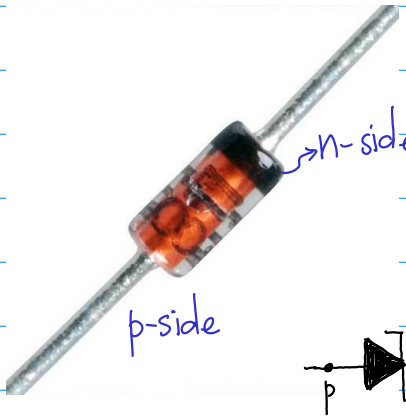
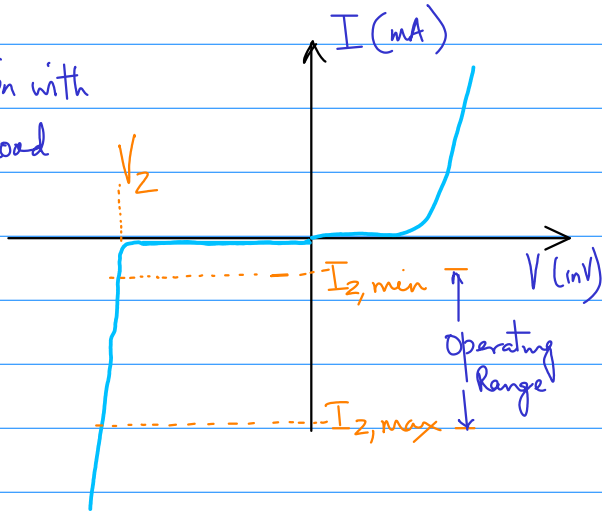
01.02.2022

# Special Purpose Diodes

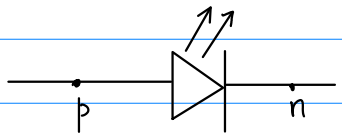
## 1. Zener Diode – Voltage Regulation



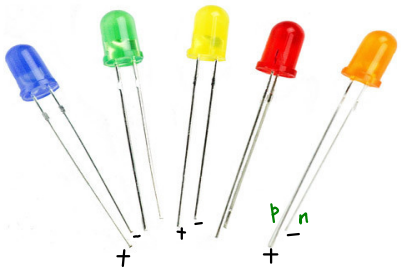

Regulation with
- Changes in load resistance
- Changes in the input voltage.



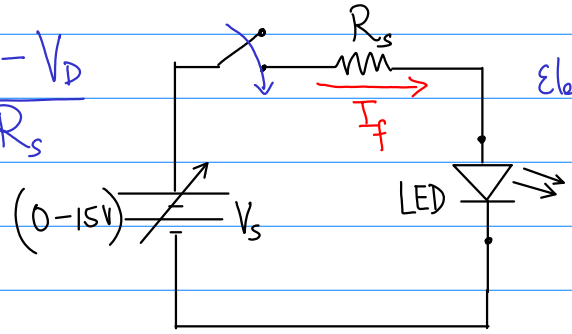

## 2. Light-emitting Diodes (LEDs):

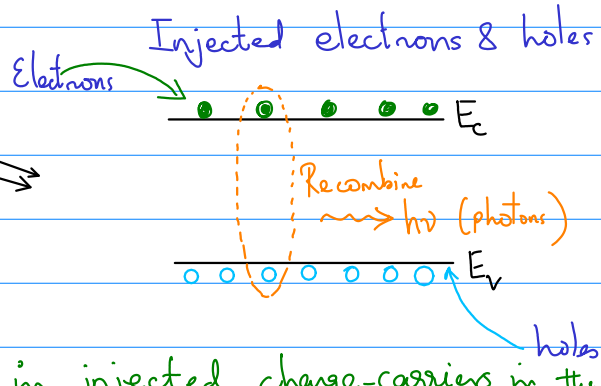



- Convert electrical energy in light energy
- Process is termed as "Electroluminescence".



