QB365 Question Bank Software Study Materials

Magnetism and Electromagnetism Important 2,3 & 5 Marks Questions With Answers (Book Back and Creative)

9th Standard

Science

Total Marks : 75

2 Marks

10 x 2 = 20

1) State Fleming's Left Hand Rule.

Answer : **Flemings left hand rule:**

Flemings 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.

2) Define magnetic flux density.

Answer : The number of magnetic field lines crossing unit area kept normal to the direction of field lines is called magnetic flux density. Its unit is Wb/m^2.

3) List the main parts of an electric motor.

Answer : NS - permanent magnet

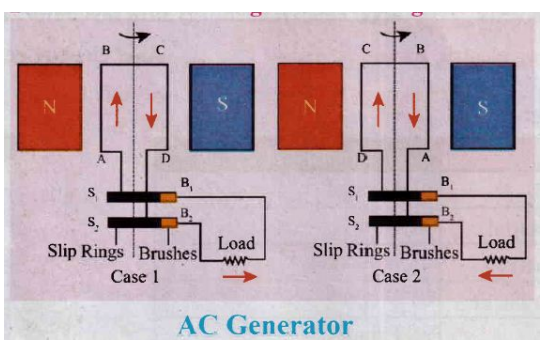
ABCD - coil wire

B_1 B_2 - carbon brushes

S_1 S_2 - split ring

4) Draw and label the diagram of an AC generator.

Answer :



5) Differentiate step up and step down transformer.

Answer :

S.No.	Step up transformer	Step down transformer
1.	It is used to change low alternative voltage to high alternative voltage.	It is used to change high alternative voltage to low alternative voltage.
2.	The number of turns in the secondary coil is more than the number of turns in the primary coil.	The number of turns in the secondary coils are less than the number of turns in the primary coil.

6) State the advantages of ac over dc.

Answer : (i) The ac can be carried over long distances using step up transformers.

(ii) The ac can be easily converted into dc.

(iii) Generating ac is easier than dc.

7) A portable radio has a built in transformer so that it can work from the mains instead of batteries. Is this a step up or step down transformer? Give reason.

Answer : The portable radio has a step down transformer. So that rectified DC voltage is equal to battery voltage hence it can work on mains as well as on battery.

8) State Faraday's laws of electromagnetic induction.

Answer : **First law:** Whenever there is a change in magnetic flux linked with a coil, an electric current is induced. The induced potential difference lasts so long as there is a change in the magnetic flux linked with the coil.
Second law: The magnitude of the induced current is directly proportional to the rate of change of magnetic flux linked with the coil

9) Define electric motor.

Answer : It is a device to convert electrical energy into mechanical energy. It is based on the principle that when a current carrying coil is placed is a magnetic field, it experiences a force.

10) What are the factors that depend on the strength of magnetic field?

Answer : The strength of the magnetic field at a point depends on
(i) The current in the wire.
(ii) Distance of the point from wire.
(iii) The orientation of the point from the wire.
(iv) The magnetic nature of the medium.

3 Marks 10 x 3 = 30

11) State an important advantage of ac over dc.

Answer : (i) The cost of generation of AC is less than the cost of generation of DC.
(ii) AC can be easily converted into D.C.
(iii) Only alternating voltage can be stepped up or stepped down by using a transformer.
(iv) AC can be transmitted to distant places without much loss of electric power than DC.

12) A portable radio has a built in transformer so that if can work from the mains instead of batteries. Is this a step up or step down transformer?

Answer : It is a step down transformer. So that rectified DC voltage is equal to battery voltage, hence it can work on mains as well as on battery.

13) Two coils A and B of insulated wire are kept close to each other. Coil A is connected to a galvanometer. While coil B is connected to a battery through a key. What would happen if
(i) a current is passed through coil B by plugging the key?
(ii) the current is stopped by removing the plug from the key?

Answer : (i) If a current is passed through coil B by plugging the key, the needle of the galvanometer instantly jumps to one side and just as quickly returns to zero, indicating a momentary current in coil - A (As the current in the coil B changes, the magnetic field associated with it also changes).
(ii) If the current is stopped by removing the plug from the key: The needle of the galvanometer in coil - A momentarily moves, but to the opposite side. It means that now the current flows in the opposite direction in coil - A.

14) State Faraday's laws of electromagnetic induction.

Answer : **First law:** Whenever there is a change in magnetic flux linked with a coil, an electric current is induced. The induced potential difference lasts so long as there is a change in the magnetic flux linked with the coil.
Second law: The magnitude of the induced current is directly proportional to the rate of change of magnetic flux linked with the coil

15) Mention the properties of magnetic lines of force

Answer : Magnetic lines of force are closed continuous curves, extending through the body of the magnet.
Magnetic lines of force start from the North Pole and end at the South Pole

16) Give the uses of magnets in everyday life.

Answer : (i) Used in radio and stereo speakers.

(ii) Used in almirah and refrigerator doors to snap them closed.

(iii) In medicine, the magnetic resonance imaging (MRI) scanners expose the inner parts of the patient's body for detailed examination by doctors.

17) Can two magnetic lines of force intersect? Justify your answer.

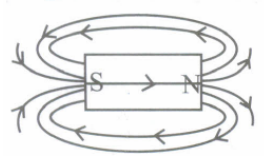
Answer : No, if two magnetic lines of force intersect then there will be two tangents and hence two directions of the magnetic field at the point of intersection. This is not possible.

