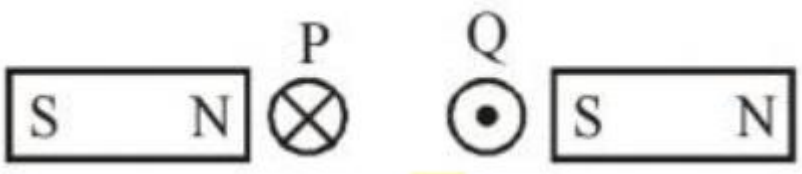
INDIAN SCHOOL AL WADI AL KABIR

Class: X	**Department: SCIENCE 2020 - 21**	**Date of submission: 11-01-2021**
Worksheet No: 06 WITH ANSWERS	**CHAPTER: MAGNETIC EFFECTS OF ELECTRIC CURRENT**	**Note: A4 FILE FORMAT**
Name of the student:	**Class & Sec:**	**Roll No:**

OBJECTIVE TYPE QUESTIONS

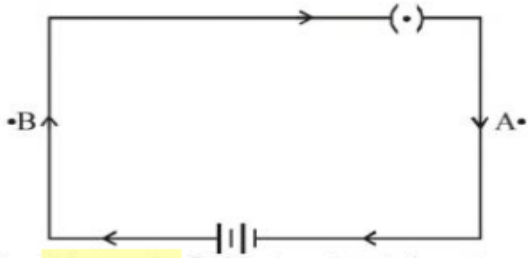
1. The magnetic field lines outside a bar magnet:
    a. Originate from the South pole and end at its North Pole
    b. Originate from the North pole and end at its East Pole
    c. Originate from the North Pole and end at its South Pole
    d. Originate from the South pole and end at its West Pole
2. An induced emf is produced when a magnet is moved into a coil. The magnitude of induced emf does not depend on:
    a. The speed with which the magnet is moved
    b. The number of turns of the coil
    c. The resistivity of the wire of the coil
    d. The strength of the magnet
3. No force acts on a current carrying conductor when it is placed-
    a. perpendicular to the magnetic field
    b. parallel to the magnetic field
    c. far away from the magnetic field
    d. inside a magnetic field
4. What is that instrument which can detect the presence of electric current in a circuit?
    a. galvanometer
    b. motor
    c. generator
    d. voltmeter
5. What is electromagnetic induction?
    a. the process of charging a body
    b. The process of rotating a coil of an electric motor.
    c. producing induced current in a coil due to relative motion between a magnet and the coil
    d. The process of generating magnetic field due to a current passing through a coil.

6. With the help of which law can the direction of a magnetic field decided?
    a. Faraday's law
    b. Fleming's right-hand rule
    c. Right hand thumb rule
    d. Fleming's left-hand rule
7. A soft iron bar is inserted inside a current-carrying solenoid. The magnetic field inside the solenoid:
    a. Will decrease
    b. Will increase
    c. Will become zero
    d. Will remain the same
8. A current carrying conductor is held in exactly vertical direction. In order to produce a clockwise magnetic field around the conductor, the current should be passed in the conductor:
    a. From top to bottom
    b. From left to right
    c. From bottom to top
    d. From right to left
9. The magnetic field inside a solenoid is...
    a. strong at N pole and weak at S pole
    b. strong at S pole and weak at N pole
    c. uniform throughout
    d. zero
10. Two current carrying wires (P and Q) are placed between two magnets and their currents are equal but in opposite directions as shown below. What is the direction of force acting on each wire.



	Force on P	**Force on Q**
a.	Upwards	Upwards
b.	Downwards	Downwards
c.	Upwards	Downwards
d.	Downwards	Upwards

11. In the following figure four set of observations are taken. Identify the correct observation.

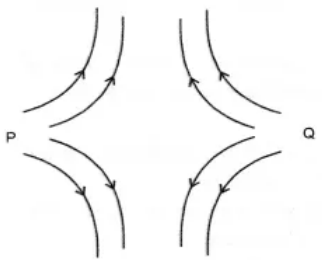


a. Magnetic field at point A is outwards and at B is inwards.
b. Magnetic field at point A is inwards and at B is outwards.
c. Magnetic field at both the points is inwards.
d. Magnetic field at both the points is outwards.

