PHYSICS

BOOKS - SELINA PHYSICS (ENGLISH)

ELECTRO-MAGNETISM

Examples

1. Why does a compass needle get deflected when brought near a bar magnet?

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2. A straight conductor passes vertically through a cardboard having some iron filings sprinkled on it

(a) A current is passed in the conductor in downward direction and the cardboard is gently tapped. Show the setting of iron filings on the card board and draw arrows to represent the direction of magnetic field lines.

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3. A straight conductor passes vertically through a cardboard having some iron filings sprinkled on it

What changes occur in the arrangement of iron filings in part (a) if

(i) the strength of current is increased ?

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4. What changes occur in the arrangement of iron filings in part (a) if

the single conductor is replaced by several

parallel conductors each carrying the same current flowing in the same direction ? Give reason in each case (i) and (ii).

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5. Name the law used by you to find the direction of magnetic field lines.

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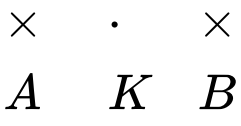
6. In Fig. , A and B represent two straight wires carrying equal currents in a direction normal to the plane of paper inwards.



$Fig.10.11$

Sketch separately the magnetic field lines produced by each current.

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7. In Fig. A and B represent two straight wires carrying equal currents in a direction normal

to the plane of paper inwards.

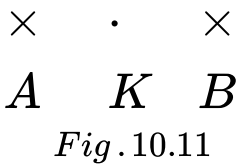

Fig. 10.11

What will be the magnetic field at the mid point K of the line joining A and B. Give reason.

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8. In Fig., A and B represent two straight wires carrying equal currents in a direction normal to the plane of paper inwards.

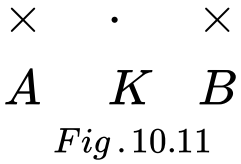

Fig. 10.11

How will the magnetic needle of compass rest if it is placed at the point K?

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9. In Fig. A and B represent two straight wires carrying equal currents in a direction normal to the plane of paper inwards.

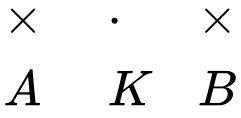

Fig. 10.11

What will be the effect on the magnetic field at the point K if the current in wire B is reversed ?

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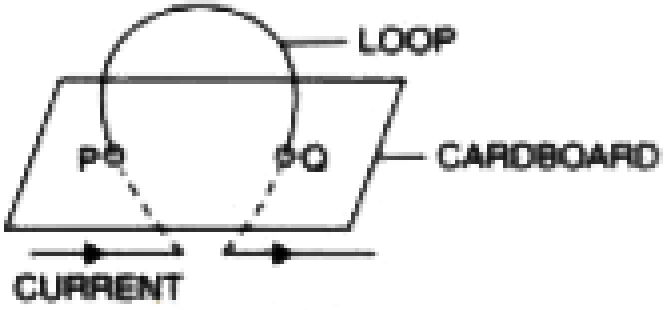
10. The diagram in Fig. shows a current carrying loop passing through a sheet of stiff cardboard at the points P and Q.



Draw three magnetic f'ield lines on the cardboard, one each at points P and Q, and

one at the centre of loop. Draw arrows to show the direction of magnetic field lines

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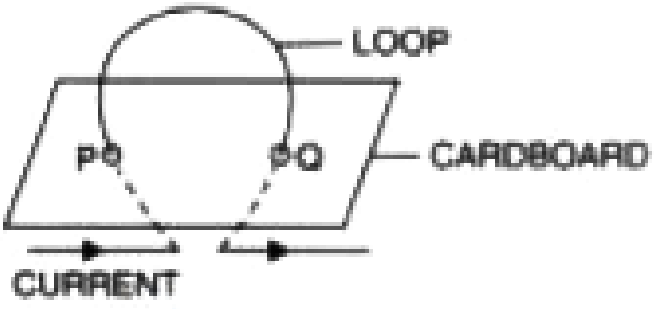
11. The diagram in Fig. shows a current carrying loop passing through a sheet of stiff cardboard at the points P and Q.



State two factors on which the magnitude of magnetic field at the centre of loop depends

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12. Draw a labelled diagram to make an electromagnet from a soft iron bar AB. Mark the polarity at its ends A and B. State one precaution which you will observe.

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13. Draw a diagram representing the magnetic field lines inside and outside a solenoid through which a current is flowing and mark the direction of current in the solenoid and the direction of magnetie field lines. Also mark the polarity at the faces of solenoid.

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14. A bar off soft iron is placed inside the solenoid parallel to its length in part (a).

Describe what happens.

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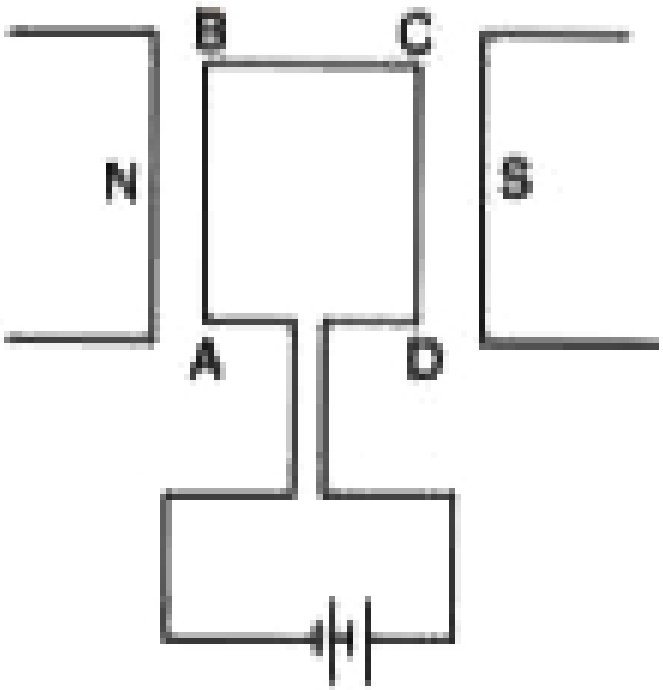
15. A rectangular coil ABCD having a battery connected between its ends A and D is placed in between the pole pieces of a horseshoe magnet as shown in Fig. 10.26.