18) Why does a compass needle get deflected when brought near a bar magnet?

Answer : The magnetic field of the magnet exerts force on both the poles of the compass needle. The forces experienced by the two poles are equal and opposite. These two forces form couple which deflects the compass needle.

19) Draw magnetic field lines around a bar magnet

Answer :



20) Give some uses of electromagnets

Answer : (i) It is used in factories and cranes to lift heavy iron ingots and steel scraps from one place to another.

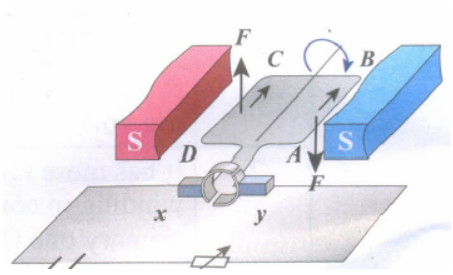
(ii) Used in hospitals to remove iron splinters from the eyes of the patients.

(iii) Used in electric bells, relays, electric switches etc.

5 Marks 5 x 5 = 25

21) Explain the principle, construction and working of a dc motor.

Answer :



Principle: An electric motor works on the principle that a current carrying conductor placed in a magnetic field experiences a force. The direction of force is given by Fleming's left hand rule.

Construction: An electric motor consists of the following main parts.

Armature: It is a rectangular coil ABCD having a large number of turns of this insulated copper wire wound over a soft iron core. The armature is placed between the poles of the field magnet and it can be rotated about an axis perpendicular to the magnetic field lines.

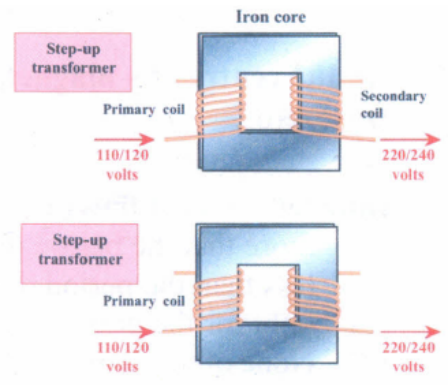
Split rings (commutators): It consists of a cylindrical metal ring split into two halves S1 & S2. As the coil rotates, the split rings also rotate about the same axis of rotation. The function of the split ring is to reverse the direction of current in the coil after every half rotation. Carbon brushes: Two graphite or flexible metal rods maintain a sliding contact with split rings S1 and S2 alternately.

Battery: A battery of few cells is connected to the brushes. The current from the battery flows to the armature coil through the brushes and the split rings with split rings S1 and S2 alternately battery flows to the armature coil through the brushes and the split rings.

Working: 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. When two ends of the coil experience force in opposite direction, they rotate. 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 anyone 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. 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 commutator 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.

22) Explain two types of transformer.

Answer : Depending upon the number of turns in the primary and secondary coils, we can step-up or step-down the voltage in the secondary coil.

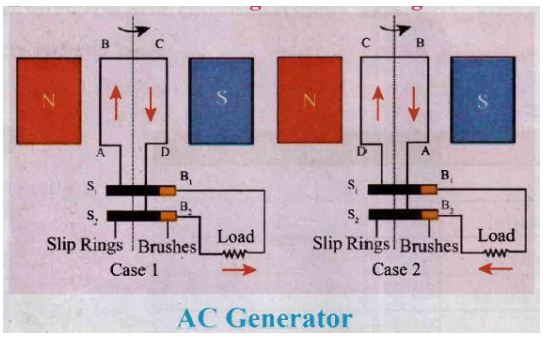


Step up transformer: The transformer used to change a low alternative voltage to a high alternating voltage is called a step up transformer. ie ($V_s > V_p$). In a step up transformer, the number of turns in the secondary coil is more than the number of turns in the primary coil ($N_s > N_p$).

Step down transformer: 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).

23) Draw a neat diagram of an AC generator.

Answer :



Explanation:

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. 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 B_2 to B_1. During the second half of rotation, the direction of current is along DCBA in the coil and in the outer circuit it flows from B_1 to B_2. 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.

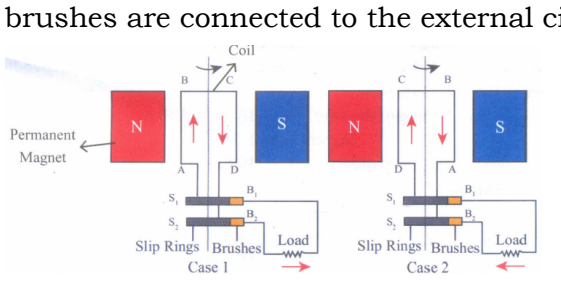
24) Explain the principle, construction and working of a AC generator.

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

(ii) The two ends of this coil are connected to the two slip rings S_1 and S_2. The inner sides of these rings are insulated.

(iii) Two conducting stationary brushes B_1 and B_2 are kept separately on the rings S_1 and S_2 respectively. The two rings S_1 and S_2 are internally attached to an axle.

(iv) 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



(v) 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.

(vi) 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 B_2 to B_1.

(vii) During the second half of rotation, the direction of current is along DCBA in the coil and in the outer circuit it flows from B_1 to B_2

(viii) 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

25) How are electromagnets used in magnetic levitation trains?

Answer : 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. The train travels along a guideway of magnets which controls the train's stability and speed using the basic principles of magnets.