OBJECTIVE TYPE QUESTIONS & ANSWERS

Q1. Each question is followed by four options encircle the correct option.

1) **The shape of magnetic lines of force in case of a straight current carrying conductor is:**
   a. elliptical b. triangular c. rectangular d. circular

2) **When a straight current carrying conductor is placed in a magnetic field at right angles to it, the direction of force acting upon it is:**
   a. the same as the direction of field
   b. opposite to the direction of the field
   c. makes an angle of 45° with the current
   d. at right angles to both the field and the current

3) **A transformer has 100 turns in the primary and 500 turns in the secondary. If 6 volts is applied across its primary, the voltage induced across its secondary would be:**
   a. 0 volts b. 30 volts c. 45 volts d. 60 volts

4) **Select the statement which is not true:**
   a. The value of induced e.m.f is inversely proportional to the rate of change of flux
   b. When there is relative motion between the coil and the magnet, induced e.m.f. is produced
   c. Michael Faraday discovered Faraday's law of electromagnetic induction in 1831
   d. Change of flux induces an e.m.f. in the coil

5) **Which statement is not correct?**
   a. magnetic lines of force can be drawn in any magnetic field
   b. If a coil is placed in the magnetic field of a bar magnet, some lines of force will pass through its face
   c. A solenoid cannot be connected with a galvanometer
   d. Battery contains chemical energy in it

6) **The D.C. motor converts, electrical energy of battery into _____ of the coil.**
   a. kinetic energy b. mechanical energy
   c. potential energy d. sound energy

7) **Which is not correct according to Fleming's left hand rule?**
   a. The forefinger points in the direction of magnetic field
   b. The middle finger points in the direction of current
   c. The thumb indicates the direction of force
   d. The thumb indicates the direction of current

8) **Who discovered electromagnetic induction?**
   a. Volta b. Ohm
   c. Michael Faraday d. Maxwell

9) **Which indicates the number of turns in primary coil?**

a. E_p b. E_s c. N_p d. N_s

10) Whi' eq ıtion is true?

a. $\frac{E_s}{E_p} = \frac{N_s}{N_p}$ b. $E_p = \frac{N_p}{N_s} \times \frac{1}{E_s}$ c. $\frac{N_s}{E_p} = \frac{N_p}{E_s}$ d. $\frac{N_p}{E_p} = \frac{E_p}{N_s}$

11) Which statement is not true about A.C. generator?

a. it consists of a rectangular coil
b. coil rotates between two poles of permanent magnet
c. both the ends are soldered to five slip rings
d. there are two carbon brushes present in it

12) Which statement is not true about transformer?

a. transformer is used to increase or decrease the value of alternative voltage
b. it consists of five coils
c. it consists of two coils
d. one coil is called primary coil

13) When current passes through a conductor, which of the following produces around the conductor?

a. electric field b. magnetic field
c. gravitational field d. none of these

14) The magnetic lines of force can be traced by using a:

a. magnetic pen b. tracing paper
c. compass needle d. lead pencil

15) The magnetic lines of force in the form of concentric circles if conductor is:

a. straight b. curve c. circle d. rectangle

16) According to right hand rule if current is flowing through the wire in upward direction, then the direction of magnetic field will be:

a. upward b. clockwise c. downward d. anti clockwise

17) The direction out of plane of the paper is indicated by:

a. cross (×) b. dot (·) c. plus (+) d. negative (–)

18) The magnetic lines are straight and parallel in a small region near the:

a. centre of coil b. left side of coil
c. right side of coil d. out side of coil

19) A closely wound cylindrical coil of insulated wire is called:

a. lever b. current carrying coil
c. solenoid d. inductor

20) Inside the solenoid magnetic lines of force are:

a. cancel each other b. parallel
c. in the same direction d. both (c) and (d)

21) The direction of current or magnetic field into the plane of paper is indicated by the symbol:

a. ⊕ b. ⊗ c. d. ⊖

22) The angle between current, magnetic field and force is:

a. 0° b. 45° c. 90° d. 180°

23) Fleming's left-hand rule is used to determine the direction of:

a. force b. current c. electric field d. e.m.f

24) If the conductor is placed parallel to the field, then the force acting upon it is:

a. maximum b. zero
c. small deflection towards left d. large deflection towards right

