**QUESTIONS WITH ANSWERS ON ELECTROMAGNETISM**

**Ques 1. Define an electromagnet?**  
**Ans.** An electromagnet is an object that acts like a magnet, but its magnetic force is created and controlled by electricity—thus the name electromagnet. By wrapping insulated wire around a piece of iron and then running electrical current through the wire, the iron becomes magnetized. This happens because a magnetic field is created around a wire when it has electrical current running through it. Creating a coil of wire concentrates the field. Wrapping the wire around an iron core greatly increases the strength of the magnetic field.

![Simple Electromagnet Diagram](image1)

**Ques 2. How electromagnetisms work?**  
**Ans.** When electricity passed through a wire, a magnetic field is created around the wire. Looping the wire increases the magnetic field. Adding an iron core greatly increases the effect and creates an electromagnet. You can create an electromagnet without the iron core. That is usually called a solenoid.

![Working of an Electromagnet Diagram](image2)
Ques 3. What do you mean by right hand rule?
Ans. To find the direction the magnetic field is going, you can use the "right-hand rule" to determine it. If you take your right hand and wrap it around the wire, with your thumb pointing in the direction of the electrical current (positive to negative), then your fingers are pointing in the direction of the magnetic field around the wire.

Ques 4. Give some strength of electromagnetic fields.
Ans. Following are the some of the major strengths of electromagnetic fields-

**Unit**
The unit of magnetic force is called the tesla (T). Near a strong magnet the force is 1-T. Another unit used is the gauss, where 104 gauss (10,000) equals 1 tesla.

**Current**
The strength of the magnetic field is proportional to the current in the wire. If you double the current, the magnetic force is doubled.

Since Voltage = Current x Resistance (V = I*R), you can double the current in a wire by doubling the voltage of the source of electricity.

**Turns of coil**
If you wrap the wire into a coil, you increase the magnetic force inside the coil, proportional to the number of turns. In other words, a coil consisting of 10 loops has 10 times the magnetic force as a single wire with the same current flowing through it. Likewise, a coil of 20 loops has 2 times the magnetic force than one with 10 loops.

**Varies with distance**
The magnetic force decreases with distance. It varies inversely proportional to the square of the distance. For example the force at 2 cm. from a wire is 1/4 that of at 1 cm., and the force at 3 cm. is 1/9 the force at 1 cm.

Ques 4. What do you mean by electromagnetic induction?
Ans. Electromagnetic induction is a process where a conductor placed in a changing magnetic field causes the production of a voltage across the conductor. This process of electromagnetic induction, in turn, causes an electrical current - it is said to induce the current.
Ques 5. What do you mean by magnetic flux?
Ans. Magnetic flux is the magnetic lines of force produced by a magnet. It is measured by the unit weber. A weber (Wb) is equal to 100,000,000 maxwell(s). Flux density (B), a measure of the strength of a wave, is equal to the number of magnetic lines of flux per square meter in terms of the unit tesla (T), where \( B = \frac{Wb}{A} \).

Ques 6. What is an electromagnetic wave?
Ans. Electromagnetic waves are formed when an electric field couples with a magnetic field. The magnetic and electric fields of an electromagnetic wave are perpendicular to each other and to the direction of the wave.

Ques 7. State the applications of electromagnetism.
Ans. A primary electromagnetic device is the relay. The action of the armature, spring, and coil is the same in all relays. Notice, however, the schematics are only different as far as the contacts are concerned. Relays are usually used to control high-voltage switching (contact use) with a low-voltage control application (the coil winding). They may also be used as remote control devices. Relay contacts are normally open (until armature action closes them) or normally closed (until armature action opens them). Contacts have pole configurations similar to switches, and so you should already be familiar with the contact summary.