to 10 $V_{p\text{-}p}$ PWM signal at 1 kHz with duty cycle 50%.

4) Connect an amperemeter to the motor.

5) Apply PWM signal to A and D pins at the same, B-C pins should be grounded. Fill Table 1.

6) Disconnect PWM signal from A-D and do the opposite connection where PWM signal connecting to B and C pins. Fill Table 2. (Note: Do not change direction of amperemeter probes during measurement, leave it as in Step 5.)

POSTLIMINARY QUESTIONS:

1) Generate a correlation between duty cycle and the current flowing through rotor using Table 1 and 2.

Table 1. PWM signal applied to A-D pins.

Duty Cycle	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
i (mA)										

Table 2. PWM signal applied to B-C pins.

Duty Cycle	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
i (mA)										