What is the direction of current in the coil?

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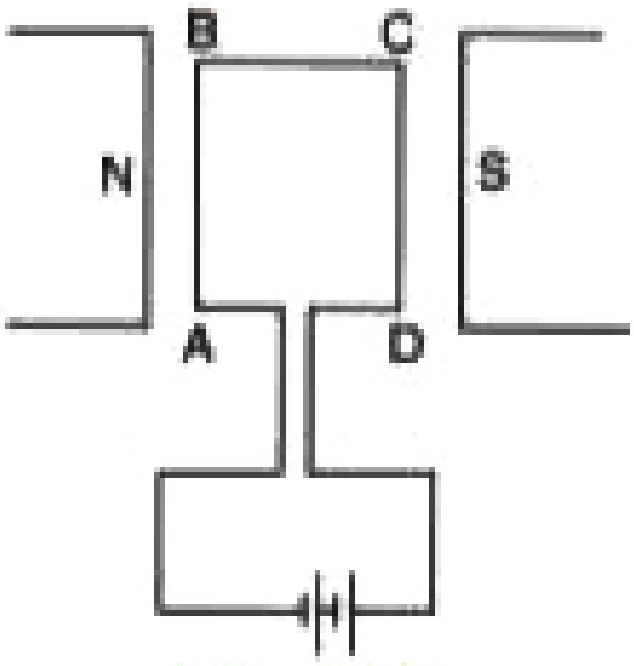
16. A rectangular coil ABCD having a battery connected between its ends A and D is placed

in between the pole pieces of a horseshoe magnet as shown in Fig. 10.26.



What is the direction of force on each arm?

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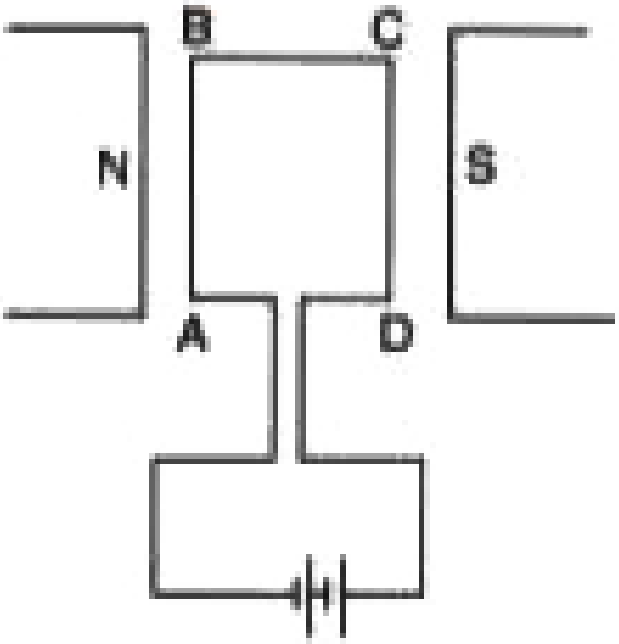
17. A rectangular coil ABCD having a battery connected between its ends A and D is placed in between the pole pieces of a horseshoe magnet as shown in Fig. 10.26.



What is the effect of the forces on coil?

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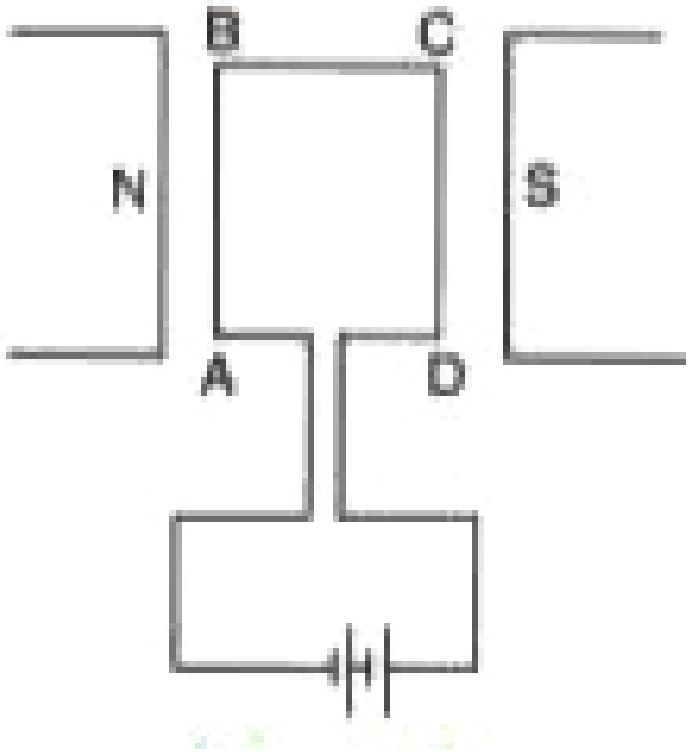
18. A rectangular coil ABCD having a battery connected between its ends A and D is placed in between the pole pieces of a horseshoe magnet as shown in Fig. 10.26.



How is the effect of forces on coil changed if the connections at the terminals of battery are interchanged ?

