1. Define electromagnetism. *(ALP)*
Electromagnetism is the study of magnetic effects of current.

***2. What is meant by magnetic field?** *(ALP)*
Ampere discovered that when a current passes through a conductor, it produces field around it. This field is called magnetic field.

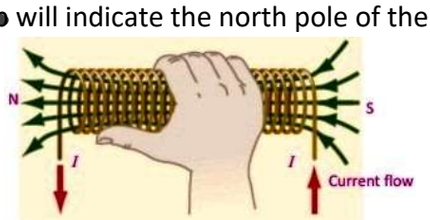
****3. How to find direction of magnetic field?** *(ALP)*
A simple method of finding the direction of magnetic field around the conductor is the Right Hand Grip Rule.
Right Hand Grip Rule: Grasp a wire with your right hand such that your thumb is pointed in the direction of current. Then curling fingers of your hand will point in the direction of the magnetic field.

****4. What is meant by solenoid? Write a short note on magnetic field lines of solenoid.** *(ALP)*
A long coil of wire consisting of many loops is called solenoid. It is a type of electromagnet, the purpose of which is to generate a controlled magnetic field.

****5. Define electromagnet.** *(ALP)*
The type of temporary magnet, which is created when current flows through a coil, is called an electromagnet.

***6. How the force acting on a current carrying conductor can be increased?** *(ALP)*
Michael Faraday discovered that the force on the wire is at right angles to both the direction of the magnetic field and the direction of the current. The force is increased if
(i) The current in the wire is increased.
(ii) Strength of magnetic field is increased.
(iii) The length of the wire inside the magnetic field is increased.

****7. Write down the rules to find polarity of solenoid.** *(ALP)*
If we grip the coil with our right hand by curling our fingers in the direction of the conventional current, our thumb will indicate the north pole of the coil.



****8. State Fleming's left hand rule.**
Stretch the thumb, forefinger and the middle finger of the left hand mutually perpendicular to each other. If the forefinger points in the direction of the magnetic field, the middle finger in the direction of the current, then the thumb would indicate the direction of the force acting on the conductor.

****9. What is difference between motor and generator?**

Motor	Generator
A device that converts electric energy into rotational kinetic energy.	A device which converts mechanical energy into electrical energy is called generator.
Electromagnet or temporary magnet used in motor.	Permanent magnet used in generator.

***10. Define armature.**
In a practical electric motor, the coil, called the armature, is made of many loops mounted on a shaft or axle.

***11. Define field coil.**
The magnetic field is produced either by permanent magnets or by an electromagnet, called a field coil.

***12. How force acting on the armature can be increased.**
The total force acting on the armature can be increased by
(i) Increasing the number of turns of the coil
(ii) Increasing the current in the coil
(iii) Increasing the strength of the magnetic field
(iv) Increasing the area of the coil

****13. What is D.C motor? What is principal of D.C motor?**
DC motor is a devise that converts electrical energy into mechanical energy.
Working Principle: When current carrying loop placed inside magnetic field, the loop starts to rotate due to torque acting on the coil. This is working principal of electric motor.

***14. What is the function of split rings in D.C. motor?**
To reverse direction of current, the connection to coil is made through an arrangement of brushes and a ring that is split into two halves, called a split ring commutator. Brushes, which are usually pieces of graphite, make contact with the commutator and allow current to flow into the loop. As the loop rotates, so does the commutator. The split ring is arranged so that each half of the commutator changes brushes just as the coil reaches the vertical position. Changing brushes reverse the current in the loop. As a result, the direction of the force on each side of the coil is reversed and it continues to rotate.

15. What do you mean by strength of magnetic field? Under what conditions the magnetic flux will be maximum and minimum? *(ALP)*

The strength of magnetic field (magnetic flux) is defined as the number of magnetic lines of force passing through any surface.

Conditions:

(i) The number of lines of force (magnetic flux) is maximum when the surface is held perpendicular to the magnetic lines of force.

(ii) Magnetic flux will be minimum when surface is held parallel to the magnetic lines of force.

16. Define electromagnetic induction. *(ALP)*

The process of generating an induced current in a circuit by changing the number of magnetic lines of force passing through it is called electromagnetic induction.

17. State Faraday's law of electromagnetic induction. *(ALP)*

The value of induced $e.m.f.$ in a circuit is directly proportional to the rate of change of number of magnetic lines of force through it.