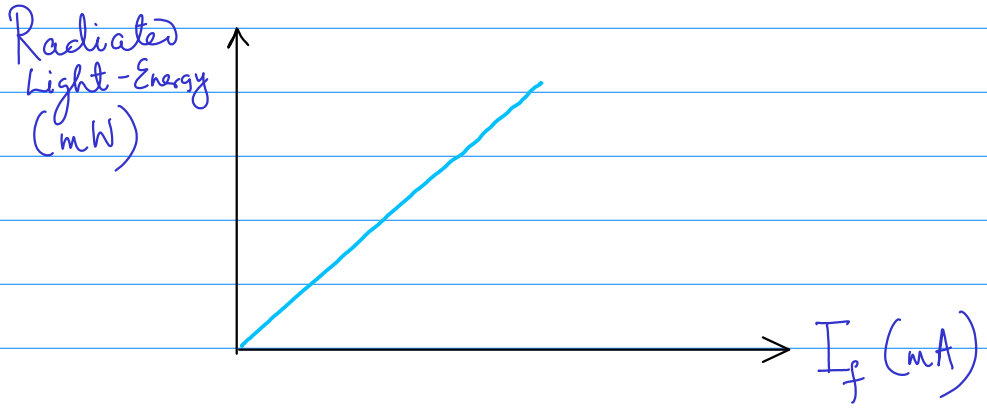

$$I_f \uparrow = \frac{V_S \uparrow - V_D}{R_S}$$




Increase in $I_f$ $\Rightarrow$ Increase in injected charge-carriers in the diode.

$\Rightarrow$ More probability of recombination $\Rightarrow$ more light photons

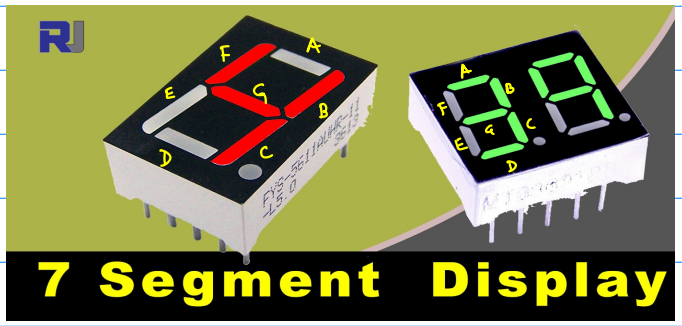



## Application of LEDs :

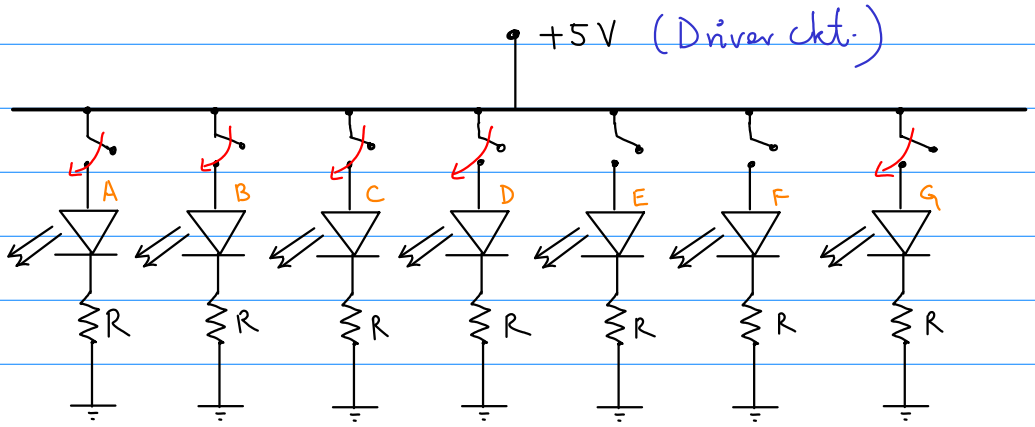
(i) As a power indicator.

(ii) Lighting.

(iii) Displays :