25) A D.C. motor consists of:

a. a coil b. split ring
c. a U shape magnet d. all of these

26) Fleming's left hand rule is also known as:

a. Kirrchoff's rule b. Ohm's law c. motor rule d. none of these

27) D.C. motors converts electrical energy into:

a. magnetic energy b. mechanical energy
c. heat energy d. light energy

28) In bar magnet magnetic lines are started from:

a. north pole b. south pole c. centre d. none of these

29) If the magnetic flux through a coil or solenoid is changed, then:

a. it will rotate b. e.m.f is induced
c. coil oscillate d. coil becomes stationary

30) Farady's law of electromagnetic induction is the principle of:

a. magnetism b. electromagnetism
c. induced e.m.f d. electric field

31) The device which converts mechanical energy into electrical energy:

a. motor b. generator c. battery d. thermocouple

32) A.C. generator works on the principle of:

a. induced e.m.f b. motor principle
c. Fleming's law d. Joule's law

33) An A.C. generator consists of:

a. rectangular coil b. U shape magnet
c. slip rings d. all of these

34) A.C. in Pakistan has a frequency of:

a. 10 Hz b. 20 Hz c. 40 Hz d. 50 Hz

35) Rate of change of current in a coil produces induced current in other coil, this is known as:

a. induced e.m.f b. self induction
c. mutual induction d. none of these

36) The S.I. unit of mutual induction is:

a. Tesla b. Henery c. Weber d. Weber m^{-2}

37) If rate of change of current produces e.m.f in the same coil, it is called:

a. self induction b. mutual induction
c. induced e.m.f d. conductance

38) The S.I. unit of self induction is:

a. Henery b. Tesla c. Weber d. Weber m^{-2}

39) The principle of transformer is:

a. law of electromagnetic induction b. mutual induction
c. self induction d. lens law

40) Number of primary coils is represented by:

a. N_s b. E_p c. E_s d. N_p

41) In step up transformer:

a. $N_p > N_s$ b. $N_s > N_p$ c. $E_s > E_p$ d. both (b) and (c)

42) In step down transformer:

a. $N_p > N_s$ b. $N_s > N_p$ c. $E_s > E_p$ d. both (b) and (c)

43) In transformer, the strength of magnetic field increases by using:

a. iron core b. wood core c. brass core d. air core

44) E_p stands for:

a. voltage at secondary b. voltage at primary
c. no of turns at primary d. no of turns at secondary

45) In A.C. generator, flux will be zero if coil is:

a. horizontal b. vertical c. parallel d. inclined

46) Voltage is increased by using transformer which is:

a. step down b. step up
c. by increasing magnetic field d. increasing no of turn in primary coil

47) Number of turns in secondary coil is represented by symbol:

a. E_p b. E_s c. N_s d. N_p

48) When current passes through solenoid, it behaves like a:

a. bare magnet b. D.C. motor
c. A.C. generator d. transformer

49) If curl of fingers of right hand shows the direction of current in solenoid, then thumb indicates:

a. flow of current b. direction of voltage
c. north pole d. south pole

50) If a coil moves parallel to magnetic field, the induced e.m.f will be:

a. maximum b. zero c. negative d. positive

Answers

No.	Ans.	No.	Ans.	No.	Ans.	No.	Ans.
1.	d	2.	d	3.	b	4.	a
5.	c	6.	b	7.	d	8.	c

9.	c	10.	a	11.	c	12.	b
13.	b	14.	c	15.	a	16.	d
17.	b	18.	a	19.	c	20.	d
21.	b	22.	c	23.	a	24.	b
25.	d	26.	c	27.	b	28.	a
29.	b	30.	c	31.	b	32.	a
33.	d	34.	d	35.	c	36.	b
37.	a	38.	a	39.	b	40.	d
41.	d	42.	a	43.	a	44.	b
45.	b	46.	b	47.	c	48.	a
49.	c	50.	b				

Q2. Give short Answers.

1. Define magnetic field.

Answer

The region around a magnet where its magnetic effects are felt is called magnetic field.

2. What is the SI unit of magnetic field?

Answer

The SI unit of magnetic field is **Tesla**.

3. Write some magnetic effects of electric current?

Answer

- When current passes through a conductor, magnetic field is produced in the space around it.
- If the conductor is a straight wire, these magnetic lines of force will be in the form of concentric circles.

