Physics 126 Discussion #9: Chapter 22.1-22.5

1. A 1.0 m long conducting rod is moving perpendicular to a 0.35 T magnetic field. How fast must the rod move in order to produce an emf of 12 V across its ends?

2. A conducting bar such as that in Figure 22.4b in the text moves perpendicular to a 1.5 T magnetic field with a constant speed of 150 m/s. The conducting bar delivers a current of 5.5 A to a 6.0 Ω load. How long is the bar? How much force is necessary to keep the bar moving at constant speed?
3. A 0.25 m long coil consists of 560 square turns 6.5 cm on a side. The coil is placed in a uniform magnetic field of strength 1.2 T. Initially the coil is oriented so that its axis coincides with the magnetic field direction. The coil is then rotated 90° about an axis perpendicular to the magnetic field direction in 0.20 ms. What is the magnitude of the emf induced in the coil?

4. A ring of aluminum is placed over the iron core of an electromagnet as shown in the drawing. The current in the coil of the electromagnet is 60.0 Hz ac. Use Lenz's Law to show that the flux change due only to the time changing magnetic field through the ring is insufficient to explain why the ring is repelled from the electromagnet.