9th Science Lesson 5 Questions in English

5] Magnetism and Electromagnetism

1. Which among the following was the strongest natural magnet?

a) Limestone
b) Metaquartzite
c) Sandstone
d) Lodestone

Explanation

Natural magnets exist in the nature. These kinds of magnets can be found in rocks and sandy deposits in various parts of the world. The strongest natural magnet is lodestone magnetite. The magnetic property in the natural magnets is permanent. It never gets destroyed.

2. What was the purpose of the magnet used by the captain of the ship effectively?

a) To identify weather
b) To identify the distance from land
c) To identify the direction
d) All the above

Explanation

Captains of the ships effectively used the magnets to identify the direction of the ship in the sea. There are two kinds of magnets that we can see around us: Natural magnet and Artificial magnet. Natural magnet lodestones were used to make compasses in the olden days. Artificial magnets are made by us. The magnets available in the shops are basically artificial magnets.

3. What is the unit of magnetic field?

a) Newton
b) Joule
c) Tesla
d) Weber

Explanation

The magnetic field is the region around the magnet where its magnetic influence can be felt. It is denoted by B and its unit is Tesla.

4. The Earth produces its own magnetic field, which shields which layer from the solar wind?

a) Mantle layer
b) Crust layer

c) Exo layer
d) Ozone layer

Explanation

Magnetic field can penetrate through all kinds of materials, not just air. The Earth produces its own magnetic field, which shields the earth's ozone layer from the solar wind and it is important for navigation also.

5. Which among the following statement is correct about magnetic field lines?

a) They start at north pole and end at south pole
b) They start at south pole and end at north pole
c) They start at both north and south pole
d) None of the above

Explanation

A magnetic field line is defined as a curve drawn in the magnetic field in such a way that the tangent to the curve at any point gives the direction of the magnetic field. They start at north pole and ends at south pole. The magnetic field at a point is tangential to the magnetic field lines.

6. The number of magnetic field lines passing through a given area is know as ____

a) Magnetic impulse
b) Magnetic pulse
c) Magnetic loop
d) Magnetic flux

Explanation

Magnetic flux is the number of magnetic field lines passing through a given area.

7. The number of magnetic field lines crossing unit area kept normal to the direction of field lines is called ___

a) Magnetic flux inventor
b) Magnetic flux density
c) Magnetic flux frustrates
d) Magnet flux impulse

Explanation

The number of magnetic field lines crossing unit area kept normal to the direction of field lines is called magnetic flux density.

8. Which among the following is the unit of Magnetic flux?

a) Newton
b) Joule
c) Tesla
d) Weber

Explanation

Magnetic flux is denoted by ϕ and its unit is weber (Wb).

9. Which among the following animals can return to their birth place many decades after they were born by perceiving variations in magnetic parameters of Earth such as magnetic field intensity and remember them?

a) Sheep
b) Bison
c) Turtle
d) Shark

Explanation

Some sea turtles (loggerhead sea turtle) return to their birth beach many decades after they were born, to nest and lay eggs. In a research, it is suggested that the turtles can perceive variations in magnetic parameters of Earth such as magnetic field intensity and remember them. This memory is what helps them in returning to their homeland.

10. Which among the following is the unit of magnetic flux density?

a) Wb/m^2
b) Wb/m^3
c) Wb/m
d) Wb m

Explanation

Magnetic flux density unit is Wb/m^2.

11. Which among the following is not the Properties of magnetic lines of force?

a) Magnetic lines of force are closed, continuous curves, extending through the body of the magnet.
b) Magnetic lines of force never intersect.
c) They will be maximum at the equator than at the poles.
d) The tangent drawn at any point on the curved line gives the direction of magnetic field.

Explanation

Magnetic lines of force start from the North Pole and end at the South Pole. They will be maximum at the poles than at the equator.

12. Who among the following in 1820 discovered that electric current create magnetic field while demonstrating electrical circuits in the class?

a) Andre Marie Ampere
b) Hans Christian Oersted
c) James Clerk Maxwell
d) Michael Faraday

Explanation

It was on 21st April 1820, Hans Christian Oersted, a Danish Physicist was giving a lecture. He was demonstrating electrical circuits in that class. He had to often switch on and off the circuit during the lecture. Accidentally, he noticed the needle of the magnetic compass that was on the table. It deflected whenever he switched on and the current was flowing through the wire. The compass needle moved only slightly, so that the audience didn't even notice. But it was clear to Oersted that something significant was happening. He conducted many experiments to find out a startling effect, the magnetic effect of current.