12. Assertion: A soft iron bar placed inside a solenoid carrying current is magnetised.
Reason: Magnetic field inside a long solenoid carrying current is non-uniform.
a. Both A and R are true and R is correct explanation of the assertion.
b. Both A and R are true but R is not the correct explanation of the assertion.
c. A is true but R is false.
d. A is false but R is true.

VERY SHORT ANSWER QUESTIONS (one-mark question)

13. What is an electromagnet?
14. What does the degree of closeness of magnetic field lines near the poles signify? (CBSE 2012)
15. What is a fuse? What material is used for making fuse wire?
16. Draw the magnetic field lines due to current through circular loop
17. Why two magnetic field lines cannot intersect with each other?
18. What is the angle between a current carrying conductor and magnetic field for which the force experienced by the conductor is largest.
19. In the figure below, identify the poles marked P and Q as North Pole or South pole. Give reason for your answer. (CBSE 2010)



SHORT ANSWER QUESTIONS – 2 marks

20. Explain the properties of the pattern of magnetic field around a circular coil carrying current.

21. What are the factors on which the strength of induced current depends?
22. What is a solenoid? Draw the pattern of magnetic field lines of a solenoid through which a steady current flow. What does the pattern of field lines inside the solenoid indicate? [CBSE, 2016]

SHORT ANSWER QUESTIONS (3 MARKS)

23. A coil of insulated copper wire is connected to a galvanometer. What would you observe if a bar magnet is
    (i) Pushed into the coil
    (ii) Held stationary inside the coil
    (iii) Pushed out of the coil. Give reason for your answer.

24. With the help of a labelled circuit diagram describe an activity to illustrate the pattern of the magnetic field lines around a straight current carrying long conducting wire. (CBSE Sample Paper 2018-2019)

25. A horizontal power line carries current in east to west direction. What is the direction of the magnetic field due to the current in the power line at a point above and at a point below the power line?
    (CBSE 2013, 2015)

PREVIOUS YEAR BOARD QUESTIONS

26. What is meant by solenoid? How does a current carrying solenoid behaves? Give its main use. (CBSE 2016)
27. Draw magnetic field lines produced around a current carrying straight conductor passing through a cardboard. Name, state and apply the rule to mark the direction of these field lines.
    (b) How will the strength of the magnetic field change when the point where magnetic field is to be determined is moved away from the straight wire carrying constant current? Justify your answer. (CBSE 2019)
28. (a) What are magnetic field lines? How is the direction of magnetic field at a point in a magnetic field determined using field lines?
    (b) Two circular coils 'X' and 'Y' are placed close to each other. If the current in the coil 'X' is changed, will some current be induced in the coil 'Y'? Give reason. (c) State 'Fleming's right-hand rule".
29. An α-particle enters a uniform magnetic field at right angles to it as shown in figure. Stating the relevant principle, explain in which direction will this α.-particle move? (CBSE 2014)