4. What is line of magnetic force?

Answer

It is a line along which a small free north pole would move in a magnetic field.

5. How the direction of magnetic lines of force is determined?

Answer

The direction of the magnetic lines of force can be determined by right hand rule.

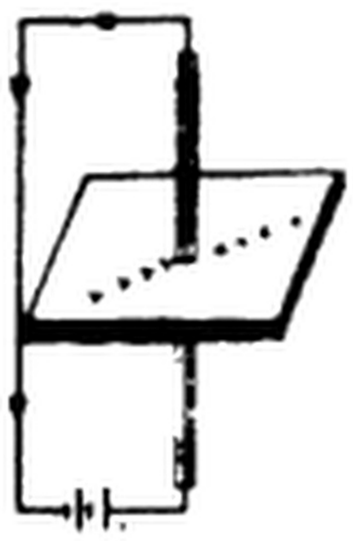
Right hand rule:

"If we grasp the current carrying conductor in our right hand with the thumb being stretched in the direction of current, the fingers would curl in the direction of the lines of force."

6. When do magnetic lines of force become clockwise?

Answer

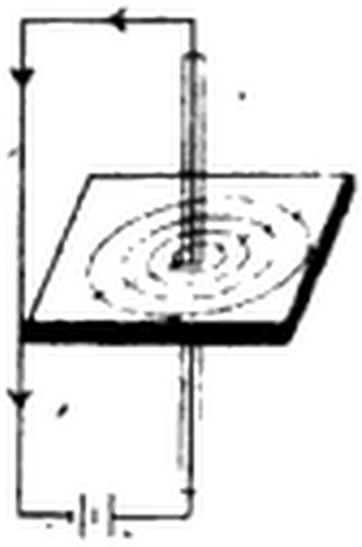
If the current flows from top towards the bottom the wire then the magnetic lines of force would be clockwise.



7. When do magnetic lines of force become anti-clockwise?

Answer

If the current flows from bottom towards the top of the wire then the magnetic lines of force would be anti-clockwise.



8. What does the symbol • and × mean?

Answer

- The dot (•) shows that the current is directed out of the paper i.e. it is flowing towards us.
- A sign of cross (×) shows that the current is flowing away from us.

9. Write some characteristics of current carrying straight wire?

Answer

- A magnetic field is set up in the region surrounding a current carrying wire.
- The line of force are circular and their direction depends upon the direction of current.
- The magnetic field remains as long as the current is flowing in the wire.

- The strength of magnetic is greater near the wire.
- Right Hand Rule can determine the direction of the magnetic lines of force.

10. What is solenoid?

Answer

A solenoid is closely wound cylindrical coil of insulated wire.

11. How poles of solenoid can be found?

Answer

Hold the solenoid in your right hand by curling the finger in the direction of the current; the stretched thumb would indicate towards the North Pole.

12. How the direction of magnetic field of the solenoid is found?

Answer

The direction of magnetic of the solenoid is found by the use of Right Hand Rule. It states that:

"Hold the solenoid in the right hand with fingers curling in the direction of current, then the thumb will point in the direction of the magnetic field."

13. On what factors the strength of a magnetic field inside a solenoid depends?

Answer

The strength of a magnetic field inside a solenoid depends on the following factors:

- Current flowing in the solenoid.
- Number of turns per unit length.
- Medium inside solenoid.

14. Write some characteristics of current carrying solenoid?

Answer

- Magnetic field inside the solenoid in uniform.
- Magnetic field inside the solenoid is large, as compared with outside the solenoid.
- Inside the solenoid, the lines of force are parallel and all point in the same direction.
- The Right Hand Rule gives the direction of magnetic field.

