MEE ELECTRICAL MACHINES – Experiment #6

LABORATORY CONTENT: Power amplifiers

EQUIPMENT REQUIRED: (students should bring electronic components)

Qty	Description
1	Voltage supply (will be ready at lab.)
1	DC motor (5-6V or 12V, 1A nominal current at max)
1	*2N2222 (these components may fail during application, advised to bring extra for backup)
1	*2N2907 (these components may fail during application, advised to bring extra for backup)
2	*LM741 (these components may fail during application, advised to bring extra for backup)
2	1k resistor
1	10k potentiometer
-	Wiring equipments (jumper cables, crocodiles, etc.)

**** You may use equivalent components as well, just look up the datasheet for the component specifications***

PRELIMINARY QUESTIONS:

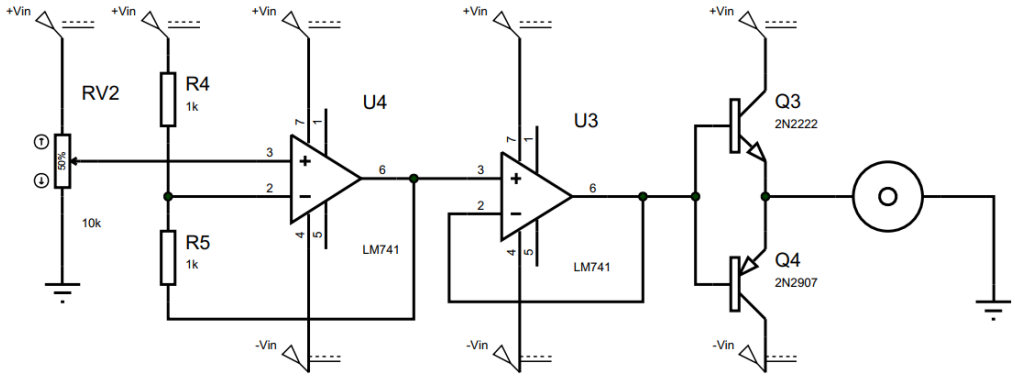
1) Search about the power amplifier classes (A, B, AB, C and D). Draw their circuits basically. Briefly describe the field of applications, advantages and disadvantages (two sentences/matters at max. for each is enough).

2) Simulate a B class and an AB class amplifier. Print/plot the results of input and output voltage for input voltage 5 $V_{p\text{-}p}$ at 50Hz, 100Hz and 500Hz. Comment about the crossover distortions.

3) Briefly describe the terms nominal and rated currents of the electrical motors.

EXERCISE STEPS:

1) Apply the B class amplifier circuit below. Change the potentiometer to have two-directional motion with the DC motor.



POSTLIMINARY QUESTIONS:

1) Write down the voltage equation applied on the transistor base pins.

2) Compare this work with the one in 5th experiment and comment about the advantages/disadvantages with the field of applications.

3) For a fundamental npn-type transistor circuit (consisting of one transistor, a resistive load, supply voltage, control signal and a base-pin resistor), find the formula of heat loss with the transistor (where most of the efficiency losses occur in the amplifier circuits). Show it with a simple example (numerical). (Hint: This is not about a datasheet parameter or plot, it is about P=V*I fundamental formula)

IMPORTANT NOTE: For the next experiment, you need to build up some contents. So, the ones who are not prepared for the experiment will not be allowed to participate.