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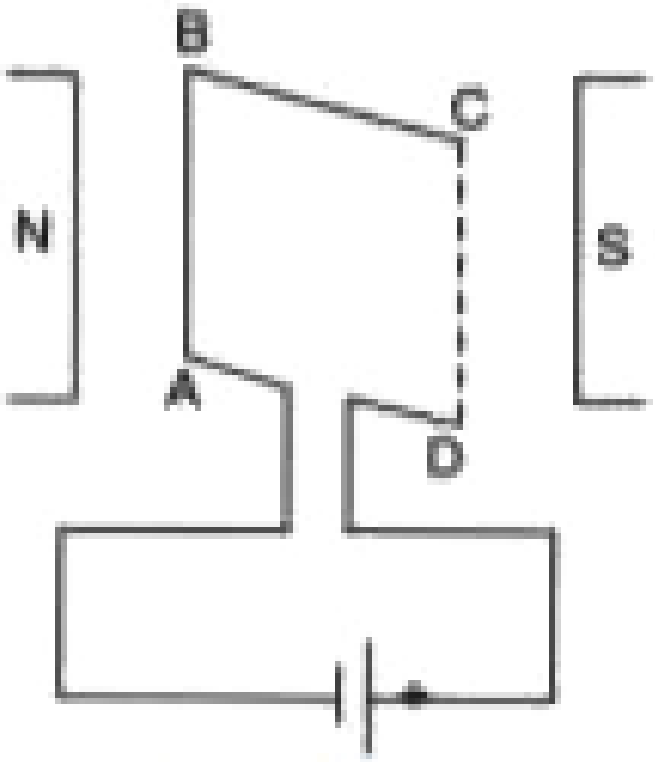
19. Fig. shows a rectangular coil ABCD placed in between the pole pieces of a horse-shoe magnet with its plane perpendicular to the magnetic field. A battery is connected between the ends A and D of the coil.



What is the direction of current in the coil?

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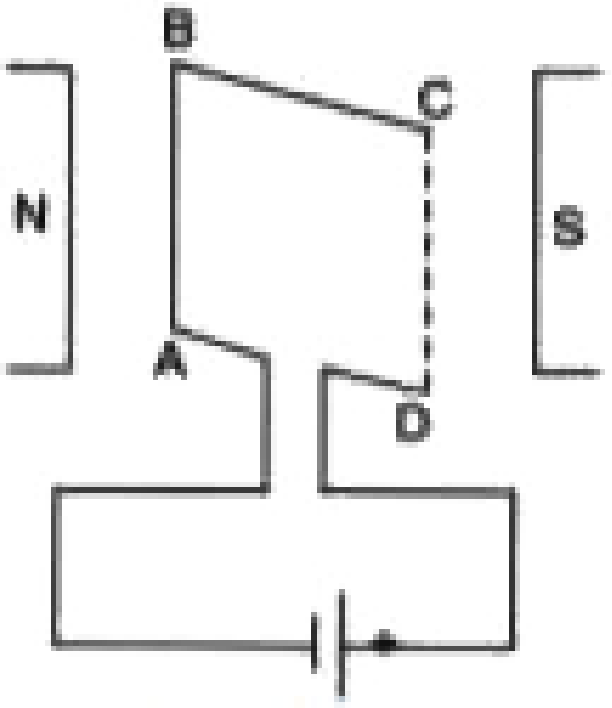
20. Fig. shows a rectangular coil ABCD placed in between the pole pieces of a horse-shoe magnet with its plane perpendicular to the magnetic field. A battery is connected between the ends A and D of the coil.



What is the direction of force on each arm of the coil?

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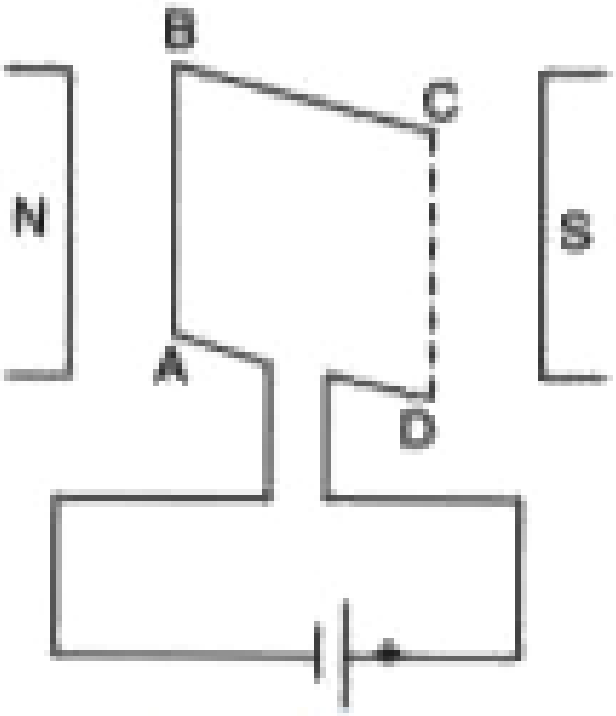
21. Fig. shows a rectangular coil ABCD placed in between the pole pieces of a horse-shoe magnet with its plane perpendicular to the magnetic field. A battery is connected between the ends A and D of the coil.



Will the coil rotate due to the forces on its arms?

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22. State the function of split rings in a d.c. motor.

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23. A d.c. motor is rotating in a clockwise direction. How can its direction of rotation be reversed ?

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24. State with reason in a d.c. motor, the effect of

inserting a soft iron core within the coil,

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25. State with reason in a d.c. motor, the effect of

increasing the area of the coil, and

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26. State with reason in a d.c. motor, the effect of

increasing the strength of current in the coil.