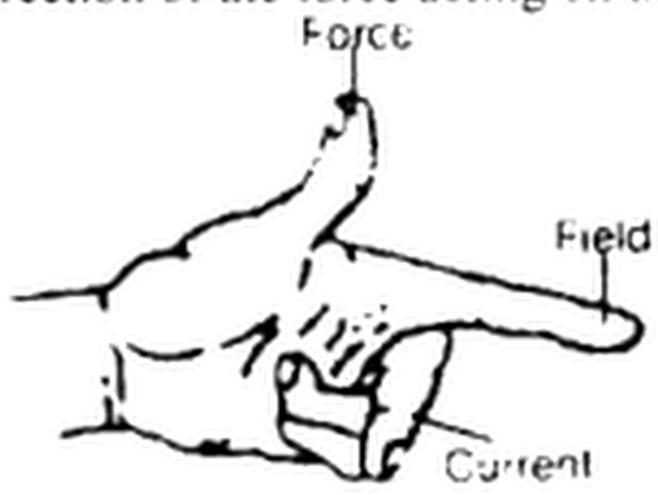
- The current carrying solenoid acts like a bar magnet.
- The field at the coil is proportional to the current in the coil.

15. How the magnetic force is determined due to a current carrying conductor in a magnetic field?

Answer

When a current carrying conductor is placed in a magnetic field at right angles to it, it experiences a force, which is determined by Fleming's left hand rule. According to this rule:

"Stretch the thumb, forefinger and the middle finger of the left hand mutually at right angles to each other. If the forefinger points in the direction of the current, then the thumb would indicate the direction of the force acting on the conductor."



16. On what factors the force on a current carrying conductor in a magnetic field depends?

Answer

The force on a current carrying conductor in a magnetic field depends upon the following factors:

- The current flowing through the conductor.
- Strength of the magnetic field.
- Length of the conductor.
- Angle between length and magnetic field of the conductor.

17. Why is magnetic field non-zero outside a solenoid?

Answer

As solenoid behaves as a bar magnet, so the magnetic field lines form a closed path, that is why the magnetic field is non-zero outside the solenoid.

18. How we increase the magnetic field in case of current carrying solenoid?

Answer

The magnetic field within the solenoid is increased by:

- Increasing the current in the wire.
- Increasing the number of turns per unit length.

19. Define mutual induction.

Answer

The phenomenon in which a changing a current in one coil induces an emf in another coil is called the mutual induction.

20. What is D.C motor? Draw its diagram.

Answer

A D.C motor is a device, which converts electrical energy into mechanical energy.

21. Give the principle of D.C motor.

Answer

When a current carrying wire is placed in a magnetic field, it experiences a force. This is the basic principle of an electric motor.

22. Define induced emf.

Answer

An emf is induced in a conductor when it moves in a magnetic field, is called an induced emf.

23. What is induced current?

Answer

The current produced by moving a loop of wire in the magnetic field is called induced current.

24. On what factors the induced current depends?

Answer

Induced current depends upon the following factors:

- The speed with which the conductor moves in the magnetic field.
- Resistance of the loop.

25. How induced current can be increased?

Answer

The induced current can be increased:

- Using a strong magnetic field.
- Moving the loop faster.
- Replacing the loop by a coil of many turns.

26. What is electromagnetic induction?

Answer

The production of an electromotive force either by motion of a conductor through a magnetic field or by a change in the magnetic flux is known as electromagnetic induction.

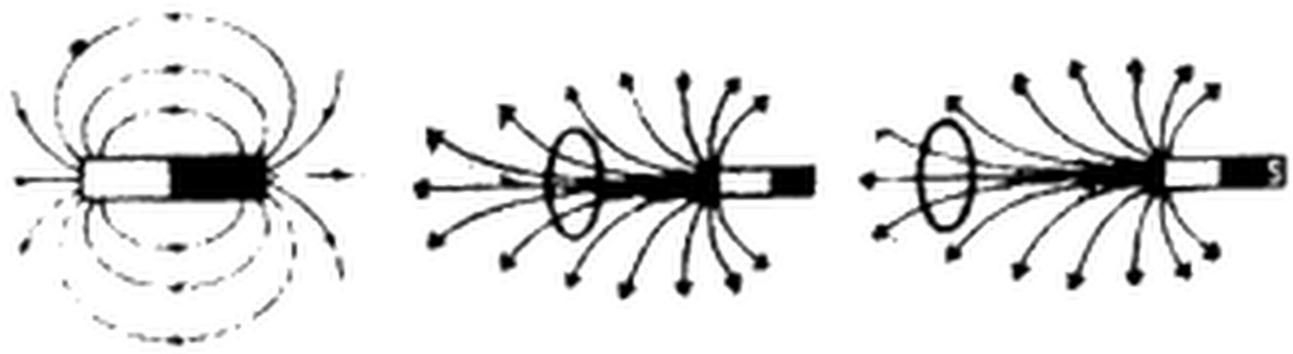


Figure (i) Figure (ii) Figure (iii)

27. What is magnetic flux?

Answer

The number of magnetic lines passing through any surface is known as the magnetic flux through that surface.