13. Which among the following statement is correct

1) Oersted aligned a wire XY such that they were exactly along the North-South direction. He kept one magnetic compass above the wire at A and another under the wire at B. When the circuit was open and no current was flowing through it, the needle of both the compass was pointing to north.
2) Once the circuit was closed and electric current was flowing, the needle at A pointed to east and the needle at B to the west. This showed that current carrying conductor produces magnetic field around it.
    a) Only 1
    b) Only 2
    c) Both 1 and 2
    d) None

14. The direction of the magnetic lines around a current carrying conductor can be easily understood using which rule?

a) Faraday rule
b) Right hand thumb rule
c) Sea rule
d) Kirchhoff rule

Explanation

The direction of the magnetic lines around a current carrying conductor can be easily understood using the right-hand thumb rule.

15. The magnetic field is always what to the direction of current?

a) Parallel
b) Perpendicular
c) Both parallel and perpendicular
d) None

Explanation

Hold the wire with four fingers of your right hand with thumbs-up position. If the direction of the current is towards the thumb then the magnetic lines curl in the same direction as your other four fingers. This shows that the magnetic field is always perpendicular to the direction of current.

16. Which among the following the strength of the magnetic field at a point due to current carrying wire doesn't depend on?

a) The current in the wire
b) Distance of the point from the wire
c) Surrounding temperature in the environment
d) The magnetic nature of the wire

Explanation

The strength of the magnetic field at a point due to current carrying wire depends on: (i) the current in the wire, (ii) distance of the point from the wire, (iii) the orientation of the point from the wire and (iv) the magnetic nature of the medium. The magnetic field lines are stronger near the current carrying wire and it diminishes as you go away from it. This is represented by drawing magnetic field lines closer together near the wire and farther away from the wire.

17. Who found that a charge moving in a magnetic field, in a direction other than the direction of magnetic field, experiences a force?

a) H.A. Lorentz
b) Max Plank
c) H.K. Onnes
d) Pieter Zeeman

Explanation

H.A. Lorentz found that a charge moving in a magnetic field, in a direction other than the direction of magnetic field, experiences a force. It is called the magnetic Lorentz force.

18. Which among the following statement is correct

1) Charge in motion constitutes a current, a conductor carrying moving charges, placed in magnetic field other than the direction of magnetic field, will also experience a force and can produce motion in the conductor.
2) The current carrying wire has a magnetic field parallel to the wire (by looking at the deflection of the compass needle in the vicinity of a current carrying conductor). The deflection of the needle implies that the current carrying conductor exerts a force on the compass needle.
    a) Only 1
    b) Only 2
    c) Both 1 and 2
    d) None

Explanation

The current carrying wire has a magnetic field perpendicular to the wire (by looking at the deflection of the compass needle in the vicinity of a current carrying conductor). The deflection of the needle implies that the current carrying conductor exerts a force on the compass needle.

19. In 1812, who discovered that a current carrying conductor also gets deflected when it is placed in a magnetic field?

a) Georg Ohm
b) J.J. Thomson
c) Nikola Tesla
d) Michael Faraday

Explanation

In 1821, Michael Faraday discovered that a current carrying conductor also gets deflected when it is placed in a magnetic field. The magnetic field of the permanent magnet and the magnetic field produced by the current carrying conductor interact and produce a force on the conductor.

20. If a current, I is flowing through a conductor of length, L kept perpendicular to the magnetic field B, then the force F experienced by it is given by which equation?

a) F= I L / B
b) F=I / L B
c) F=I L / B
d) F=I L B

Explanation

If a current, I is flowing through a conductor of length, L kept perpendicular to the magnetic field B, then the force F experienced by it is given by the equation, F = I L B. The above equation indicates

that the force is proportional to current through the conductor, length of the conductor and the magnetic field in which the current carrying conductor is kept.