18. Which are two factors which effect induced e.m.f? OR What are the factors which affect the magnitude of the e.m.f induced in a circuit by a changing magnetic field? *(ALP)*

The magnitude of induced $e.m.f.$ in a circuit depends on the following factors:

(i) Speed of relative motion of the coil and the magnet

(ii) Number of turns of the coil

19. Define Lenz's law. *(ALP)*

The direction of an induced current in a circuit is always such that it opposes the cause that produces it.

***20. What is A.C. generator? State the principle of A.C. generator.**

A device which produces or generates an alternating $e.m.f$ is called A.C generator. It converts mechanical energy into electrical energy.

Principle: AC generators work on the principle of Faraday's law of electromagnetic induction. If a coil is rotated in a magnetic field, a current will be induced in the coil. It is basic principal of A.C generator.

21. Define mutual induction. Also write SI unit. *(ALP)*

The phenomenon of production of induced current in one coil due to change of current in a neighboring coil is called mutual induction.

SI Unit: SI unit if mutual induction is Henry.

22. What is transformer? On what principle it works? Also write its uses. *(ALP)*

Transformer is an electrical device which is used to increase or decrease the value of an alternating voltage. It works on the principle of mutual induction.

Uses: Many of the devices in our homes, such as game systems, printers, and stereos use transformers for their working.

23. What are the parts of transformer? *(ALP)*

A transformer has two coils, which are insulated from each other, but wound around same iron core. One is called primary coil and other is called secondary coil.

24. What do you know about primary coil and secondary coil? *(ALP)

Primary Coil: The coil of transformer in which the change in current produces induced current in another coil is called primary coil.

Secondary Coil: The second coil of transformer in which current is induced is known as a secondary coil.

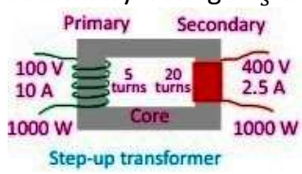
25. Describe the types of transformer. *(ALP)*

There are two types of transformer.

(i) Step Up Transformer

(ii) Step Down Transformer

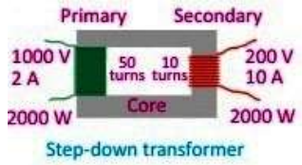
Step Up Transformer: If the secondary voltage V_s is greater than primary voltage V_p, than this type of transformer is called step-up transformer.



Step-up transformer

$$V_s > V_p \quad \textbf{OR} \quad N_s > N_p$$

Step Down Transformer: If secondary voltage V_s is less/smaller than primary voltage V_p then this type of transformer is called step down transformer.



Step-down transformer

$$V_s < V_p \quad \textbf{OR} \quad N_s < N_p$$

26. What is meant by ideal transformer? *(ALP)*

In an ideal transformer, the electric power delivered to the secondary circuit is equal to the power supplied to the primary circuit. An ideal transformer dissipates no power itself, and for such a transformer, we can write:

$$P_p = P_s$$
$$V_p I_p = V_s I_s$$
$$\frac{V_p}{V_s} = \frac{I_s}{I_p}$$

***27. What are the applications of electromagnet?**

Magnetic effect of current is called electromagnet. This effect is used in many devises like relay, electric bell, etc. Soft iron can easily be magnetized and demagnetized.

***28. What is meant by relay? Write its use.**

A relay is an electrical switch that opens and closes under the control of another electrical circuit.

Use: The relay is used to control a large current with help of small current.

****29. On which principle walk through metal detectors work?**

Walk-through metal detectors are installed at airports and other places for security purpose. These detectors detect metal weapons etc. using the principle of electromagnetic induction.

***30. What is the shape of a magnetic field produced by a coil?**

The magnetic field of a coil is identical to the field of a bar or disk shaped permanent magnet.

Important Long Questions

(1) Explain that current carrying coil coil in a magnetic field experiences a torque.
(2) Describe the magnetic field of solenoid.
(3) Explain the force on current carrying conductor placed in magnetic field. How it can be increased?
(4) What is an electric motor? Write the principle of electric motor.
(5) Define electromagnetic induction and explain it with example.
(6) Write a note on A.C generator.
(7) What do you understand the term mutual induction?
(8) What is transformer? Explain its working.