28. State Faraday's law of electromagnetic induction?

Answer

Faraday's law of Electromagnet Induction is stated as:
"The value of the induced e.m.f is directly proportional to the rate of change of flux."
Mathematically,

$$\text{Induced emf} = N\frac{\Delta\varphi}{\Delta t}$$

Where
N = number of turns of the coil
$\frac{\Delta\varphi}{\Delta t}$ = Rate of change of flux

29. What is A.C generator? Draw its diagram.

Answer

A device, which converts mechanical energy into electrical energy, is called current generator. A generator, which produces alternating voltage and current is called A.C generator.

30. Give its principle.

Answer

The principle of an electric generator is based on Faraday's law of electromagnetic induction.

31. Name the main parts of an A.C generator.

Answer

These are following main parts of an A.C generator.

1) A coil of many turns
2) Slip rings
3) Brushes
4) A permanent magnet

32. What are the similarities between a motor and a generator?

Answer

A motor and a generator are similar in following way:

- Both require magnetic field produced by a permanent magnet.
- Both have a coil capable of rotation.
- Both have split rings.
- Both work on the principle of Faraday's law of electromagnetic induction.
- Both of them have carbon brushes.

33. What are the differences between a motor and a generator?

Answer

A motor and a generator are different in following ways:

- A motor converts electrical energy into mechanical energy, while a generator converts mechanical energy into electrical energy.
- In a motor, electric current is supplied to the coil that causes it to rotate in the outer magnetic field while in a generator, the coil is rotated in the magnetic field due to which emf is induced in the coil.

34. What is mutual induction?

Answer

If the current is induced in a circuit due to change of current in another circuit, this phenomenon is known as mutual induction.

35. Differentiate between primary and secondary coil?

Answer

The coil to which A.C voltage is supplied is called primary coil while the coil from which power is delivered to the circuit is called secondary coil.

36. How some birds like pigeon, correctly estimate the direction?

Answer

There is some sort of natural magnet in their head to estimate the direction correctly.

37. What is a self-induction?

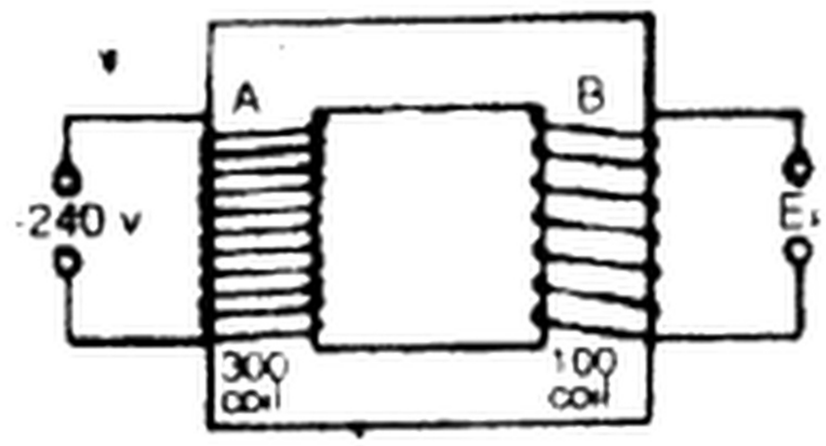
Answer

If the current through a coil or a circuit changes and this change induces an emf in the circuit itself, the phenomenon is known as self-induction.

38. What is transformer?

Answer

An electrical device, which is used to increase or decrease the value of alternating voltage, is called transformer.