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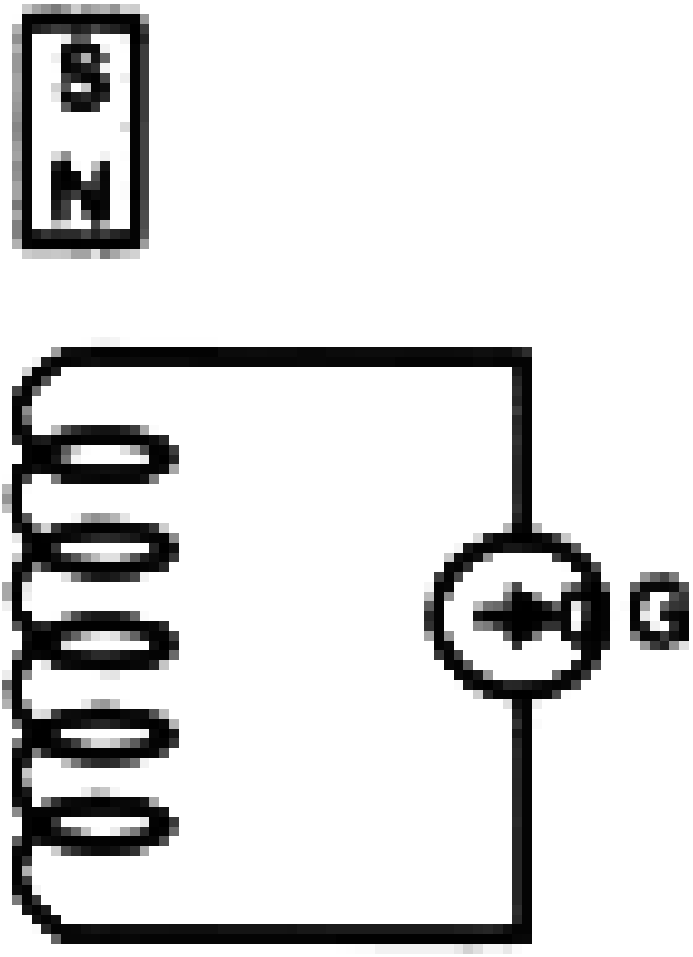
27. Fig. shows a coil AB connected to a centre zero galvanometer G and a magnet NS.



What will you observe when : (a) the magnet is inserted into the coil, (b) the magnet is taken out of the coil ?

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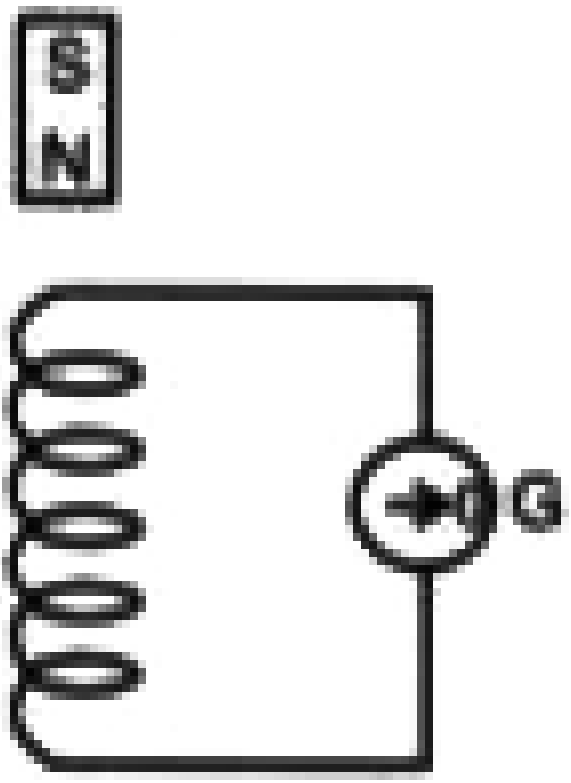
28. Fig. shows a coil AB connected to a centre zero galvanometer G and a magnet NS.



How will your observation in part (i) change if the number of turns in the coil is increased?

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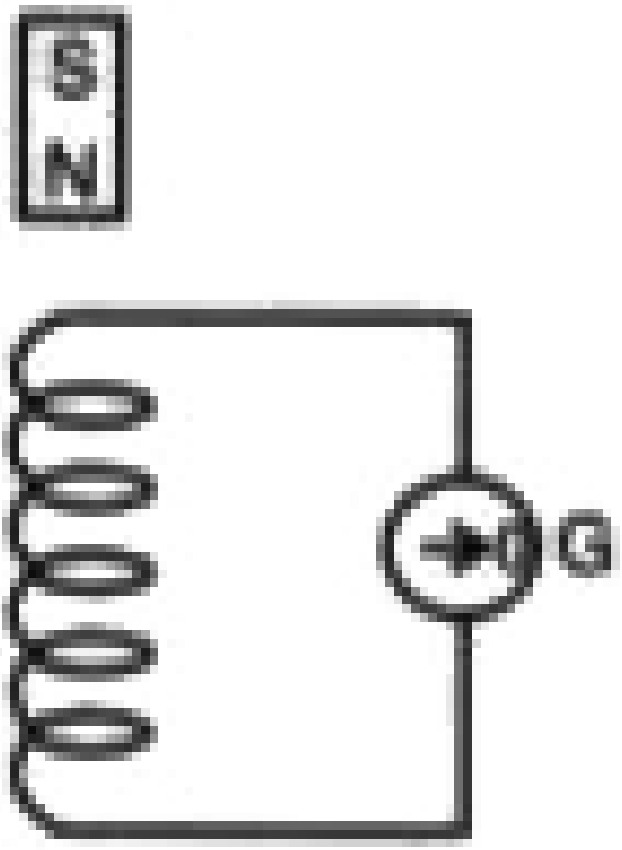
29. Fig. shows a coil AB connected to a centre zero galvanometer G and a magnet NS.



State the direction of current in the coil in part (i) (a).

