Linear mode and Switched mode power supplies

Linear mode and Switched mode power supplies

•The **linear power supply** and **Switch mode power supply,** both supplies DC power to electrical and electronic circuits but the similarities end here.

•The **Linear power supply** converts high voltage AC into the low voltage using a transformer and then converts it into DC voltage

•while the **switched mode supply** converts AC into DC first then transform that DC voltage into desired voltage.

•The **Switch mode power supply** is also termed as **SMPS** in abbreviated form.

Applications - Linear power supply and SMPS

•SMPS is most commonly used in **mobile chargers, DC motors** etc.

•On the contrary, the linear power supply is used in high-frequency application such as **Radio Frequency application etc.**

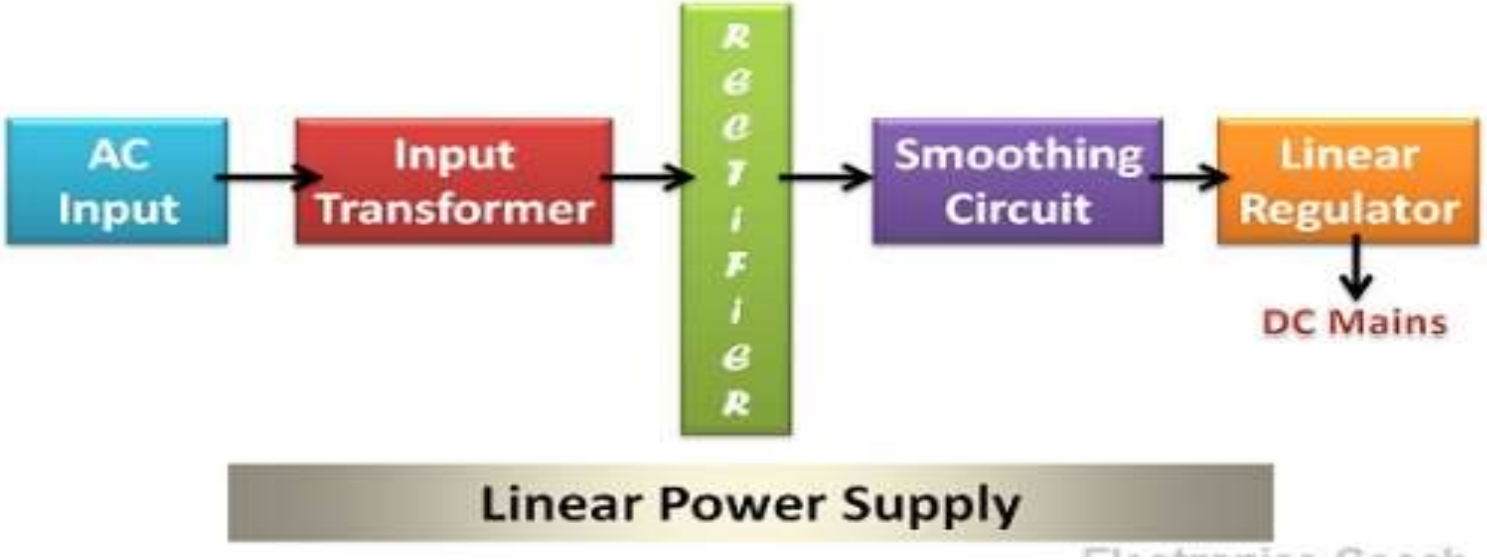
•Another significant factor which creates the difference between these linear power supply and SMPS is size. The linear power supply is bulky while the **SMPS is light in weight.**

•This makes the SMPS portable and can be easily used anywhere while linear power supply can be used only for laboratory or big electrical and electronic circuit.

Linear Power Supply

Linear Power Supply

The **Linear Power Supply** is power supplying circuit which is used in electrical and electronic circuit to supply the DC power to the circuit. It consists of a step-down transformer, rectifier, a filter circuit and voltage regulator.



Linear Power Supply-working

The AC is always supplied with high voltage because it is economical to supply AC at high voltage. The frequency of the AC signal is very low, i.e. **50 Hz or 60Hz.** To reduce the voltage of AC, step down transformer is used. The size of the transformer is large for linear power supply.