39. Give the principle of transformer.

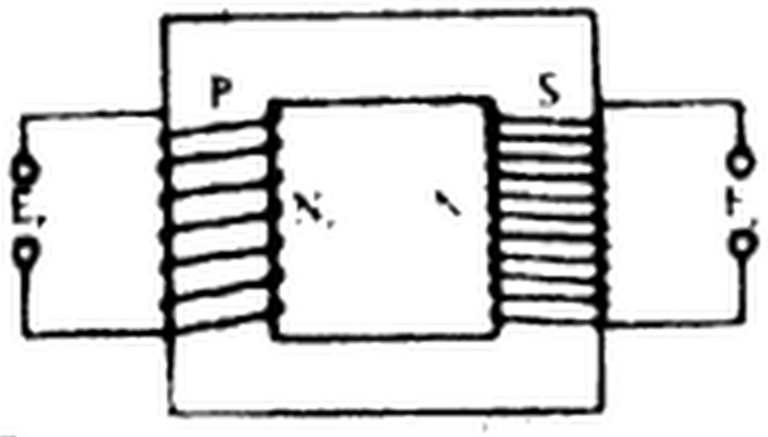
Answer

It works on the principle of mutual induction between two coils.

40. Define step-up transformer?

Answer

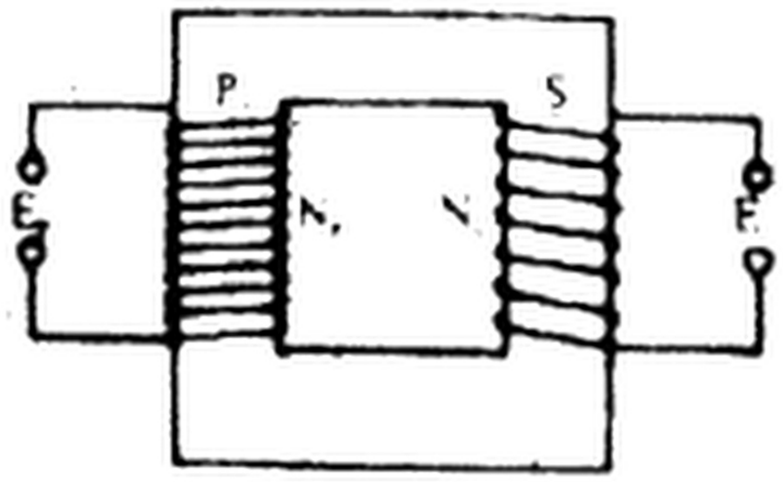
Such a transformer in which voltage across secondary coil is greater than the primary coil is called step-up transformer.



41. Define step-down transformer?

Answer

Such a transformer in which voltage across secondary coil is less than the primary coil is called step-up transformer.



42. Why two lines of forces never intersect each other?

Answer

If two lines of force intersect at a point, then there will be two directions of resultant magnetic field at that point, which is impossible. Hence two lines of force never intersect each other.

43. Can a transformer operate on D.C?

Answer

A transformer cannot operate on steady or changing D.C voltage.

44. Why we use A.C to operate the transformer?

Answer

It requires a voltage, which rises and falls. Since an A.C voltage not only changes its magnitude but its direction as well. So it is used to operate transformer.

45. Write the equation of the transformer.

Answer

The relation for a transformer is give by:

$$\frac{E_s}{E_p} = \frac{N_s}{N_p}$$

Where

N_p = Number of turns in the primary coil
N_s = Number of turns in the primary coil
E_p = voltage applied across the primary coil
E_s = the required voltage generated across the secondary coil

46. On what factors the output voltage depends in a transformer?

Answer

The output voltage of a transformer depends upon the following factors:

- Number of turns in the primary coil.
- Number of turns in the secondary coil.
- Soft iron core.

47. How magnetic field can be set?

Answer

Magnetic field can be set up around a conductor due to the flow current through a conductor.

48. Show the presence of magnetic field around a current carrying coil?

Answer

According to Orested, moving charges rise to a magnetic field around the wire, which appears in the form of concentric circles around the conducting wire and remains present as long as current is flowing.

49. A current carrying wire is placed in a magnetic field, how must it be oriented so that the force on it is zero.

Answer

When the current carrying conductor is placed in such a way that the direction of current is parallel to lines of magnetic field, the force on it is zero because:

$$F = BIL \sin\theta$$

$$\text{Hence } F = 0 \qquad \text{when } \theta = 0°$$

50. A current carrying wire is placed in a magnetic field, how must it be oriented so that the force on it is maximum.

Answer

When the current carrying conductor is placed in such a way that the direction of current is perpendicular to lines of magnetic field, the force on it is maximum because F will be maximum when $\theta = 90°$

$$F = BIL \sin\theta$$

$$F = BIL \times \sin 90°$$

$$F = BIL$$