21. When the conductor is parallel to the magnetic field, the force will be _____

a) Maximum
b) Minimum
c) Zero
d) Can't define

Explanation

The angle of inclination between the current and magnetic field also affects the magnetic force. When the conductor is perpendicular to the magnetic field, the force will be maximum (=BIL). When it is parallel to the magnetic field, the force will be zero.

22. The Force is always what quantity?

a) Radar
b) Vector
c) Scalar
d) Both scalar and vector

Explanation

The force is always a vector quantity. A vector quantity has both magnitude and direction. It means we should know the direction in which the force would act. The direction is often found using what is known as Fleming's Left-hand Rule.

23. In Fleming's Left-hand rule while stretching the three fingers of left hand in perpendicular manner with each other, if the direction of the current is denoted by the middle finger of the left hand, what does the second finger denotes?

a) Direction of the force
b) Direction of the magnetic field
c) Direction of the conductor
d) Direction of the thrust

Explanation

Fleming's Left-hand Rule states that while stretching the three fingers of left hand in perpendicular manner with each other, if the direction of the current is denoted by the middle finger of the left hand and the second finger is for direction of the magnetic field, then the thumb of the left hand denotes the direction of the force or movement of the conductor.

24. A conductor of length 50 cm carrying a current of 5 A is placed perpendicular to a magnetic field of induction 2×10−3 T. Find the force on the conductor?

a) $F = 5 \times 10$ N
b) $F = 5 \times 10^{3}$ N
c) $F = 5 \times 10^{-3}$ N
d) $F = 5 \times 10^{-1}$ N

Explanation

Force on the conductor = ILB

$= 5 \times 50 \times 10^{-2} \times 2 \times 10^{-3}$

$= 5 \times 10^{-3}$ N

25. Which among the following statement is incorrect

1) We have seen that a current carrying conductor has a magnetic field around it. If we place another conductor carrying current parallel to the first one, the second conductor will experience a force due to the magnetic field of the first conductor.
2) The first conductor will experience a force due to the magnetic field of the second conductor. These two forces will be equal in direction and opposite in magnitude. Using Fleming's left-hand rule, we can find that the direction of the force on each wire would be same when the current in both of them are flowing in the different direction, i.e., the wires would experience an attractive force
    a) Only 1
    b) Only 2
    c) Both 1 and 2
    d) None

Explanation

The first conductor will experience a force due to the magnetic field of the second conductor. These two forces will be equal in magnitude and opposite in direction. Using Fleming's left-hand rule, we can find that the direction of the force on each wire would be towards each other when the current in both of them are flowing in the same direction, i.e., the wires would experience an attractive force.

26. Which among the following statement is incorrect

1) Before 18th century people thought that magnetism and electricity were separate subjects of study. After Oersted's experiment the electricity and magnetism were united and became a single subject called 'Electromagnetism'.
2) When there is current, the magnetic field is produced and the current carrying conductor behaves like a magnet. You may now wonder how was it possible for a lodestone to behave

like a magnet when there was no current passing through it. Only in the twentieth century, we understood that the magnetic property arises due to the motion of neutrons in the lodestone.

3) In the circuit the electrons flow from positive of the battery to negative of the battery and constitutes current. As a result, it produces magnetic field. In natural magnets and artificial magnets that we buy in shops, the neutron move around the nucleus constitutes current which leads to magnetic property.
    a) Only 1
    b) Only 3
    c) Both 1 and 3
    d) Both 2 and 3

Explanation

When there is current, the magnetic field is produced and the current carrying conductor behaves like a magnet. You may now wonder how was it possible for a lodestone to behave like a magnet when there was no current passing through it. Only in the twentieth century, we understood that the magnetic property arises due to the motion of electrons in the lodestone.

In the circuit the electrons flow from negative of the battery to positive of the battery and constitutes current. As a result, it produces magnetic field. In natural magnets and artificial magnets that we buy in shops, the electrons move around the nucleus constitutes current which leads to magnetic property.