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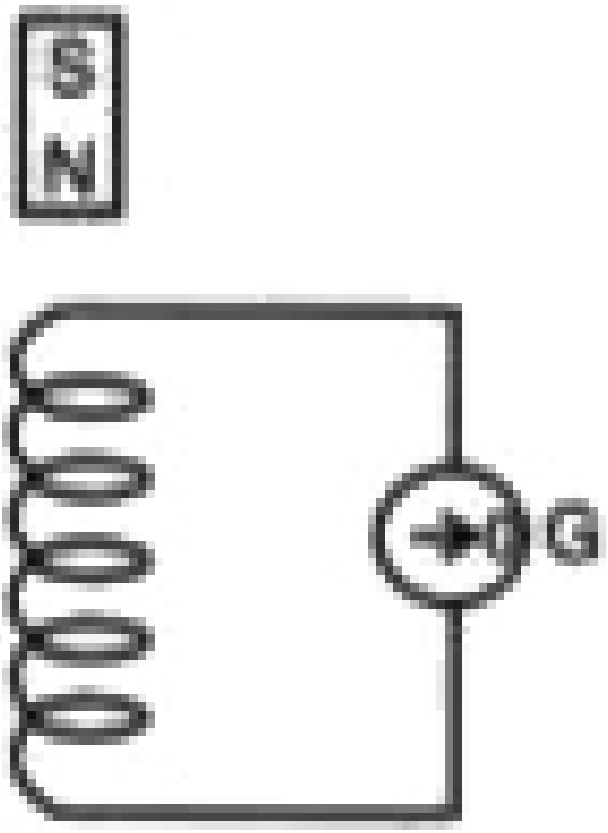
30. Fig. shows a coil AB connected to a centre zero galvanometer G and a magnet NS.



State the law by which you arrived to the answer in part (iii).

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31. A coil has 50 turns and the magnetic flux linked with the coil increases by 0-5 weber in 10-0 s. Calcualte the e.m.f. induced in the coil.

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32. A flat rectangular coil is rotated between the pole pieces of a horse-shoe magnet.

(a) In which position of coil with respect to the

magnetic field, will the e.m.f.be (i) maximum, and (ii) zero.

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33. A flat rectangular coil is rotated between the pole pieces of a horse-shoe magnet.

(b) When does the e.m.f. change its direction?

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34. Name the principle on which a transformer works.

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35. What is the function of a step up transformer?

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36. Draw a simple labelled diagram of a step down transformer.

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37. Can a transformer work when it is connected to a d.e. source ? Give a reason.

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38. Draw a simple labelled diagram of a step up transformer.

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Exercise 10 A

1. How is the magnetic field due to a straight current carrying wire affected if current in the wire is

decreased

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2. How is the magnetic field due to a straight current carrying wire affected if current in the wire is

reversed

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3. A straight wire lying in a horizontal plane carries a current from north to south.

What will be the direction of magnetic field at a point just underneath it?

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4. A straight wire lying in a horizontal plane carries a current from north to south.

Name the law used to arrive at the answer in part (a).

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5. What is the direction of magnetic field at the Centre of a coil carrying current in the clockwise,

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6. What is the direction of magnetic field at the Centre of a coil carrying current in the anticlockwise, direction?

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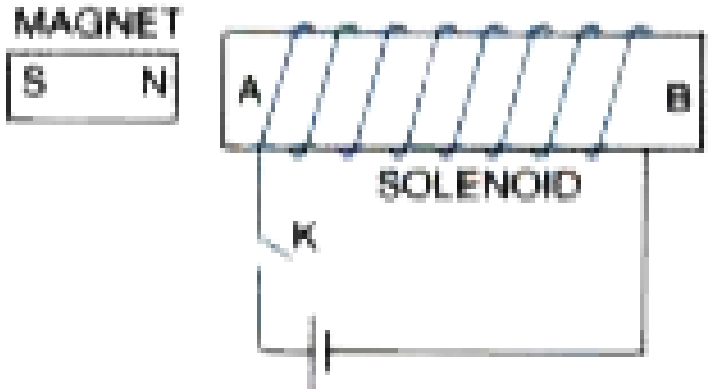
7. The diagram in shows a small magnet placed near a solenoid AB with its north pole N near the end A. Current is switched on in the solenoid by pressing the key K



State the polarity at the ends A and B.

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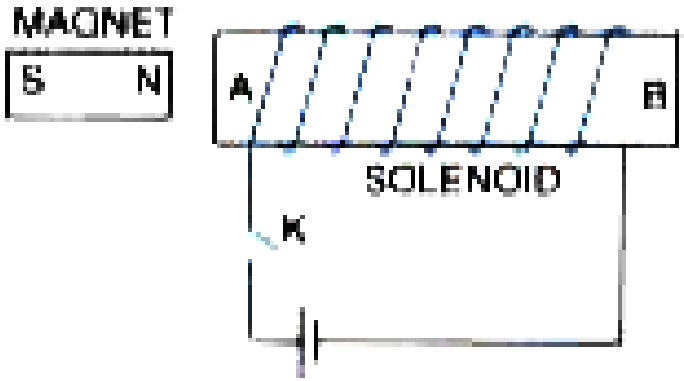
8. The diagram in Fig. shows a small magnet placed near a solenoid AB with its north pole N near the end A. Current is switched on in the solenoid by pressing the key K



Will the magnet be attracted or repelled ? Give a reason for your answer.

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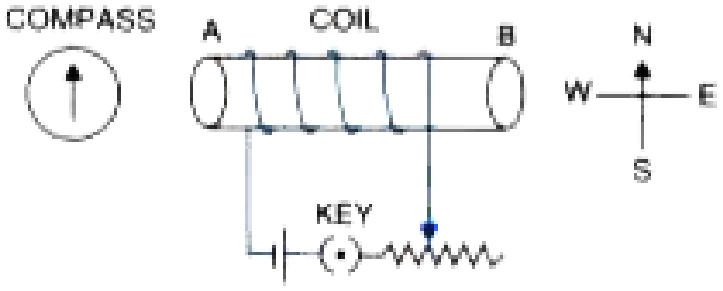
9. The diagram in Fig. shows a spiral coil wound on a hollow cardboard tube AB. A magnetic compass is placed close to it. Current is switched on by closing the key.

What will be the polarity at the ends A and B ?



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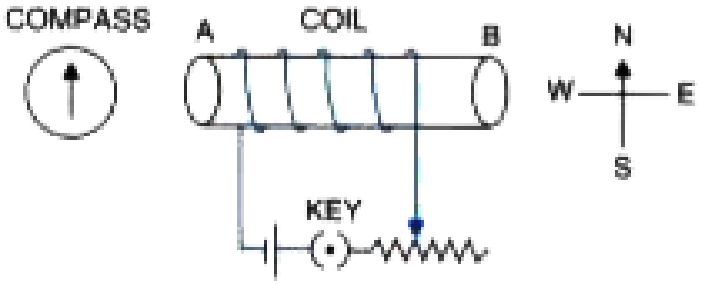
10. The diagram in Fig. shows a spiral coil wound on a hollow cardboard tube AB. A magnetic compass is placed close to it. Current is switched on by closing the key.

