Questions

Chapter 30
Induction and Inductance

30-3 Faraday's Law of Induction
final-062

A 1.7-T uniform magnetic field makes an angle of 30^0 with the z axis. The magnetic flux through an area of 4.0-m^2 lying in the xy-plane is:

A)A) 6.0 $T.m^2$
B)B) 4. 0 $T.m^2$
C)C) 3.4 $T.m^2$
D)D) 8. 0 $T.m^2$
E)E) 1. 2 $T.m^2$

Answer A

30-3 Faraday's Law of Induction
final-062

A uniform magnetic filed B is perpendicular to a loop of an area 1.5 m^2. The resistance of the wire forming the loop is 2.50 **Ω**. At what rate must the magnitude of the magnetic field **B** change to induce a current of 0.3 **A** ?

A) 0.3 T/s
B) 0.5 T/s
C) 0.1 T/s
D) 1.0 T/s
E) 1.5 T/s

Answer B

30-3 Faraday's Law of Induction
final-061

Each turn of a 150-turn coil, encloses an area of 0.8 m^2. What should be the rate of change of a magnetic field parallel to its axis in order to induce a current of 0.1 A in the coil? [The resistance of the coil is 600 Ohm]

A) 0.24 T/s.
B) 0.13 T/s.
C) 0.50 T/s .
D) 7.51 T/s.
E) Zero.

Answer C

30-3 Faraday's Law of Induction
final-061

A constant magnetic flux of 4.0×10^{-5} Wb is maintained through a coil for 0.5 s. What emf is induced in the coil by this flux during that period?

A) - 2.0×10^{-4} V.
B) 4.0×10^{-6} V.
C) - 4.0×10^{-6} V.
D) 2.0×10^{-4} V.
E) Zero .

Answer E

30-3 Faraday's Law of Induction
final-042

A small circular loop of area 0.50 cm^2 is placed in the plane of, and concentric with, a large circular loop of radius 2.0 m. The current in the large loop is changed uniformly from +100 A to –100 A in a time of 0.50 s. Find the emf induced in the small loop in this time interval (Assume the field is uniform through the smaller loop).

A)3.1 $x10^{-8}$ V.
B)9.2 $x10^{-9}$ V.
C)5.0 $x10^{-8}$ V.
D)6.3 $x10^{-9}$ V .
E)7.5 $x10^{-6}$ V.

Answer D

30-3 Faraday's Law of Induction
final-042

A long straight wire is in the plane of a circular conducting loop as shown in figure 9. The straight wire carries a constant current I in the direction shown. The circular loop starts moving to the left. The induced current in the circular loop is:

A)clockwise.
B)counter clockwise .
C)zero.
D)2I.
E)4I.

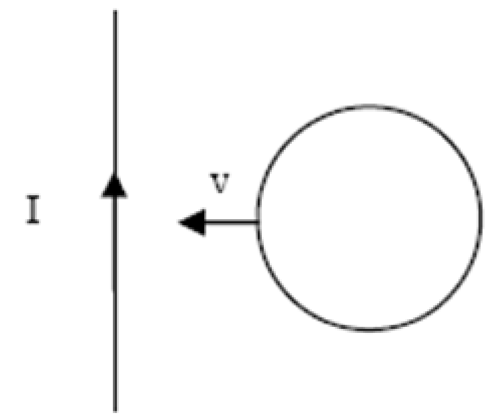

Figure 9

Answer B

30-3 Faraday's Law of Induction
final-041

A circular wire loop, of an area 0.10 m^2, is initially oriented so that its plane is perpendicular to a 0.40 T magnetic field. When the loop is rotated so that its plane is parallel to the field, a 25 V average potential difference is induced across the loop. The time (in seconds) required to make this rotation of the loop is

A)$4.5\ x10^{-3}$.
B)$1.6\ x10^{-3}$.
C)$1.2\ x10^{-3}$.
D)$3.3\ x10^{-3}$.
E)$1.0\ x10^{-3}$.

Answer B

30-3 Faraday's Law of Induction
final-041

A 2.0 m long copper wire, with resistance 5.0 Ohm, is formed into a square loop and placed perpendicular to a uniform magnetic field that is increasing at the constant rate of 10.0 mT/s, at what rate is thermal energy generated in the loop?

A)2.1 $\times 10^{-4}$ W.
B)4.5 $\times 10^{-6}$ W.
C)3.2 $\times 10^{-3}$ W.
D)1.3 $\times 10^{-6}$ W .
E)0.1 $\times 10^{-6}$ W.

Answer D