

**quiz5****Multiple Choice**

Identify the letter of the choice that best completes the statement or answers the question.

- \_\_\_\_\_ 1. A flat coil of wire consisting of 20 turns, each with an area of  $50 \text{ cm}^2$ , is positioned perpendicularly to a uniform magnetic field that increases its magnitude at a constant rate from 2.0 T to 6.0 T in 2.0 s. If the coil has a total resistance of  $0.40 \ \Omega$ , what is the magnitude of the induced current?
- 70 mA
  - 140 mA
  - 500 mA
  - 800 mA
  - 900 mA
- \_\_\_\_\_ 2. A bar magnet is falling through a loop of wire with constant velocity. The north pole enters first. As the south pole leaves the loop of wire, the induced current (as viewed from above) will be:
- clockwise.
  - counterclockwise.
  - zero.
  - along the length of the magnet.
  - More information is needed.
- \_\_\_\_\_ 3. A 500-turn circular coil with an area of  $0.050 \text{ m}^2$  is mounted on a rotating frame, which turns at a rate of  $20.0 \text{ rad/s}$  in the presence of a  $0.050 \text{ T}$  uniform magnetic field that is perpendicular to the axis of rotation. What is the instantaneous emf in the coil at the moment that the normal to its plane is parallel to the field?
- zero
  - 125 V
  - 216 V
  - 250 V
  - 375 V
- \_\_\_\_\_ 4. By what factor is the self-inductance of an air solenoid changed if only its cross-sectional area,  $A$ , is tripled?
- $1/3$
  - 3
  - 6
  - 9
  - $1/9$
- \_\_\_\_\_ 5. An inductor, battery, resistance, and ammeter and switch are connected in series. If the switch, initially open, is now closed, what is the current's final value?
- zero
  - battery voltage divided by inductance
  - battery voltage times inductance
  - battery voltage divided by resistance
  - resistance times inductance

Name: \_\_\_\_\_

ID: A

- \_\_\_\_\_ 6. What is the stored energy in a 0.50-mH coil carrying a current of 4.0 A?
- $2.0 \times 10^{-3}$  J
  - $4.0 \times 10^{-3}$  J
  - $8.0 \times 10^{-3}$  J
  - $12 \times 10^{-3}$  J
  - $16 \times 10^{-3}$  J
- \_\_\_\_\_ 7. An airplane with a wingspan of 60.0 m flies parallel to the Earth's surface at a point where the downward component of the Earth's magnetic field is  $0.400 \times 10^{-4}$  T. If the induced potential between wingtips is 0.900 V, what is the plane's speed?
- 250 m/s
  - 338 m/s
  - 375 m/s
  - 417 m/s
  - 569 m/s
- \_\_\_\_\_ 8. A 12-V battery is connected in series with a switch, resistor and coil. If the circuit's time constant is  $2.0 \times 10^{-4}$  s and the final steady current after the switch is closed becomes 1.0 A, what is the value of the inductance?
- 1.2 mH
  - 2.4 mH
  - 9.6 mH
  - 48 mH
  - 96 mH

**quiz5**  
**Answer Section****MULTIPLE CHOICE**

- |           |        |  |
|-----------|--------|--|
| 1. ANS: C | DIF: 2 | TOP: 20.2 Faraday's Law of Induction                             |
| 2. ANS: A | DIF: 2 | TOP: 20.4 Lenz's Law Revisited (The Minus Sign in Faraday's Law) |
| 3. ANS: A | DIF: 3 | TOP: 20.5 Generators   |
| 4. ANS: B | DIF: 1 | TOP: 20.6 Self-Inductance  |
| 5. ANS: D | DIF: 1 | TOP: 20.7 RL Circuits  |
| 6. ANS: B | DIF: 2 | TOP: 20.8 Energy Stored in a Magnetic Field                      |
| 7. ANS: C | DIF: 2 | TOP: 20.3. Motional emf  |
| 8. ANS: B | DIF: 2 | TOP: 20.7 RL Circuits  |