How will the compass needle be affected ? Give reason.



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11. Why does a current carrying freely suspended solenoid rest along a particular direction ? State the direction in which it rests.

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12. What effect will there be on a magnetic compass when it is brought near a current carrying solenoid ?

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13. How is the magnetic field due to a solenoid carrying current affected if a soft iron bar is introduced inside the solenoid ?

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14. Complete the following sentences :

When current flows in a wire, it creates .....

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15. Complete the following sentences :

On reversing the direction of current in a wire, the magnetic field produced by it gets .....

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16. Complete the following sentences :

A current carrying solenoid behaves like a .....

View Text Solution

17. Complete the following sentences :

A current carrying solenoid when freely suspended, it always rests in ..... direction

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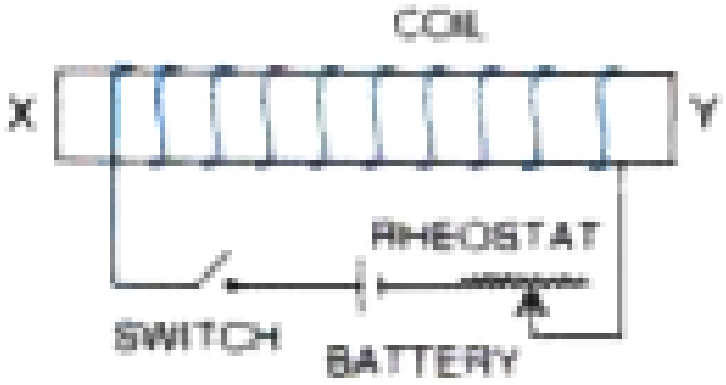
18. The diagram in Fig. 10.19 shows a coil wound around a soft iron bar XY.



State the polarity at the ends X and Y as the switch is pressed. X

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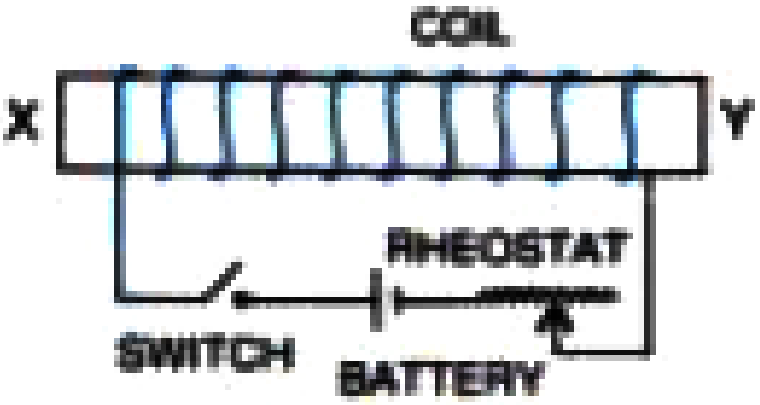
19. The diagram in Fig. 10.19 shows a coil wound around a soft iron bar XY.



Suggest one way of increasing the strength of electromagnet so formed.

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20. What name is given to a cylindrical coil of diameter less than its length ?

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21. If a piece of soft iron is placed inside the coil mentioned in part (a) and current is passed in the coil from a battery, what name is then given to the device so obtained ?

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22. Give one use of the device mentioned in part (b).

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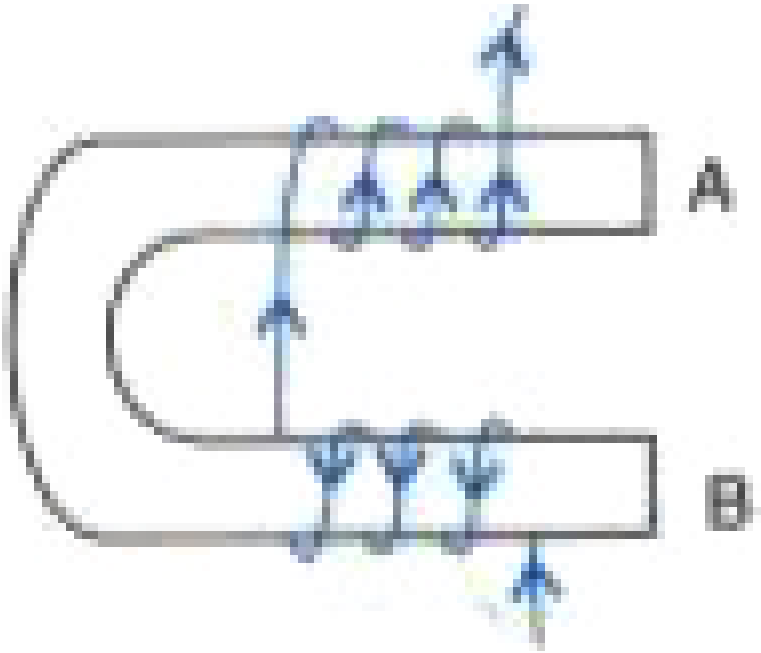
23. Fig. shows the current flowing in the coil of wire wound around the soft iron horse shoe core.



State the polarities developed at the ends A and B.

