Physics Cheat Sheet

by sagar via cheatography.com/29580/cs/8705/

MAGNETISM

A physical phenomena arising from the force caused by magnets, objects that produce fields that attract or repel other objects.	MAGNETIC INDUCTION The process by which an object or material is magnetized by an external magnetic field. The induced magnetism is produced by the force of the field radiating from the poles of a magnet.
MAGNETIC FIELD Magnetic fields are areas where an object exhibits a magnetic influence. A magnetic field is a space around a conductor carrying current or magnetic in which its magnetic effect can be felt. The magnetic field disappears as soon as the current is off or charges stop moving. It means a moving charge is both a source of electric field as well as a magnetic field. Magnetic field denoted by (B ⃗) is a vector.	

MAGNETISM (cont)

MAGNETIC FIELD LINES The lines of magnetic field from a bar magnet form closed lines. By convention, the field direction is taken to be outward from the North Pole and in to the South Pole of the magnet. As can be visualized with the magnetic field lines, the magnetic field is strongest inside the magnetic material. The strongest external magnetic fields are near the poles. A magnetic north pole will attract the south pole of another magnet, and repel a north pole.

The term electromagnetic propulsion (EMP) can be described by its individual components: electromagnetic- using electricity to create a magnetic field (electromagnetism), and propulsion- the process of propelling (forcing or boosting) something. One key difference between EMP and propulsion achieved by electric motors is that the electrical energy used for EMP is not used to produce rotational energy for motion; though both use magnetic fields and a flowing electrical current.

TRANSFORMER

A transformer is a device in which two multi-turn coils are wound around an iron core. One coil acts as an input while the other acts as an output. The purpose of the transformer is to produce an output AC voltage that is different from the input AC voltage. An ideal transformer does not lose energy. The power output of the secondary coil is equal to the power input of the primary coil. Thus

How does a transformer work

Imagine an iron core shaped as a square. Around two sides are coils of wire. If an AC voltage is applied to the primary coil, an alternating magnetic field will be set up in the iron core. This alternating magnetic field will propagate through the iron core to the secondary coil. Here, the alternating magnetic field will induce an alternating voltage in this coil of the same frequency as the primary AC voltage. An AC voltage supplied to the primary coil produces an AC voltage at the secondary coil, even though there is no electrical connection between the two coils. How do the sizes of the two voltages compare? In other words, how do the RMS voltages compare?

TRANSFORMER (cont)

Comparing Voltages

When an AC voltage supply, V_prim, is connected to the primary coil, the current will be limited by the resistance in the coil which will be proportional to the number of turns, N_prim, in the coil.

This relationship means that two types of transformer can be built. One type, which produces a secondary voltage greater than the primary, is called a step-up transformer. In this, the number of secondary turns is greater than the number of primary turns. The other type is a step-down transformer, which features more primary turns than secondary turns. It produces a smaller secondary voltage than the primary voltage. Both types are used in the distribution of electricity from generator to home, and also inside the home. As we know, for an ideal transformer

ELECTRIC POWER

Electrical power is the rate at which electrical energy is converted to another form, such as motion, heat, or an electromagnetic field. The common symbol for power is the uppercase letter P. The standard unit is the watt, symbolised by W. In utility circuits, the kilowatt (kW) is often specified instead; 1 kW = 1000 W.

USE OF TRANFORMERS

IN AN ELECTRICITY DISTRIBUTION SYSTEM

Development of the transformer meant that the AC voltage from the generator could be connected to a step-up transformer to increase the voltage and decrease the current, and so reduce energy loss in the transmission lines. However, at the other end of the transmission line, the high voltage would be unsuitable, and possibly dangerous, for domestic appliances. So a step-down transformer is used to bring the voltage down to a safe level for home use.

USE OF TRANFORMERS (cont)

In Victoria, electricity is generated at a variety of voltages. In Yallourn, the voltage is 20 000 V (20 kV). In Newport, the generating voltage is 24 000 V. From the various generators around Victoria, the voltage is stepped up to 500 kV to transmit the electrical energy over the long distances to Melbourne. Because of the very high voltage, there is an increased risk of electrical discharge to the ground or the frame of the cable support, so tall towers are needed to hold the transmission cables high off the ground. Several porcelain discs are used to insulate the cables from the steel frame of the tower. When the cables reach the outskirts of Melbourne, the high voltage is stepped down to 66 kV for distribution within the suburban area.

USE OF TRANFORMERS (cont)

In each suburb, the voltage is then further stepped down to 11 kV, either for delivery to yet another step-down transformer or to a neighbourhood power pole. There it is reduced to 240 V for connection to all the houses in the immediate neighbourhood. The high-voltage transmission line feeds several outer suburban terminal stations, each of which passes the current to several zone substations. These substations each connect to hundreds of pole transformers, which then connect to hundreds of homes. As the distribution system spreads further and further down to the domestic consumer, the current in the transmission line at each stage gets less and less.