quiz4

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

_____ 1. If a proton is released at the equator and falls toward the Earth under the influence of gravity, the magnetic force on the proton will be toward the:
   a. north.
   b. south.
   c. east.
   d. west.

_____ 2. A horizontal wire of length 3.0 m carries a current of 6.0 A and is oriented so that the current direction is 50° S of W. The Earth's magnetic field is due north at this point and has a strength of 0.14×10^{-4} T. What is the size of the force on the wire?
   a. 0.28×10^{-4} N
   b. 2.5×10^{-4} N
   c. 1.9×10^{-4} N
   d. 1.6×10^{-4} N
   e. 5.9×10^{-4} N

_____ 3. A circular loop carrying a current of 1.0 A is oriented in a magnetic field of 0.35 T. The loop has an area of 0.24 m^2 and is mounted on an axis, perpendicular to the magnetic field, which allows the loop to rotate. If the plane of the loop is oriented parallel to the field, what torque is created by the interaction of the loop current and the field?
   a. 5.8 N·m
   b. 0.68 N·m
   c. 0.084 N·m
   d. 0.017 N·m
   e. 0.0093 N·m

_____ 4. Two long parallel wires 40 cm apart are carrying currents of 10 A and 20 A in the same direction. What is the magnitude of the magnetic field halfway between the wires?
   a. 1.0×10^{-5} T
   b. 2.0×10^{-5} T
   c. 3.0×10^{-5} T
   d. 4.0×10^{-5} T
   e. 5.0×10^{-5} T

_____ 5. Two parallel wires are separated by 0.25 m. Wire A carries 5.0 A and Wire B carries 10 A, both currents in the same direction. The force on 0.80 m of Wire A is:
   a. 3.2×10^{-5} N.
   b. 2.6×10^{-5} N.
   c. 1.6×10^{-5} N.
   d. less than 1.0×10^{-5} N.
   e. more than 1.0×10^{-4} N.

_____   6. Superconductors can carry very large currents with no resistance. If a superconducting wire is formed into a solenoid of length 50.0 cm with 500 turns, what is the magnetic field inside the solenoid when the current is 10^4 A? ($\mu_0 = 4\pi \times 10^{-7}$ T·m/A)
   a.   1.25 T
   b.   2.50 T
   c.   6.28 T
   d.   12.6 T
   e.   25.2 T

_____   7. A deuteron, with the same charge but twice the mass of a proton, moves with a speed of 3.0×10^5 m/s perpendicular to a uniform magnetic field of 0.20 T. Which of the paths described below would it follow? ($q_p = 1.6 \times 10^{-19}$ C and $m_d = 3.34 \times 10^{-27}$ kg)
   a.   a straight line path
   b.   a circular path of 1.6 cm radius
   c.   a circular path of 3.1 cm radius
   d.   a circular path of 0.78 cm radius
   e.   a circular path of 0.39 cm radius

_____   8. Two insulated current-carrying straight wires of equal length are arranged in the lab so that Wire A carries a current northward and Wire B carries a current eastward, the wires crossing at their midpoints separated only by their insulation. Which of the following statements are true?
   a.   The net force on Wire B is southward.
   b.   The net force on Wire A is westward.
   c.   There are no forces in this situation.
   d.   There are forces, but the net force on each wire is zero.
   e.   The net force on Wire A is upward.

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Answer Section

MULTIPLE CHOICE

1. ANS: C   DIF: 1   TOP: 19.3 Magnetic Fields
2. ANS: D   DIF: 2
   TOP: 19.4 Magnetic Force on a Current-Carrying Conductor
3. ANS: C   DIF: 2
   TOP: 19.5 Torque on a Current Loop and Electric motors
4. ANS: A   DIF: 2
   TOP: 19.7 Magnetic Field of a Long, Straight Wire and Ampere's Law
5. ANS: A   DIF: 2
   TOP: 19.8 Magnetic force Between Two Parallel Conductors
6. ANS: D   DIF: 2
   TOP: 19.9 Magnetic fields of Current Loops and Solenoids
7. ANS: C   DIF: 2
   TOP: 19.6 Motion of a Charge Particle in a Magnetic field
8. ANS: D   DIF: 2
   TOP: 19.8 Magnetic force Between Two Parallel Conductors