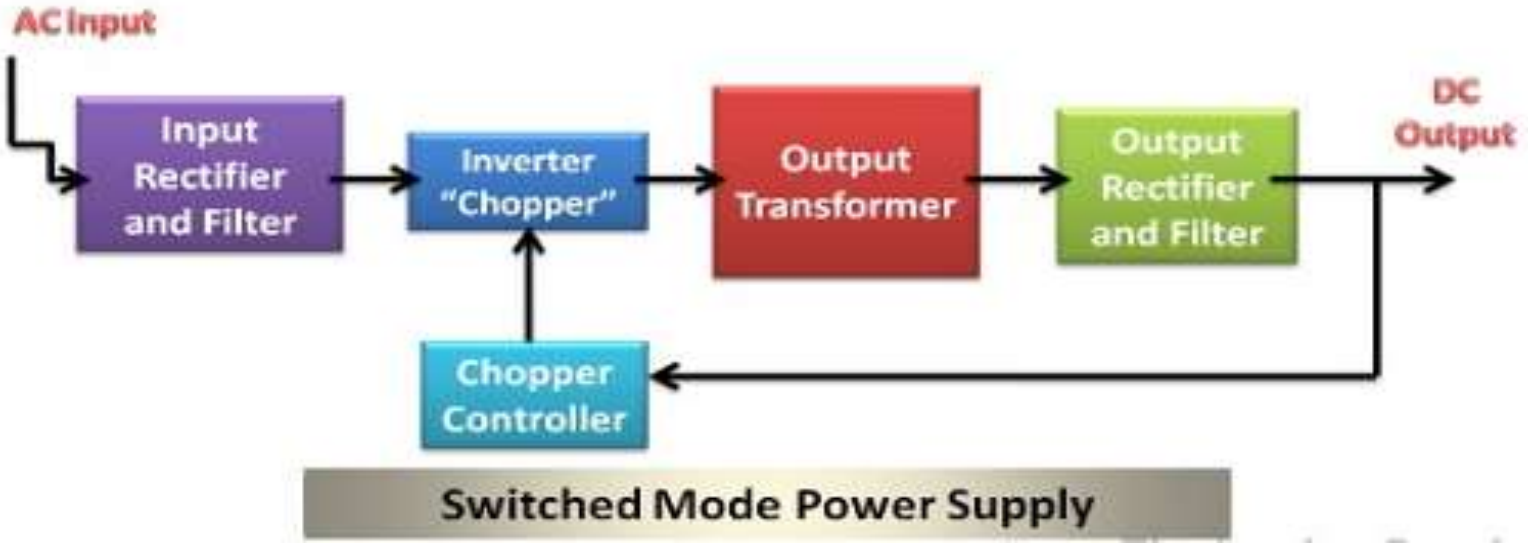
The transformer which is used to step down the low-frequency AC signal will be bulky. If the AC signal frequency is high, then a small transformer can be used but in this application the AC signal comprised of low-frequency AC thus, the circuit requires a large size and bulky transformer.

The step-down voltage is then passed to the rectifier circuit to convert it into DC. The DC voltage obtained from the rectifier comprises of AC pulses. Thus, a filter circuit is used to remove the AC ripples.

SMPS

Switched Mode Power Supply

The **Switched Mode Power Supply** operated on the principle of switching using a **MOSFET transistor.** It consists rectifier circuit, a filter circuit, chopper, chopper controller, output transformer and a filter circuit.



SMPS- working

•The principle of working of Switched Mode Power Supply is based on switching technique. The low-frequency AC is converted first into DC signal. Then this DC signal is chopped using chopper circuit. Chopper Circuit consists of MOSFET switching transistor which switches ON or OFF with the help of chopper controller circuit.

•The output obtained by Chopper is high-frequency DC signal. Now again a step-down transformer is used to convert this high voltage high-frequency signal into a low voltage signal. The step-down transformer used in this case will be small in size because the transformer used to operate for high-frequency application is small in size.

•This is the advantage of using an SMPS (switched mode power supply) circuit. This configuration power supply is not bulky and thus portable.

Comparison Chart

PARAMETERS	LINEAR POWER SUPPLY	SWITCH MODE POWER SUPPLY (SMPS)
Definition	It completes the stepping down of AC voltage first then it converts it into DC.	It converts the input signal into DC first then it steps down the voltage up to desired level.
Efficiency	Low efficiency i.e. about 20-25%	High Efficiency i.e. about 60-65%