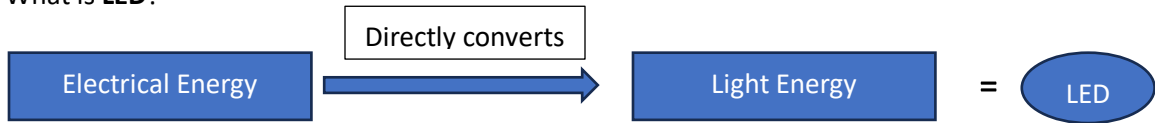


## TOPIC – LED PROCESS AND APPLICATION

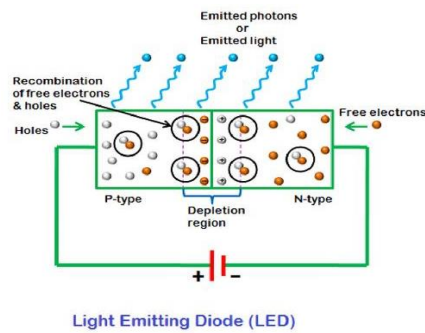
### 1. What is LED?



- Light Emitting Diode (LEDs) are the most widely used semiconductor diodes
- LEDs emit either visible light or invisible infrared light when forward biased.
- LEDs emit invisible infrared lights are used for remote controls.

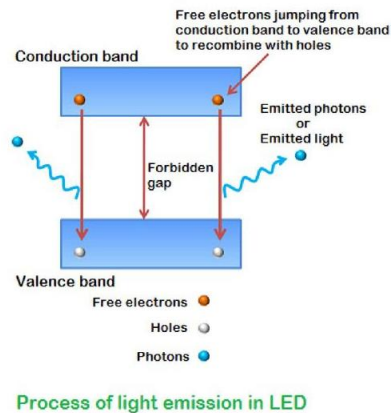
### 2. How does an LED works?

An LED (Light Emitting Diode) works by converting electrical energy into light energy through a process called electroluminescence, where electrons recombine with electron holes within the semiconductor material, emitting photons in the process.

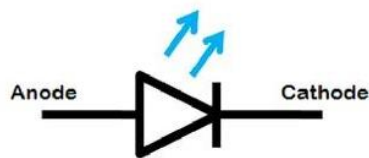


### 3. How LED emits light?

LEDs emit light when electrons recombine with electron holes within the semiconductor material, releasing energy in the form of photons.



- LEDs are available in different colours. The most common colours of LEDs are orange, yellow, green and red.
- The schematic symbol of LED does not represent the colour of light. The schematic symbol is same for all colours of LEDs. Hence, it is not possible to identify the colour of LED by seeing its symbol.



LED symbol

#### 4. LED Construction

- LED construction involves three semiconductor layers: n-type, p-type, and an active region sandwiched between them.
- When the LED is forward biased, electrons from the n-type layer and holes from the p-type layer are pushed towards the active region.
- In the active region, electrons and holes recombine, releasing energy in the form of light.
- Most of the light emission occurs in the active region where most of the electron-hole recombination take place.
- This active region is also known as the depletion region.

#### 5. Advantages of LED

- Light emitting diodes consume low energy.
- LEDs are very cheap and readily available.
- LEDs are light in weight.
- Smaller size.
- LEDs have longer lifetime.
- LEDs operate very fast. They can be turned on and off in very little time.
- LEDs do not contain toxic material like mercury which is used in fluoro-lamps.
- LEDs can emit different colors of light.

#### Disadvantages of LED

- LEDs need more power to operate than normal p-n junction diodes.
- Luminous efficiency of LEDs is low.

#### 6. Applications of LED

- Burglar alarms systems
- Calculators

- Picture phones
- Traffic Signals
- Digital computers
- Multimeter
- Microprocessors
- Digital watches
- Automotive heat lamps
- Camera flashes
- Aviation lighting