

PART A: MULTIPLE CHOICE (10 MARKS)

Choose the best response in each case and place your answer in the appropriate space on your answer sheet.

- The polarity of an unmarked magnet can be determined by using a(n):
 (a) charged ebonite rod (b) compass
 (c) electroscope (d) 2nd unmarked magnet
- A bar of soft iron held near the north pole of a magnet becomes temporarily magnetized by:
 (a) conduction (b) induction
 (c) permeability (d) retentivity
- Pole X repels pole Y. Pole Y attracts pole Z. Pole Z is repelled by a north pole. The polarity of X, Y, Z are:
 (a) S, S, N (b) S, N, N
 (c) N, N, N (d) N, N, S
- A single straight conductor carries electric current into the page away from you. What direction and shape are the magnetic field lines?
 (a) clockwise circles around the conductor
 (b) counter-clockwise circles around the conductor
 (c) straight lines radiating out from the conductor
 (d) straight lines radiating in toward the conductor
- Soft iron is used in the cores of lifting electromagnets rather than copper because iron:
 (a) has a greater resistance.
 (b) is a better insulator.
 (c) has a higher magnetic permeability.
 (d) withstands a higher temperature.
- If other factors remain constant, which of the following combinations of electric current and # of turns in a coil produce the weakest electromagnet?
 (a) 500 turns & 3 A (b) 700 turns & 2 A
 (c) 200 turns & 5 A (d) 300 turns & 4 A
- To use the Right-Hand Helix Rule, you must point your fingers:
 (a) toward the S pole of the helix.
 (b) toward the N pole of the helix.
 (c) in the direction of electron flow.
 (d) in the direction of electric current flow.
- A 1000 turn electromagnet with a current of 16 A can exert a force of 4.0 kN on an iron block. If the # of turns is increased to 4000 in the same length of electromagnet while the current is reduced to 8.0 A, what force could the electromagnet now exert?
 (a) 1.0 kN (b) 2.0 kN
 (c) 4.0 kN (d) 8.0 kN
- Two current carrying conductors are suspended next to one another. The arrows indicate current flow. Which of the following would be the expected results.

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 (a) pushed apart pushed apart
 (b) pushed apart pushed together
 (c) pushed together pushed apart
 (d) pushed together pushed together
- The brushes of a simple D.C. motor:
 (a) connect the armature to the permanent magnet.
 (b) prevent sparking within the motor.
 (c) reverse the polarity of the armature at regular intervals.
 (d) allow the armature to rotate while still being connected to the battery.

PART B: MATCH (5 MARKS)

Match the definition from the 1st column to the best term in the 2nd column and place the matching letter in the appropriate space on your answer sheet.

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| <ol style="list-style-type: none"> States that similar magnetic poles repel while opposite magnetic poles attract. Reverses the polarity of the armature at regular intervals. Object that exerts a magnetic force using electricity. Formed by a group of dipoles lined up with their magnetic axes in the same direction. The name indicates that the elements share similar magnetic properties with iron. | <ol style="list-style-type: none"> A) armature B) electric current C) electromagnet D) ferromagnetic E) induced magnetism F) law of magnetic poles G) magnetic domain H) motor principle I) right-hand rules J) split-ring commutator |
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PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10
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PART B: MATCH (5 MARKS)

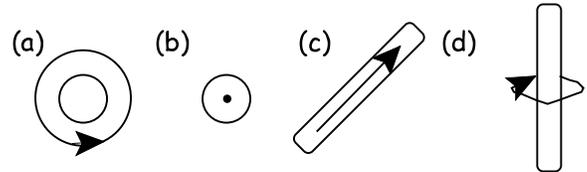
1	2	3	4	5
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PART C: SHORT ANSWER (30 MARKS)

Answer questions 1 to 7 in the space provided. Answer question 8 on a separate sheet of paper. You may use the back of this sheet.

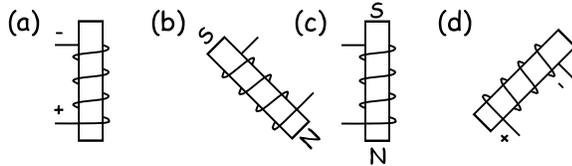
{3} 1. Sketch the magnetic field (both outside and inside) that surrounds a bar magnet.

{4} 2. Indicate the missing information: either (i) the magnetic field, or (ii) the current flow.



{4} 3. Indicate the missing information: either (i) the N-S poles, or (ii) the direction of current flow with + and -.

{3} 4. The strength of an electromagnet depends on several factors. These are:



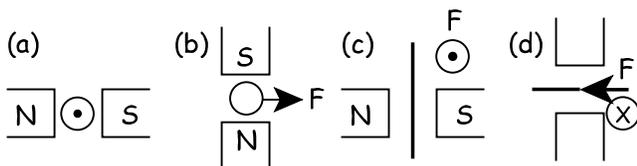
① _____
 ② _____
 ③ _____

{5} 5. Calculate the effect (ie the multiplier) on the strength of the magnetic field in a coil when each of the following separate changes is made.

- (a) The core is changed from steel with a permeability of 7000 to iron with a permeability of 2000. (a) _____
- (b) The velocity with which the coil is moving is increased from 10 cm/s to 20 cm/s. (b) _____
- (c) The length of the coil is decreased from 20 cm to a length of 10 cm. (c) _____
- (d) The number of loops in the coil is changed from 1000 to 4000 without increasing the length of the coil. (d) _____
- (e) The current in the coil is increased from 5.0 A to 7.0 A. (e) _____

{4} 6. Indicate the missing information: (i) the direction of electric current, (ii) the N-S poles, or (iii) the force on the conductor.

{3} 7. The Motor Principle is often applied in many situations that have little to do with motors. List three of these situations.



① _____
 ② _____
 ③ _____

{4} 8. Explain how the electric bell (Figure 6 on P.561 of Nelson Physics 11) operates. Begin your explanation with the statement, "When the switch is closed, electric current from the battery flows ..."