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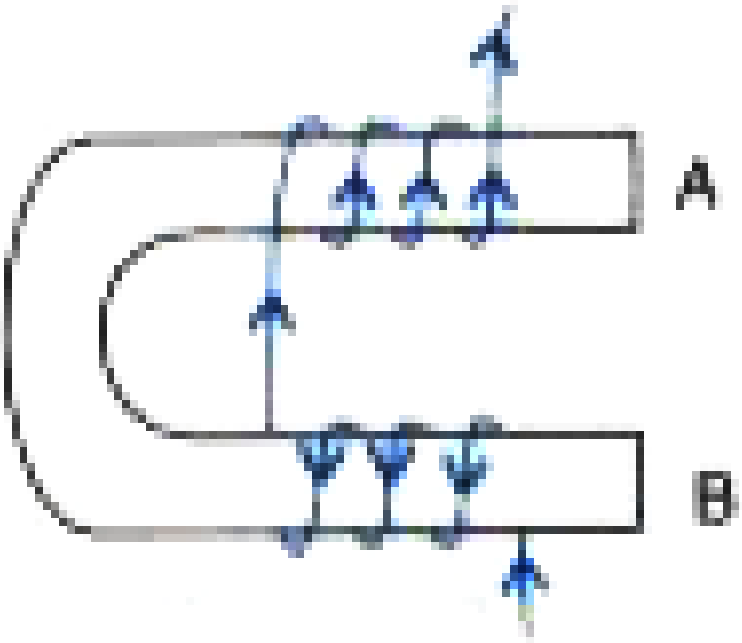
24. Fig. shows the current flowing in the coil of wire wound around the soft iron horse shoe core.



How will the polarity at the ends A and B change on reversing the direction of current

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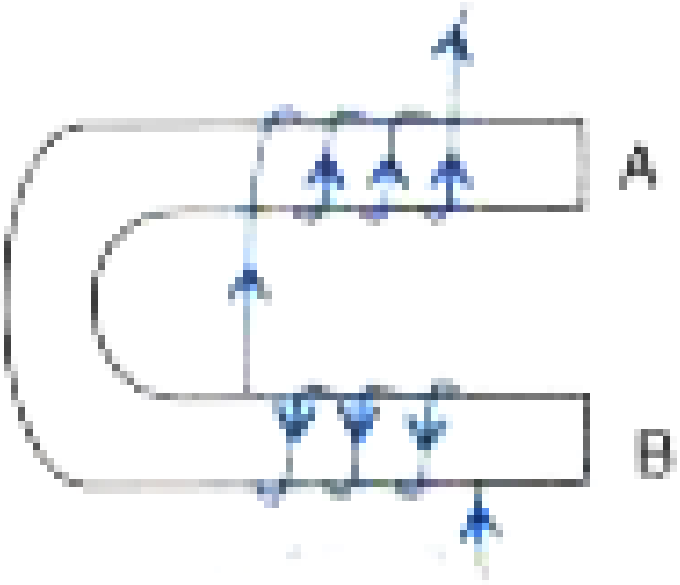
25. Fig. shows the current flowing in the coil of wire wound around the soft iron horse shoe core.



Suggest one way increase the strength of magnetic field produce.

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26. Name one device that uses an electromagnet.

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27. The presence of magnetic field at a point can be detected by means of:

A. a strong magnet

B. a solenoid

C. a compass needle

D. a current carrying wire

Answer: C

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28. On reversing the direction of current in a wire, the magnetic field produced by it:

A. gets reversed in direction

B. increases in strength

C. decreases in strength

D. remains unchanged in strength and direction.

Answer: A

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Exercise 10 B

1. Name three factors on which the magnitude of force on a current carrying conductor placed in a magnetic field depends and state how does the force depend on the factors stated by you.

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2. State condition in each case for the magnitude of force on a current carrying conductor placed in a magnetic field to be zero,

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3. State condition in each case for the magnitude of force on a current carrying conductor placed in a magnetic field to be maximum

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4. How will the direction of force be changed, if the current is reversed in the conductor placed in a magnetic field?

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5. State the unit of magnetic field in terms of the force experienced by a current carrying conductor placed in a magnetic field.

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6. A flat coil ABCD is freely suspended between the poles of a U-shaped permanent magnet with the plane of coil parallel to the magnetic field.

What happens when a current is passed in the coil?

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7. A flat coil ABCD is freely suspended between the poles of a U-shaped permanent magnet

with the plane of coil parallel to the magnetic field.

When will the coil come to rest?

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8. A flat coil ABCD is freely suspended between the poles of a U-shaped permanent magnet with the plane of coil parallel to the magnetic field.

When will the couple acting on the coil be (i) maximum, and (ii) minimum ?

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9. A flat coil ABCD is freely suspended between the poles of a U-shaped permanent magnet with the plane of coil parallel to the magnetic field.

Name an instrument which makes use of the principle stated above.

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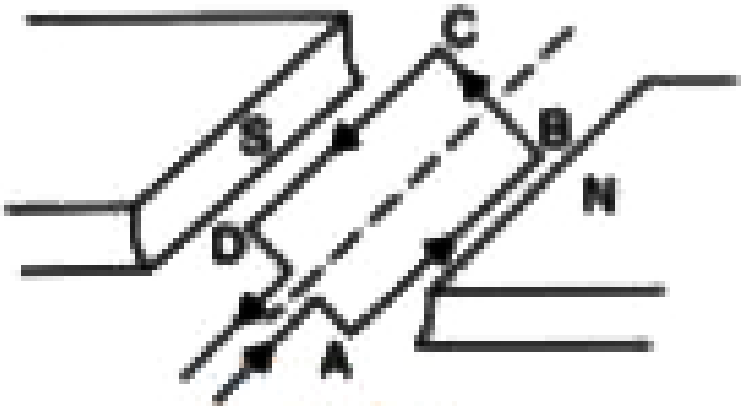
10. A coil ABCD mounted on an axle is placed between the poles N and S of a permanent magnet as shown in Fig. 10.28.

In which direction will the coil begin to rotate when current is passed through the coil in direction ABCD by connecting a battery between the ends A and D of the coil ?

View Text Solution

View Text Solution

11. A coil ABCD mounted on an axle is placed between the poles N and S of a permanent magnet as shown in Fig. 10.28.



Why is a commutator necessary for the continuous rotation of coil?