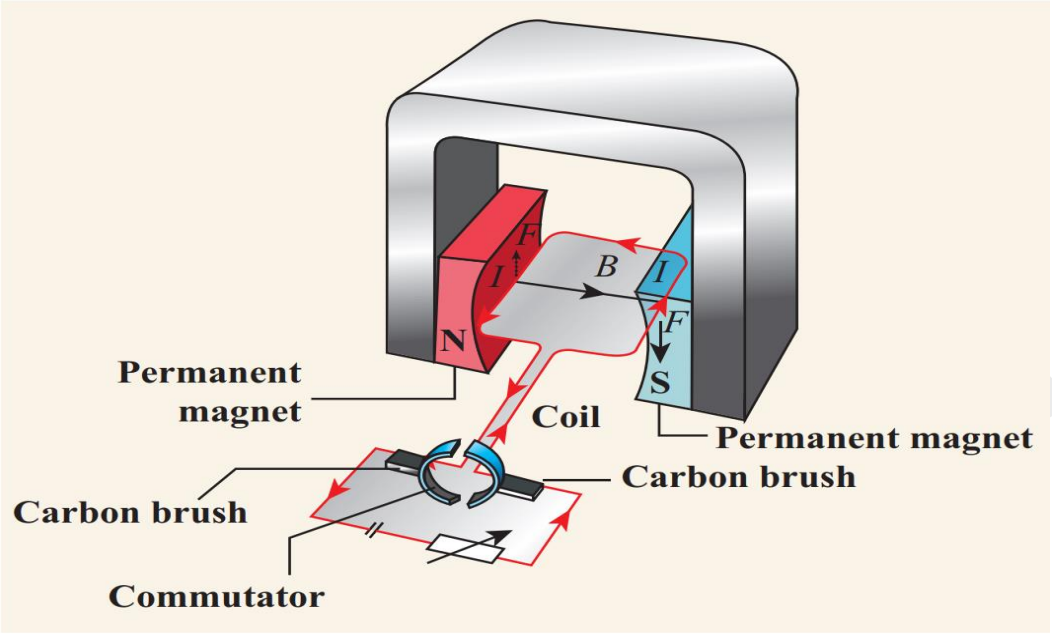
27. An electric motor is a device which converts electrical energy into what?

a) Chemical energy
b) Sound energy
c) Mechanical energy
d) Heat energy

Explanation

An electric motor is a device which converts electrical energy into mechanical energy. Electric motors are crucial in modern life. They are used in water pump, fan, washing machine, juicer, mixer, grinder etc. when electric current is passed through a conductor placed normally in a magnetic field, a force is acting on the conductor and this force makes the conductor to move.

28. Which among the following statement is correct regarding Electric motor?



1) A simple coil is placed inside two poles of a magnet. Now look at the current carrying conductor segment AB. The direction of the current is towards B, whereas in the conductor segment CD the direction is opposite. As the current is flowing in opposite directions in the segments AB and CD, the direction of the motion of the segments would be in opposite directions according to Fleming's left-hand rule.
2) If the current flow is along the line ABCD, then the coil will rotate in clockwise direction first and then in anticlockwise direction. If we want to make the coil rotate in any one direction, say clockwise, then the direction of the current should be along ABCD in the first half of the rotation and along DCBA in the second half of the rotation. To change the direction of the current, a small device called split ring commutator is used.
3) When the gap in the split ring commutator is aligned with terminals X and Y, there is no flow of current in the coil. But, as the coil is moving, it continues to move forward bringing one of the split ring commutators in contact with the carbon brushes X and Y. The reversing of the current is repeated at each half rotation, giving rise to a continuous rotation of the coil.
    a) Both 1 and 2
    b) Both 1 and 3
    c) Both 2 and 3
    d) All 1, 2 and 3

29. Which among the following doesn't increase the speed of rotation of coil?

a) Increasing the strength of current in the coil
b) Increasing the size of the magnet
c) Increasing the number of turns in the coil.
d) Increasing the area of the coil

Explanation

The speed of rotation of coil can be increased by: i. increasing the strength of current in the coil. ii. increasing the number of turns in the coil. iii. increasing the area of the coil and iv. increasing the strength of the magnetic field.

30. Who in 1831, explained the possibility of producing an e.m.f across the conductor when the magnetic flux linked with the conductor is changed.?

a) Andre Marie Ampere
b) Hans Christian Oersted
c) Michael Faraday
d) James Clerk Maxwell

Explanation

When it was shown by Oersted that magnetic field is produced around a conductor carrying current, the reverse effect was also attempted. In 1831, Michael Faraday explained the possibility of producing an e.m.f across the conductor when the magnetic flux linked with the conductor is changed.