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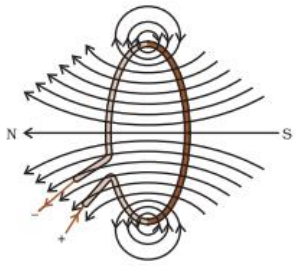
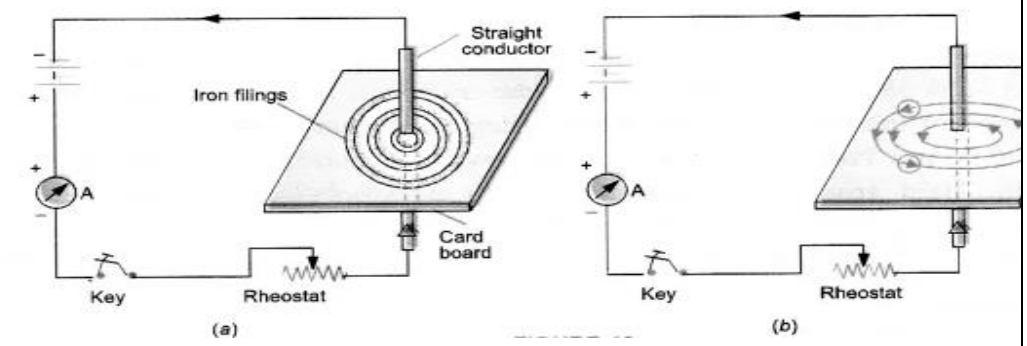
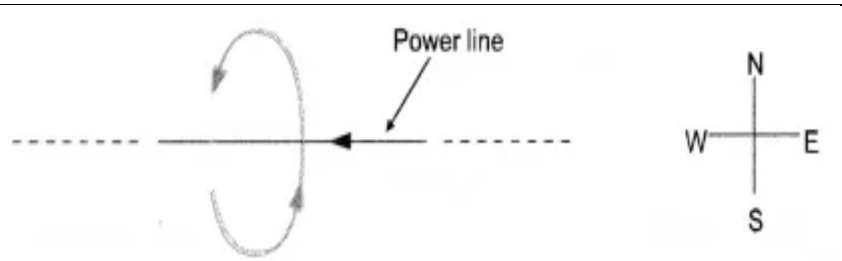
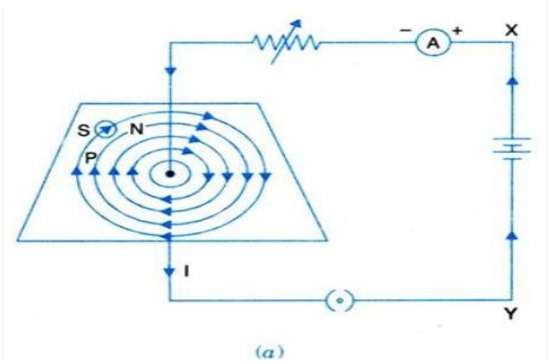
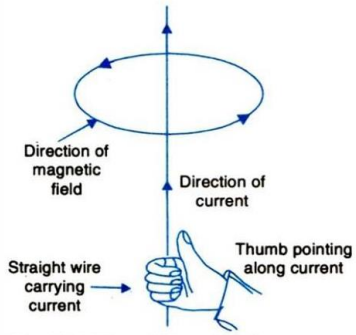
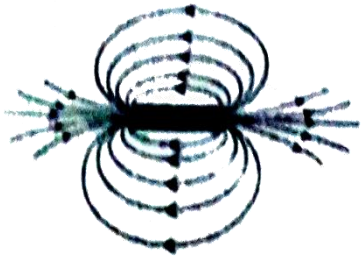
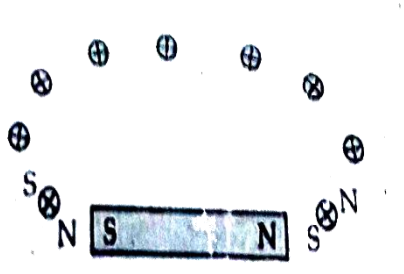
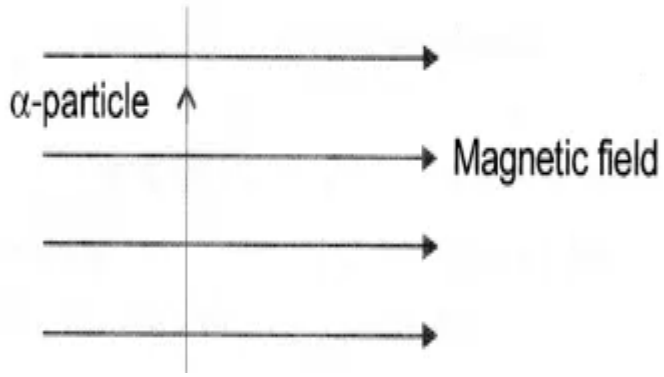
Q. No	Answers
1	Answer: (c) Originate from the North Pole and end at its South Pole
2	Answer: (c) The resistivity of the wire of the coil
3	Answer: b. parallel to the magnetic field