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12. In an electric motor, the energy transformation is

A. from electrical to chemical

B. from chemical to light

C. from mechanical to electrical

D. from electrical to mechanical.

Answer: D

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Exercise 10 C

1. State two factors on which the magnitude of induced e.m.f. in a coil depend

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2. What kind of energy change takes place when a magnet is moved towards a coil having a galvanometer between its ends?

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3. Name the phenomenon.

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4. How would you demonstrate that a momentary current can be obtained by the suitable use of a magnet, a coil of wire and a galvanometer ?

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5. What is the source of energy associated with the current obtained in part (a)?

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6. Complete the following sentence : The current is induced in a closed circuit only if there is.....

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7. In which of the following cases e.m.f. is induced ?

A current is started in a wire held near a loop of wire.

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8. A conductor is moved in a varying magnetic field. Name the law which determines the direction of current induced in the conductor.

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9. Why does it become more difficult to move a magnet towards a coil when the number of turns in the coil has been increased ?

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10. Explain why an induced current must flow in such a direction so as to oppose the change producing it.

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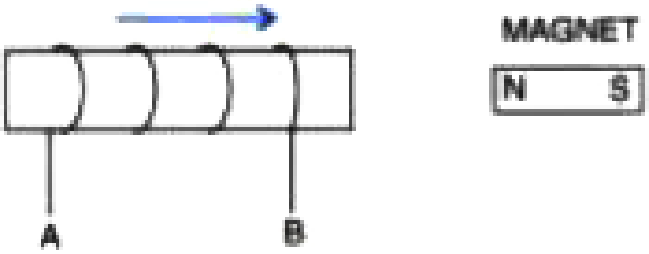
11. The diagram in Fig. 10.42 shows a coil of several turns of copper wire near a magnet NS. The coil is moved in the direction of arrow shown in the diagram



Name the law used to arrive at the conclusion in part (i).

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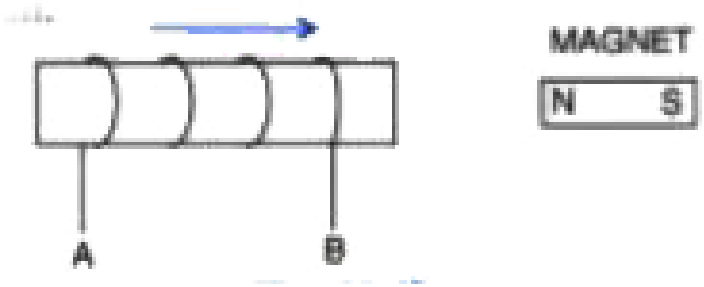
12. The diagram in Fig. 10.42 shows a coil of several turns of copper wire near a magnet NS. The coil is moved in the direction of arrow shown in the diagram



How would the current in coil be altered if (a) the coil has twice the number of turns, (b) the coil was made to move three times fast?

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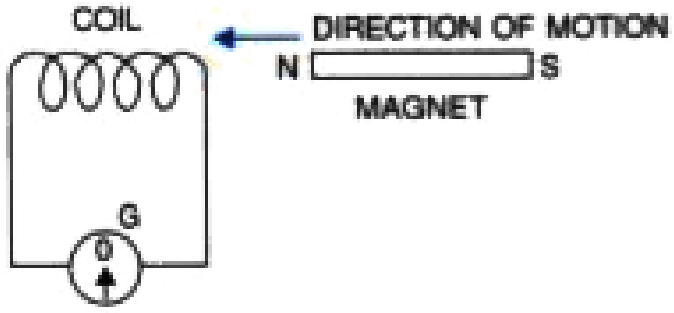
13. The diagram in Fig. 10.43 shows a fixed coil of several turns connected to a centre zero galvanometer G and a magnet NS which can move in the direction shown in the diagram. Describe the observation in the galvanometer if (i) the magnet is moved rapidly, (ii) the magnet is kept stationary after it has moved into the coil, (iii) the magnet is then rapidly pulled out of the coil.



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14. The diagram in Fig. 10.43 shows a fixed coil of several turns connected to a centre zero galvanometer G and a magnet NS which can move in the direction shown in the diagram. How would the observation in of part (a) change if a more powerful magnet is used ?

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15. What determines the frequency of a.c. produced in a generator?

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16. Complete the sentence :

An ae, generator changes the energy to ..... energy.

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17. In an a.e. generator, the speed at which the coil rotates is doubled. How would this affect (a) the frequency of the output voltage.

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18. In an a.e. generator, the speed at which the coil rotates is doubled. How would this affect the maximum output voltage.

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19. State two ways to produce a higher c.m.f. in an a.c. generator

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20. What energy conversion does take place in a generator when it is in use?

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21. For what purpose are the transformers used ? On which type of current do transformers work ?

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22. State two factors on which the magnitude of an induced e.m.f. in the secondary coil of a transformer depends.

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23. How are the e.m.f. in the primary and secondary coils of a transformer related with the number of turns in these coils ?

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24. Name the device used to transform 12 V a.c. to 200 V a.c. Name the principle on which it works.

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25. Why is the iron core of a transformer made laminated (thin sheets) instead of being in one solid piece ?

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26. Complete the following sentences :

The transformer is used in ..... current circuits.

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27. Complete the following sentences :

In a tranformer, the frequency of a.c. voltage ..... (increase/decreases/remains same)

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28. Name the material of the core in (a) an electric bell, (b) electromagnet, (c) a d.c. motor, (d) an ac. generator, and (e) a transformer.

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29. The direction of induced current is obtained by :

A. Fleming's left hand rule

B. Clock rule

C. Right hand thumb rule

D. Fleming's right hand rule.

Answer: D

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30. In a step up transformer :

A. $N_s = N_p$

B. $N_s < N_p$

C. $N_s > N_p$

D. nothing can be said

Answer: C

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Exercise 10 C Numericals

1. The primary coil of a transformer has 800 turns and the secondary coil has 8 turns. It is connected to a 220 V a.c. supply. What will be the output voltage ?

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