31. Which among the following statement is correct regarding Faraday's experiment 2?

a) The greater the number of turns, the higher is the voltage generated
b) The greater the number of turns, the lower is the voltage generated
c) The greater the number of turns, there is no change in the voltage generated
d) The greater the number of turns, the voltage will become null

Explanation

In the Faraday's experiment, current (or voltage) is generated by the movement of the magnet in and out of the coil. The greater the number of turns, the higher is the voltage generated.

32. Which among the following statement is correct regarding faraday's experiment

1) In experiment 1, two coils were wound on a soft iron ring (separated from each other). The coil on the left is connected to a battery and a switch K. A galvanometer is attached to the coil on the right. When the switch is put 'on', at that instant, there is a deflection in the galvanometer. Likewise, when the switch is put 'off', again there is a deflection – but in the opposite direction. This proves the generation of current.
2) In experiment 3, the magnet is stationary, but the coil is moved in and out of the magnetic field (indicated by the magnetic lines of force). Here also, current is induced. All these observations made Faraday to conclude that whenever there is a change in the magnetic flux linked with a closed circuit an emf is produced and the amount of emf induced varies inversely as the rate at which the flux changes.

a) **Only 1**
b) Only 2
c) Both 1 and 2
d) None

Explanation

All these observations made Faraday to conclude that whenever there is a change in the magnetic flux linked with a closed circuit an emf is produced and the amount of emf induced varies directly as the rate at which the flux changes.

33. The change in the magnetic flux linked with a closed circuit an emf is produced and the amount of emf induced varies directly as the rate at which the flux changes. This emf is known as ____

a) Flux emf
b) Coiled emf
c) **Induced emf**
d) All the above

Explanation

The change in the magnetic flux linked with a closed circuit an emf is produced and the amount of emf induced varies directly as the rate at which the flux changes. This emf is known as induced emf.

34. The phenomenon of producing an induced emf due to change in the magnetic flux linked with a closed circuit is known as _____

a) Flux inductor
b) Magnetic flux
c) **Electromagnetic induction**
d) Electromagnetic flux

Explanation

The phenomenon of producing an induced emf due to change in the magnetic flux linked with a closed circuit is known as electromagnetic induction.

35. A current carrying conductor of certain length, kept perpendicular to the magnetic field experiences a force F. What will be the force if the current is increased four times, length is halved and magnetic field is tripled?

a) F = 2F
b) **F = 6F**
c) F = 12F
d) F = 24F

Explanation

F = I L B = (4I) × (L/2) × (3 B) = 6 F

Therefore, the force increases six times.

36. The direction of the induced current was given by which law?

a) Faraday's law
b) Joule's law
c) Lenz's law
d) Stefan's law

Explanation

The direction of the induced current was given by Lenz's law, which states that the induced current in the coil flows in such a direction as to oppose the change that causes it. The direction of induced current can also be given by another rule called Fleming's Right Hand Rule.

37. Which among the following was the main discovery of Michel Faraday?

a) Electromagnetic Induction
b) Diamagnetism
c) Electrolysis
d) All the above

Explanation

Michael Faraday (22nd Sep,1791–25th Aug, 1867) was a British Scientist who contributed to the study of electromagnetism and electrochemistry. His main discoveries include the principles underlying electromagnetic induction, diamagnetism and electrolysis.

38. In Fleming's Right Hand Rule, if the fore finger indicates the direction of magnetic field and the thumb indicates the direction of motion of the conductor what does middle finger indicate?

a) Direction of induced current
b) Direction of magnetic flux
c) Direction of force
d) Direction of magnetic rays

Explanation

In Fleming's Right Hand Rule, if the fore finger indicates the direction of magnetic field and the thumb indicates the direction of motion of the conductor, then the middle finger will indicate the direction of induced current.

39. Fleming's Right hand rule is also called _____

a) **Generator rule**
b) Motor rule
c) Flux rule
d) Magnetic rule

Explanation

Fleming's Right hand rule is also called 'generator rule'.

