Types of UPS Systems

There are 3 basic types of UPS systems: Offline, line interactive, and online-double conversion.

Below is a brief technical description of the differences. However, in practical terms, the offline UPS is just a battery, providing some backup power, but with regulation for brownouts. The most essential function of a UPS is NOT to deliver a bit of power back in case of blackouts, but to regulate power to protect the connected devices and data from surges and power fluctuations.

The line interactive UPS does filter out some peaks in power, but is not fully regulation the output current. Fluctuations in the output current still exist. In case of a brownout, the battery will switch on and off.

The Online UPS transmits all power over the battery. It converts the incoming current from AC to DC and then converts it back to AC. The output current is produced with the highest possible tolerances, providing the highest protection to the connected devices and the data/media. As this technology does not require the battery to be on and off all the time as with the line interactive UPS, the life span of the batteries is highly increased.

This basic model does just what its category name implies. It just sits there ignoring everything that's going on with your power, except a complete power outage. The cheapest—of-the-cheap stand by units will do only that, turn on when the power goes out. More expensive units may also offer some surge protection, possibly even some automatic voltage regulation (AVR). A stand by UPS can take as long as 35 to 45 milliseconds to switch over to battery power. They are the least protective of attached equipment and should only be used with equipment that is not all that important, and that may also be attached to a surge protector.
The next higher level of UPS protection is line interactive. These units (with the possible exception of "off brands") will offer a quicker response time (2 to 10 milliseconds to go to battery) and have some measure of automatic voltage regulation (AVR) and surge suppression. Lower-priced units will put out a stepped, or modified, sine wave, but higher-priced units will produce a pure sine wave. Also, higher end units will go to battery in a brown-out (to boost the voltage) and in an over-voltage situation (to lower or "buck" the voltage). The best line interactive units will perform buck and boost without having to go to battery and thus extend your UPS's battery life. Some line interactive units also offer a settable range of voltages they'll tolerate before going to battery.

The highest level of UPS protection is online. Online units take the incoming voltage, rectify it and downconvert it to the battery voltage of the UPS, filter it, reinvert it and upconvert it to the appropriate output voltage for the unit. The output voltage is always rock-steady and the sine wave is always pure. Nothing bad (power-wise) gets through an online UPS. In addition, there is ZERO transfer time to go from failed line voltage to battery power. If power fails, you're on battery with no delay. Online units also tend to take better care of their batteries, so you'll typically get a year or two more lifespan from them over the other types of UPSs.