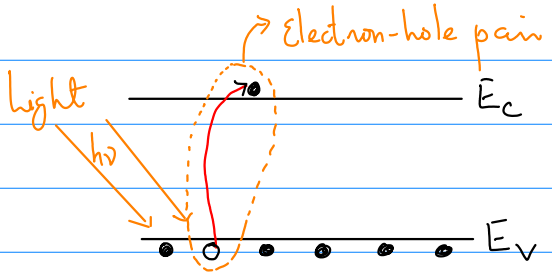



7 LEDs



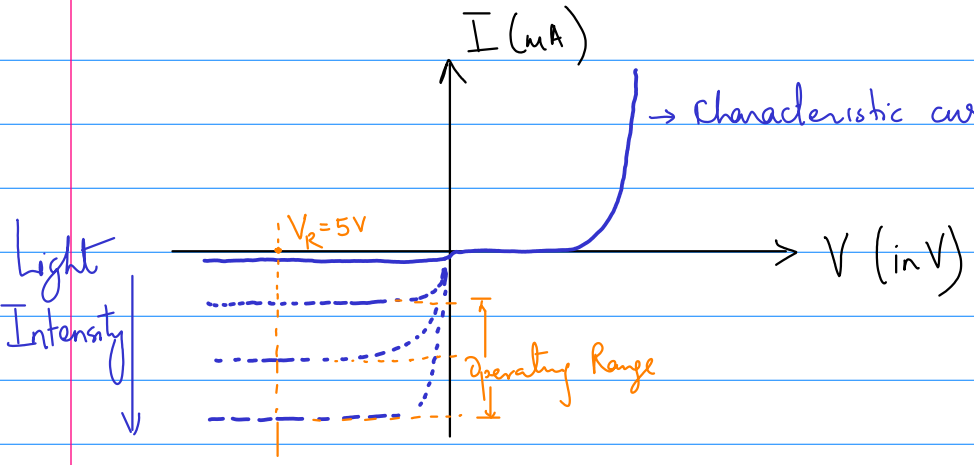

We would like to display 

## ③ Photo-diode :

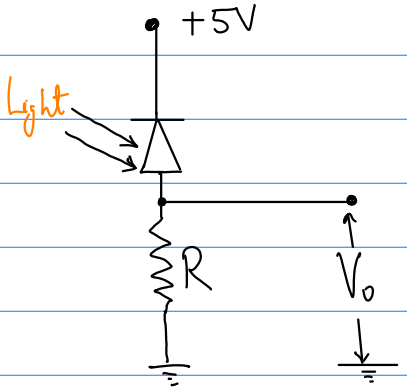




Light absorbing material : Generating electron-hole pairs

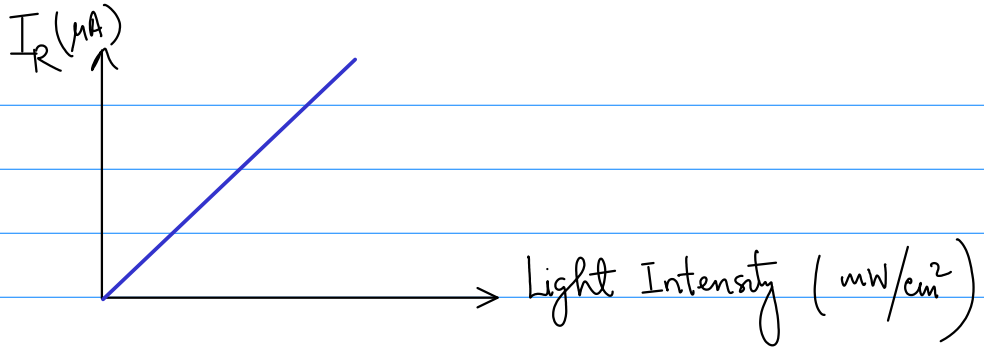
if the generated electron-hole pairs are dissociated, then "free" charge-carriers are released.
These charges constitute electric-current in external ckt.




Ckt. application :

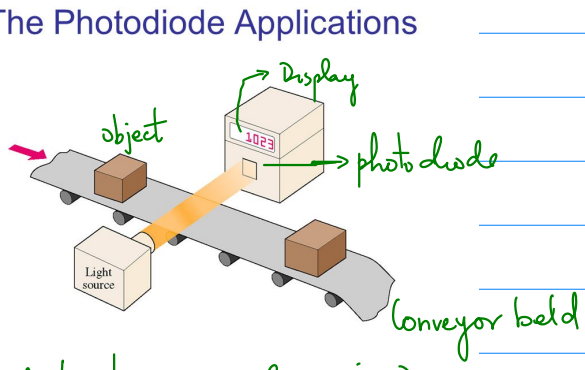



$V_o$ is directly proportional to the light intensity




## Application of photo-diodes:

(i) Electronic Counter:




(ii) LiDAR (Light detection and Ranging): Remote Sensing