NAME ______________________________ DATE __________

CHAPTER 21 PRACTICAL ASSIGNMENTS

1. Display each of the following types of voltage sources on the screen of an oscilloscope:
   (a) pure DC from a battery
   (b) AC sine wave from a bell transformer
   (c) varying DC from a variable DC power supply
   (d) square wave from a signal generator
   (e) sawtooth wave from a signal generator
2. (a) Demonstrate the generation of an AC voltage using a coil of wire, permanent magnet, and AC millivoltmeter or center-zero galvanometer.
   (b) Explain the *two* ways in which an AC voltage can be generated.
   (c) State what affect each of the following changes has on the amount of AC voltage generated:
      (i) increase in the rate at which the coil or magnet is moved;
      (ii) increase in the number of turns of wire on the coil;
      (iii) use a stronger permanent magnet
3. (a) Measure the peak-to-peak output voltage of the secondary coil of a bell transformer with an oscilloscope.
   (b) Calculate the peak value of this voltage.
   (c) Calculate the effective or rms value of this voltage.
   (d) Record the effective or rms value of this voltage as measured with an AC voltmeter.
   (e) Record the difference between the calculated and measured effective-voltage values.
4. (a) Construct the motor-generator circuit shown in Figure 21-5 using any low-voltage (3–12 V) permanent magnet DC hobby motors that are available. The second small DC motor will be used as a generator. This will work since the construction of a DC generator and DC motor are similar.
   (b) Vary the speed of the motor (prime mover) by varying the voltage supplied to it from zero to its maximum rated value. Record the value and polarity of the generated output voltage when rated voltage is applied to the prime mover. How does the speed of the prime mover affect the amount of voltage generated?
   (c) Repeat part 4(b) with the motor running in the reverse direction (reverse the leads to the motor). How does reversing the direction of rotation affect the value and polarity of the generated output voltage?
   (d) Connect a lamp of suitable voltage in parallel across the output of the DC generator and once again vary the speed of the prime mover. Record the voltage range of the DC output voltage generated. How does the amount of output voltage generated without the lamp load compare to that generated with the lamp load connected?
   (e) Connect a DC ammeter in series with the *motor* and record the current drawn by the prime mover with and without the lamp load connected. How does the lamp load affect the current drawn by the motor?

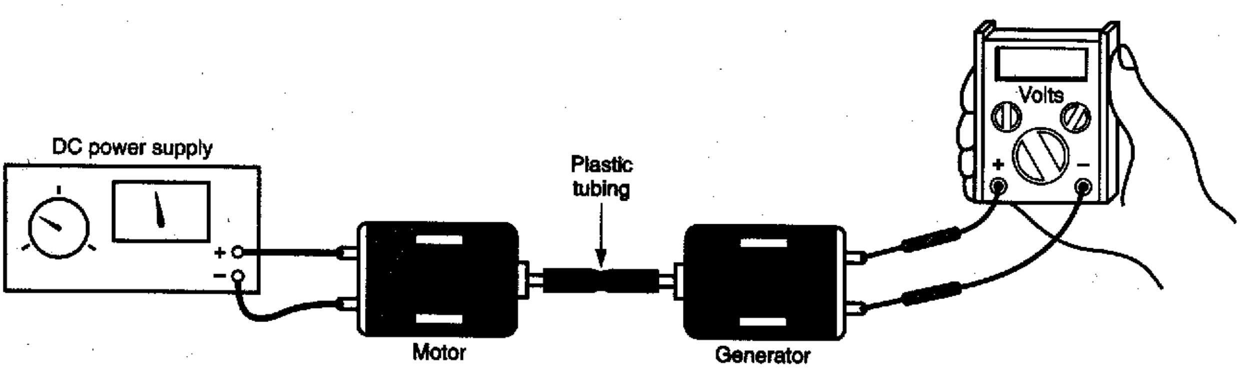

FIGURE 21-5

5. (a) Wire the separately excited DC generator circuit shown in Figure 21-6 using whatever DC generator and prime mover is available.
   (b) With the generator rotating, vary the field current and record the range of the output voltage. What should happen to the generated output voltage when the field current increases? Why?
   (c) Reconnect the generator as a *self-excited* DC shunt generator. With the generator rotating, vary the field current and record the range of the output voltage. (If the generator output voltage fails build up, reverse the leads to the shunt field.)

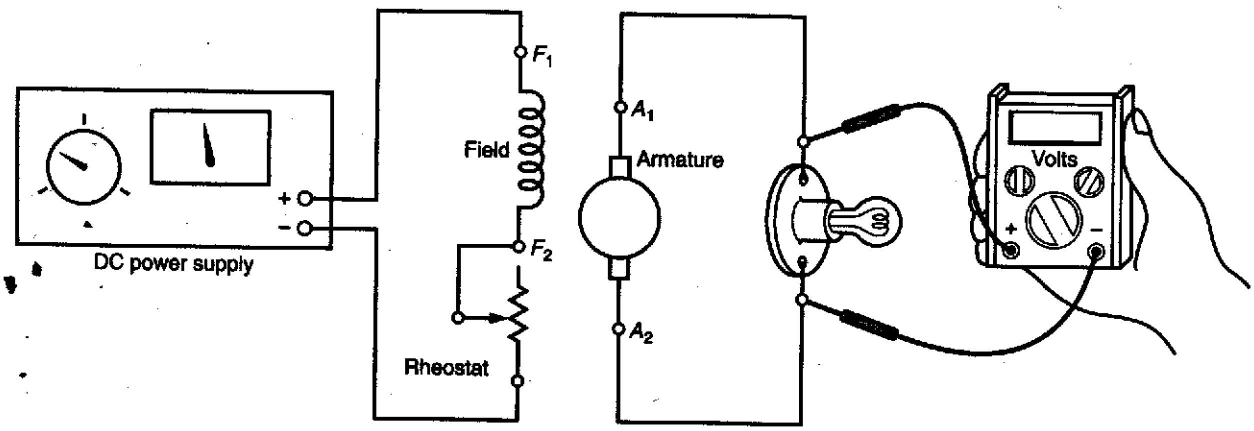

FIGURE 21-6