Worksheet 6.8 Back EMF *Do on separate sheet of paper.*

1. A 120 V DC motor draws 12.0 A when it reaches its full operating speed. If the resistance of the armature of this motor is 6.0 Ω, what is the back emf when it reaches its full operating speed? (48 V)

2. A 120 V motor draws 15.0 A when it reaches its full operating speed and 40.0 A when it is initially turned on. Find.

a) The resistance of the armature. (3.00 Ω)

b) The back emf when it reaches its full operating speed. (75 V)

3. A 120 V motor draws 9.0 A when it reaches its full operating speed. If the resistance of the armature is 5.0 Ω, find.

a) The back emf when the motor is operating at full speed. (75 V)

b) The back emf when the motor is initially turned on. (0 V)

c) The current when the motor is initially turned on. (24 A)

4. The armature of a 120V motor slows down because of an increased load (for example an electric lawn mower enters thick, tall grass). The resistance of the armature is 6.0 Ω, and the current drawn by the motor when operating at full speed is 3.6 A. The current drawn by the motor when the increased load is applied is 8.4 A.

a) Explain why the motor (armature) gets hotter when the increased load slows it down.

b) Explain why the current through the armature increase when the load is increased.

c) What is the back emf when

    i.   the motor is operating at full speed. (98 V)
    ii.   the motor slowed down because of the increased load. (70 V)

5. The back emf in a motor is 90.0 V when the armature of the motor is turning at 1000 rev/min. What is the back emf in the same motor when the motor is turning 500 rev/min? (45.0 V)

6. The current drawn by a 120 V motor when the motor is turned on is 10.0 A and 3.0 A when it is operating at its full speed.

a) What is the resistance of the armature? (12.0 ohms)

b) What is the back emf when the motor is operating at full speed? (84 V)