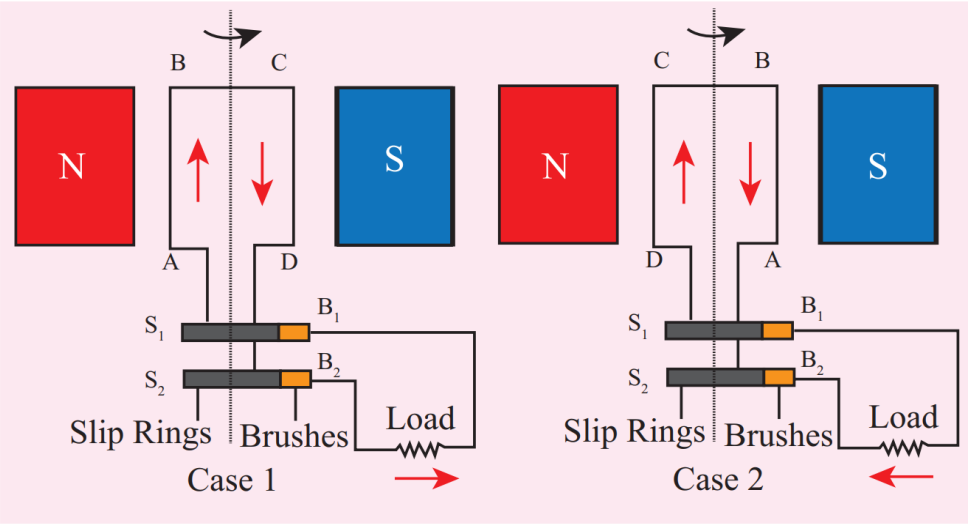
40. In an alternating current (AC) generator, there is a rotating rectangular coil ABCD called what placed between the two poles of a permanent magnet?

a) Horseshoe
b) Slip ring
c) **Armature**
d) Coil

Explanation

An alternating current (AC) generator, consists of a rotating rectangular coil ABCD called armature placed between the two poles of a permanent magnet.

41. Which among the following statement is correct regarding Electric generator.



1) An alternating current (AC) generator, consists of a rotating rectangular coil ABCD called armature placed between the two poles of a permanent magnet. The two ends of this coil are connected to two slip rings S1 and S2. The inner sides of these rings are insulated. Two conducting stationary brushes B1 and B2 are kept separately on the rings S1 and S2 respectively.
2) The two rings S1 and S2 are externally attached to an axle. The axle may be mechanically rotated from outside to rotate the coil outside the magnetic field. Outer ends of the two

brushes are connected to the internal circuit. When the coil is rotated, the magnetic flux linked with the coil changes. This change in magnetic flux will lead to generation of induced current.

3) The direction of the induced current, as given by Fleming's Right Hand Rule, is along ABCD in the coil and in the outer circuit it flows from B2 to B1. During the second half of rotation, the direction of current is along DCBA in the coil and in the outer circuit it flows from B1 to B2. As the rotation of the coil continues, the induced current in the external circuit is changing its direction for every half a rotation of the coil.
    a) Both 1 and 2
    b) Both 1 and 3
    c) Both 2 and 3
    d) All 1, 2 and 3

Explanation

The two rings S1 and S2 are internally attached to an axle. The axle may be mechanically rotated from outside to rotate the coil inside the magnetic field. Outer ends of the two brushes are connected to the external circuit. ed with the coil changes. This change in magnetic flux will lead to generation of induced current.

42. To get a direct current (DC), which type commutator must be used?

a) Full ring
b) Split ring
c) Coiled full ring
d) Both full and split ring

Explanation

To get a direct current (DC), a split ring type commutator must be used. With this arrangement, one brush is at all times in contact with the arm moving up in the field while the other is in contact with the arm moving down. Thus, a unidirectional current is produced. The generator is thus called a DC generator.

43. Which is a device used for converting low voltage into high voltage and high voltage into low voltage?

a) Motor
b) Generator
c) Transformer
d) Invertor

Explanation

Transformer is a device used for converting low voltage into high voltage and high voltage into low voltage. It works on the principle of electromagnetic induction.

