Question 1 2 / 2 points

Which one of the following combinations of units is equivalent to one henry?

a) $N \cdot m \cdot s/C$

b) $N \cdot m \cdot s^2/C$

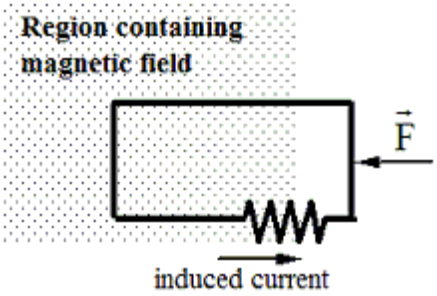
c) $N \cdot m \cdot s^2/C^2$

d) $N \cdot m \cdot C^2/s^2$

e) $N \cdot m \cdot C/s^2$

Question 2 2 / 2 points

A loop with a resistance of 4.0 Ω is pushed to the left at a constant speed of 2.0 m/s by a 24 N force. At the instant shown in the figure, the loop is partially in and partially out of a uniform magnetic field. An induced current flows from left to right through the resistor. The length and width of the loop are 2.0 m and 1.0 m, respectively.



Reference: Ref 22-9

At what rate is energy dissipated by the resistor?

a) 96 W

b) 130 W

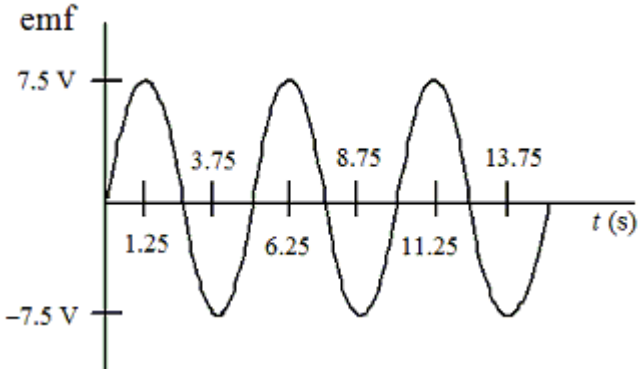
c) 32 W

d) 8.0 W

e) 49 W

Question 3 2 / 2 points

A single conducting loop with an area of 2.0 m^2 rotates in a uniform magnetic field so that the induced emf has a sinusoidal time dependence as shown.



Reference: Ref 22-3

With what angular frequency does the loop rotate?

a) 1.26 rad/s

b) 0.30 rad/s

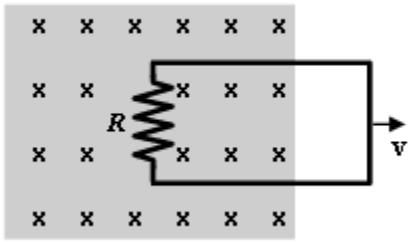
c) 0.80 rad/s

d) 0.16 rad/s

e) 0.52 rad/s

Question 4 2 / 2 points

A circuit is pulled with a 21-N force toward the right to maintain a constant speed **v**. At the instant shown, the loop is partially in and partially out of a uniform magnetic field that is directed into the paper. As the circuit moves, a 4.0-A current flows through a 6.0-Ω resistor.



Reference: Ref 22-2

Which one of the following statements concerning this situation is true?

a) The induced current flows clockwise around the circuit.

b) If the circuit were replaced with a wooden loop, there would be no induced emf.

c) The temperature of the circuit remains constant.

d) As the circuit moves through the field, the field does work to produce the current.

e) Since the circuit moves with constant speed, the force **F** does zero work.

Question 5 2 / 2 points

A conducting loop has an area of 0.065 m^2 and is positioned such that a uniform magnetic field is perpendicular to the plane of the loop. When the magnitude of the magnetic field *decreases* to 0.30 T in 0.087 s, the average induced emf in the loop is 1.2 V. What is the initial value of the magnetic field?

a) 0.75 T

b) 0.42 T

c) 0.87 T

d) 1.2 T

e) 1.9 T

Question 6 2 / 2 points

A 0.60-T magnetic field is directed perpendicular to the plane of a circular loop of radius 0.40 m. What is the magnitude of the magnetic flux through the loop?

a) zero Wb

b) 0.30 Wb

c) 0.049 Wb

d) 0.098 Wb

e) 0.24 Wb

Question 7 2 / 2 points

The angular speed of a motor is 262 rad/s. The back emf generated by the motor is 89.4 V. Assuming all other factors remain the same, determine the back emf if the angular speed of the motor is reduced to 131 rad/s.

a) 152 V

b) 32.3 V

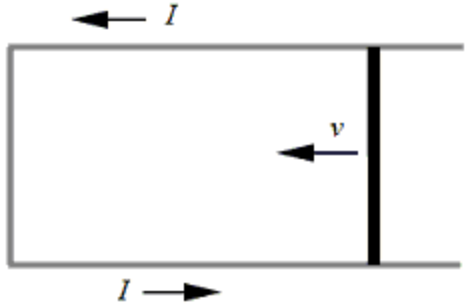
c) 44.7 V

d) 52.5 V

e) 89.4 V

Question 8 2 / 2 points

A conducting bar moves to the left at a constant speed v on two conducting rails joined at the left as shown. As a result of the bar moving through a constant magnetic field, a current I is induced in the indicated direction. Which one of the following directions is that of the magnetic field?



a) into the page

b) toward the right

c) out of the page

d) toward the left

e) parallel to the long axis of the bar

Question 9 2 / 2 points

A magnetic field is directed perpendicular to the plane of a 0.15-m × 0.30-m rectangular coil consisting of 240 loops of wire. To induce an average emf of −2.5 V in the coil, the magnetic field is increased from 0.1 T to 1.8 T during a time interval Δt. Determine Δt.

a) 0.053 s

b) 12 s

c) 6.4 s

d) 0.13 s

e) 7.3 s

Question 10 2 / 2 points

A 0.45-m metal rod moves 0.11 m in a direction that is perpendicular to a 0.80-T magnetic field in an elapsed time of 0.036 s. Assuming that the acceleration of the rod is zero m/s^2, determine the emf that exists between the ends of the rod.

a) This cannot be determined without knowing the orientation of the rod relative to the magnetic field.

b) 9.1×10^{-5} V

c) 0.27 V

d) 1.1 V

e) 0.076 V