

Mixed Review

Induction and Alternating Current

1. Which of the following actions will induce an emf in a conductor?

- a. Move a magnet near the conductor.
- b. Move the conductor near a magnet.
- c. Rotate the conductor in a magnetic field.
- d. Change the magnetic field strength.
- e. all of the above

2. A circular loop (10 turns) with a radius of 29 cm is in a magnetic field that oscillates uniformly between 0.95 T and 0.45 T with a period of 1.00 s.

a. How much time is required for the field to change from 0.95 T to 0.45 T?

b. What is the cross-sectional area of one turn of the loop?

c. Assuming that the loop is perpendicular to the magnetic field, what is the induced emf in the loop?

3. Electric generators convert mechanical energy into electrical energy.

a. What are the requirements for generating emf?

b. The mechanical energy input is usually rotational motion. What are two possible sources of rotational motion?

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4. A 250-turn generator with circular loops of radius 15 cm rotates at 60.0 rpm in a magnetic field with a strength of 1.00 T.

a. What is the angular speed of the loops?

b. What is the area of one loop?

c. What is the maximum emf?

d. What is the rms emf?

5. An electric motor is sometimes called a generator in reverse. Explain your understanding of this statement.

6. Consider a two-coil transformer joined by a common iron core.

a. If the current in the primary side is increased, what happens to the magnetic field in the core?

b. What effect does the answer to item 6a have on the secondary coil?

c. Fully explain the effect of reducing the current to the primary side of a transformer.