44. In Transformer the alternating current flowing through the primary coil induces magnetic field in what?

a) Copper ring
b) Iron ring
c) Gold ring
d) Aluminium

Explanation

Transformer consists of primary and secondary coil insulated from each other. The alternating current flowing through the primary coil induces magnetic field in the iron ring. The magnetic field of the iron ring induces a varying emf in the secondary coil.

45. Which among the following statement is correct

1) The transformer used to change a low alternating voltage to a high alternating voltage is called a step-up transformer. i.e., $V_s > V_p$. In a step-up transformer, the number of turns in the primary coil is more than the number of turns in the secondary coil ($N_s < N_p$).
2) The transformer used to change a high alternating voltage to a low alternating voltage is called a step-down transformer ($V_s < V_p$). In a step-down transformer, the number of turns in the primary coils are less than the number of turns in the secondary coil ($N_s > N_p$).
    a) Only 1
    b) Only 2
    c) Both 1 and 2
    d) None

Explanation

The transformer used to change a low alternating voltage to a high alternating voltage is called a step-up transformer. i.e., $V_s > V_p$. In a step-up transformer, the number of turns in the secondary coil is more than the number of turns in the primary coil ($N_s > N_p$).

The transformer used to change a high alternating voltage to a low alternating voltage is called a step-down transformer ($V_s < V_p$). In a step-down transformer, the number of turns in the secondary coils are less than the number of turns in the primary coil ($N_s < N_p$).

46. Which among the following gives the correct formula for Transfrmer?

a) $E_s / E_p = N_s / N_p$
b) $E_s E_p = N_s N_p$
c) $E_s / E_p = N_p / N_s$

d) None of the above

Explanation

The formulae pertaining to the transformers are given in the following equations

$E_s / E_p = N_s / N_p$ or

Number of primary turns N_p/ Number of secondary turns N_s = Primary voltage V_p/ Secondary voltage V_s

Number of secondary turns Ns/ Number of primary turns N_p = Primary current I_p/ Secondary current I_s

47. A transformer cannot be used with the which current?

a) Alternative current
b) Reverse current
c) Direct current
d) None of the above

Explanation

A transformer cannot be used with the direct current (DC) source because, current in the primary coil is constant (ie. DC). Then there will be no change in the number of magnetic field lines linked with the secondary coil and hence no emf will be induced in the secondary coil.

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

a) 2.2 volt
b) 32 volts
c) 1.1 volt
d) 16 volts

Explanation

In a transformer, $E_s / E_p = N_s / N_p$

$E_s = (N_s / N_p) \times E_p$

= 8/800 × 220 = 220/100 = 2.2 volt

49. Which among the following statement is incorrect

1) Inside the speaker, an electromagnet is placed in front of a permanent magnet. The permanent magnet is fixed firmly in position whereas the electromagnet is mobile. As

pulses of electricity pass through the coil of the electromagnet, the direction of its magnetic field is rapidly changed.

2) This means that it is in turn attracted to and repelled from the permanent magnet vibrating back and forth. The electromagnet is attached to a cone made of a flexible material such as paper or plastic which amplifies these vibrations, pumping sound waves into the surrounding air towards our ears.
    a) Only 1
    b) Only 2
    c) Both 1 and 2
    d) None

50. Which is a method by which an object is suspended with no support other than magnetic fields?

a) Magnetic projection
b) Magnetic levitation
c) Magnetic convection
d) Magnetic rejection

Explanation

Magnetic levitation (Maglev) is a method by which an object is suspended with no support other than magnetic fields. In maglev trains two sets of magnets are used, one set to repel and push the train up off the track, then another set to move the floating train ahead at great speed without friction. In this technology, there is no moving part.

51. Which among the following electromagnetic is used?

a) MRI
b) X-ray
c) Scanners
d) All the above

Explanation

Nowadays electromagnetic fields play a key role in advanced medical equipment's such as hyperthermia treatments for cancer, implants and magnetic resonance imaging (MRI). Many of the medical equipment's such as scanners, x-ray equipment's and other equipment's also use the principle of electromagnetism for their functioning.

52. The space surrounding a bar magnet in which its influence in the form of magnetic force can be detected, is called ____

a) Magnetic field
b) Magnetic flux
c) Magnetic current

d) Magnetic coil

Explanation

The space surrounding a bar magnet in which its influence in the form of magnetic force can be detected, is called magnetic field.