3.8 TYPES OF SOLAR PV SYSTEM:

The classification of solar PV systems is shown in Figure 3.8.1

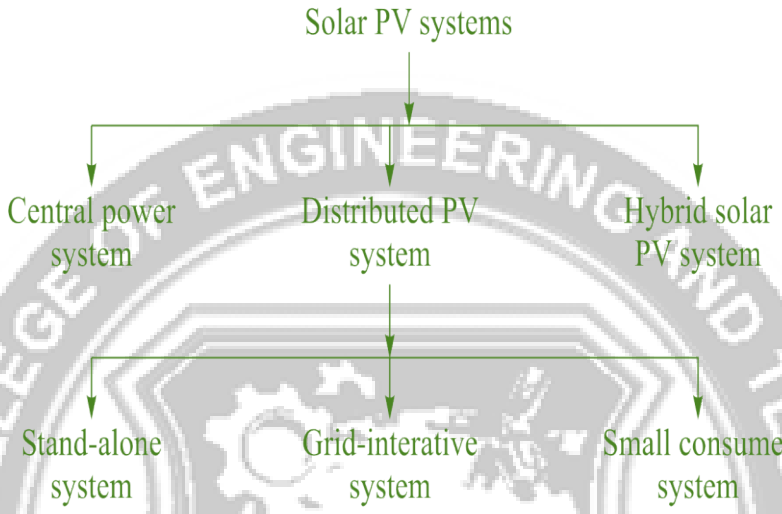

Figure 3.8.1 Classification of solar PV systems.

[Source: "Solar Photovoltaics: Fundamentals,Technologies andApplications" by ChetanSingh Solanki, Page: 274]

3.8.1 Central Power Station System:

- This type of solar power station is similar to other conventional power stations which are required to feed generated power into some national grid.
- These types of solar power stations are designed to meet high peak daytime load only and these have large generation capacity in megawatt (up to 6 MW). Only few such power stations have been installed worldwide as the capital cost of these plants is high.

3.8.2 Stand-Alone System:

- Solar PV power station is planned and located at the load centre. Its complete electricity generation is meant to meet the electrical load of any remote area, village or installation.
- Energy storage is essential to meet the requirement during non-sunshine hours. A typical stand-alone solar PV system is shown in Figure 3.31.

- The maximum power point tracker (MPPT) senses the voltage and current outputs from the solar array and then suitably adjusts the operating point to obtain maximum power output from the solar array as possible from the climatic conditions.

- The solar electric output in direct current is converted into alternating current and it is fed into the load. The excess power is preferably stored by charging the dumped in the electric heaters. When the sun radiation is unavailable, the batteries supply the electricity through the converter.

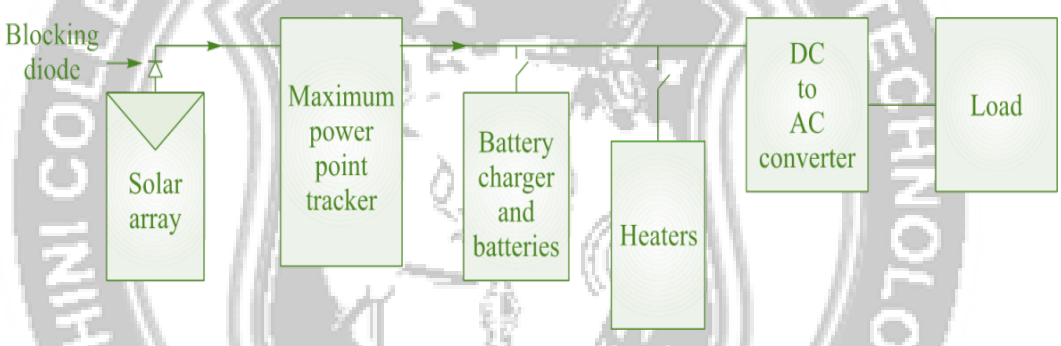

Figure 3.8.2 A schematic layout of a stand-alone solar PV system.

[Source: "Solar Photovoltaics: Fundamentals,Technologies andApplications" by ChetanSingh Solanki, Page: 275]

3.8.3 Grid Interactive Solar PV System:

- In grid interactive solar PV system, the system first meets the requirement of house,village or installation and then all excess power is fed to an electric grid during sunshine hours.

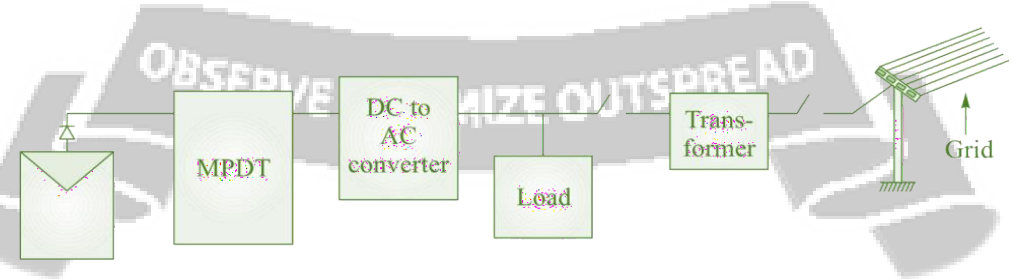

Figure 3.8.3 Grid interactive solar PV system

[Source: "Solar Photovoltaics: Fundamentals,Technologies andApplications" by ChetanSingh Solanki, Page: 276]

- This arrangement helps in preventing any dumping of electricity as required in the stand-alone solar PV system. The second advantage of this system is that during absence of insufficient sunshine, the supply of electricity is maintained from the electric grid, thereby eliminating any need of battery.
- This system is very popular in the United Kingdom, where two-way electric meters provided to record (i) the electricity generated and supplied by rooftop PV system of various houses to the electric grid system during non-peak sunshine hours and (ii) electricity supplied tothe houses from the electric grid during non-sunshine hours. The difference of twois paid to consumers or vice versa.

3.8.4 Small Consumer Systems

- These systems are designed to meet the power requirement of low energy devices which are generally used for indoor applications, such calculators, watches and electric devices.

3.8.5 Hybrid Solar PV System

- The hybrid solar PV system is designed to provide electric power by some other means besides solar electricity. It is difficult and uneconomical to provide all of the power from only solar PV system.
- It may be more economical to meet the power requirement by some other means, such as windmills, fuel cells and diesel or petrol generators. The best hybrid solar PV system is the one in which no amount of solar PV generated power is wasted.

Advantages and Disadvantages of PV System:

Advantages are as follows:

(i) It directly converts solar energy to electric power without any use of movingparts.

(ii) It is more reliable, durable and maintenance free.

(iii) It works without any noise.

(iv) It is non-polluting.

(v) It has long lifespan.

(vi) It can be located near the point of load and requires no distribution system.

Disadvantages are as follows:

(i) It has high cost of installation.

(ii) It has low efficiency.

(iii) It requires a large area for installation to produce sufficient power.

(iv) Its output is intermittent, thereby requiring some means to store energy to use during non-sunshine hours.