4	Answer: a. galvanometer
5	Answer: c. producing induced current in a coil due to relative motion between a magnet and the coil
6	Answer: c. Right hand thumb rule
7	Answer: will increase
8	Answer: (a) From top to bottom
9	Answer: c. uniform throughout
10	Answer: Downwards Upwards
11	Ans. b. Magnetic field at point A is inwards and at B is outwards.
12	A is true but R is false.
13	A current carrying solenoid with an iron core inside.
14	Ans. Crowding of magnetic field lines indicates that magnetic field in that region is strong.
15	Ans. It is a safety device which is used to protect electrical appliances from unduly high current.
16	
17	Ans. This is because if they do so at the point of intersection the north pole of the compass needle point in two different directions showing two directions of magnetic field at a given point, which is not possible.
18	Ans. 90°
19	Ans. Both P and Q are North poles. Magnetic field lines emerge from North pole.
20	• Ans. The magnetic field lines are nearly circular near the wire. • They are in the same direction within the space enclosed by the wire. • Near the centre of the loop the magnetic field lines are nearly parallel and straight, showing that the magnetic field is uniform.
21	Ans. The strength of induced current depends on the strength of the magnetic field, the velocity with which the coil or the magnet is being moved and the length of the conductor.
22	Ans. Field lines are parallel equidistant lines which indicate that magnetic field is uniform.

23	Ans: (i) Deflection to one side (Relative motion between the magnet and the coil creates a change in magnetic field which in turn produces an induced current) (ii) No deflection is seen (There is no relative motion between the magnet and the coil and hence there is no change in magnetic field which will not produce an induced current) (iii)Deflection to the opposite side (Relative motion between the magnet and the coil creates a change in magnetic field which in turn produces an induced current)
24	Ans. Take the thick piece of copper wire and a card board. Pass this thick wire through a hole in the card board placed horizontally as shown in the Fig.  Now pass electric current (about 4 A) through the wire by pressing the key and sprinkle some iron filings on the card board around the wire. Tap the card board gently. Observation: We find that the iron filings are arranged in concentric circles around the wire as shown in fig (a). If magnetic compass is placed near the current carrying wire and at different positions, we get concentric circles around the wire as shown in figure (b). These concentric circles around the wire carrying current represent the magnetic field around the wire.
25	3. Answer According to right-hand thumb rule: The direction of magnetic field at a point above the power line is from south to north. The direction of magnetic field at a point below the power line is from north to

	 south.
26	A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is called a Solenoid. A current carrying solenoid behaves as an electromagnet. The strong magnetic field produced inside a solenoid can be used to magnetise a piece of magnetic material like soft iron when placed inside the coil.
27	 (a)  Fig. Right hand thumb rule Right hand thumb rule : If we hold the current carrying conductor in the right hand such that the thumb points in the direction of current, then the fingers encircle the wire in the direction of magnetic lines of force. Magnetic field strength decreases when we move away from the straight conductor.
28	a) Magnetic field lines are the lines drawn in a magnetic field along which a north magnetic pole would move. Direction of magnetic field lines is determined by the following activity. A bar magnet is placed on a sheet of paper and its boundary is marked with a pencil. A magnetic compass is brought near the N-pole of the bar magnet. It is observed that N-pole of magnet repels the N-pole of compass needle due to which the tip of the compass needle moves away from the N-pole . Thus a magnetic field pattern is obtained around a bar magnet. Each magnetic field line is directed from the north pole of a magnet . the strength of magnetic field is indicated by the degree of closeness of the field lines. So the magnetic field is the strongest near the poles.  Drawing of a magnetic field line with the help of a compass needle  Field line around a bar magnet (b) Two circular coils X and Y are placed close to each other. If the current in coil

	X is changed, the magnetic field associated with is also changes around the coil Y placed near it . This change in magnetic field induces a current in the coil Y. When the current in coil X is switched on , it becomes an electromagnet and produces a magnetic field around coil X is switched off, its magnetic field in coil Y stops quickly. This effect is just the same as pulling a magnet quickly out of the coil Y , an induced current flows in coil Y in the opposite direction. (C) Fleming right hand rule . Hold the thumb, the forefinger and the middle finger of your hand at right angles to one another. Adjust your hand is such a way that forefinger points in the direction of magnetic field, and thumb points in the direction of motion of conductor, then the direction in which middle finger points gives the direction of induced current in the conductor.
29	 According to Fleming's left-hand rule, the force acting on a current carrying conductor placed perpendicular to a magnetic field is perpendicular to the direction of current (i. e., flow of positive charges) and the magnetic field. Here, direction of α-particle (i.e., positive charge) is the direction of current. Hence, according to Fleming's left-hand rule, the direction of force acting on α-particle is perpendicular to both the direction of motion of α-particle and the direction of magnetic field. Hence, α-particle will move perpendicular to the plane of the paper and in downward direction.

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