

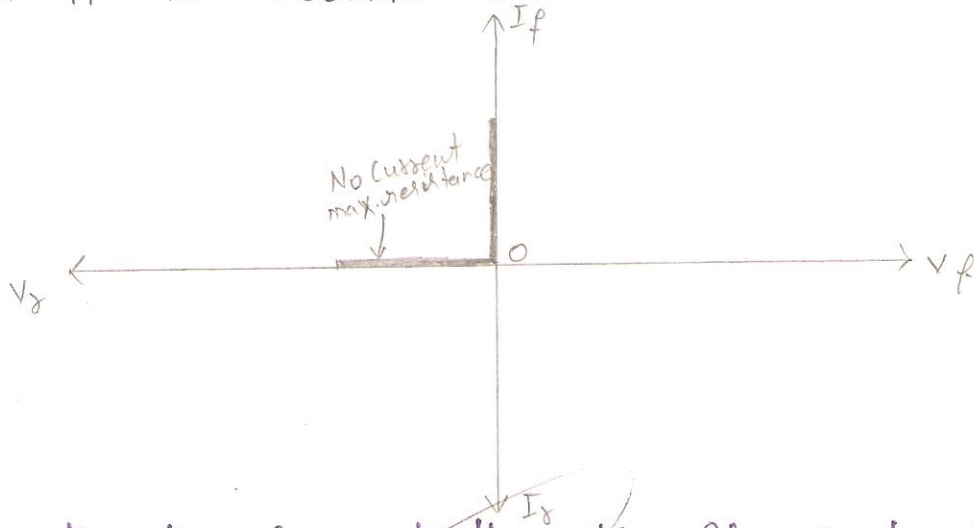
Que-3 Draw V-I characteristics of Ideal diode.

Ans → Ideal Diode →

It conducts when it is forward biased.

In forward biasing resistance of it is equal to zero.

When it is reverse biased it doesn't conduct.



uni-directional conduction is offered by this. It conducts only in forward biased. So insulators are reversed biased. It is like an automatic switch.

Que-4 Explain working of (1) Varactor diode.

(2) Zener diode.

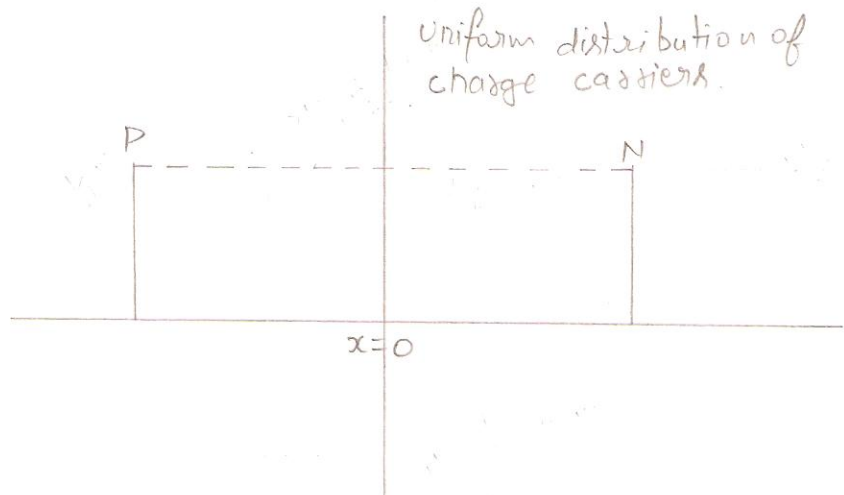
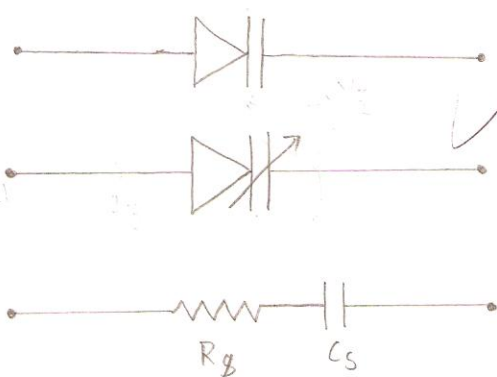
(3) LED

(4) Photo diode.

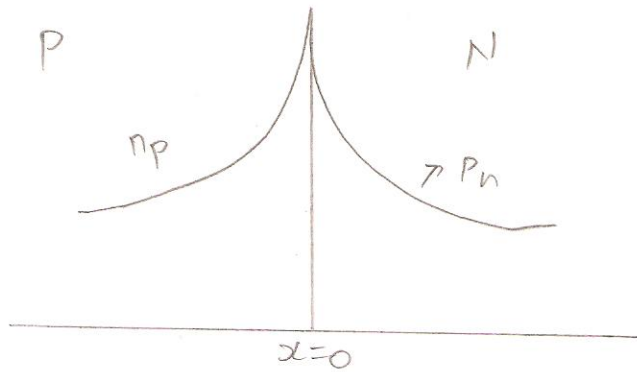
Ans → (1) Varactor Diode →

It is also known as varicap or VVC.

Symbol: →



$$C_T = \frac{K}{(V_T + V_R)^n} \quad ; \quad C = \frac{EA}{d} \quad , \quad d \propto \sqrt{V} \Rightarrow C = \frac{K}{\sqrt{V}}$$



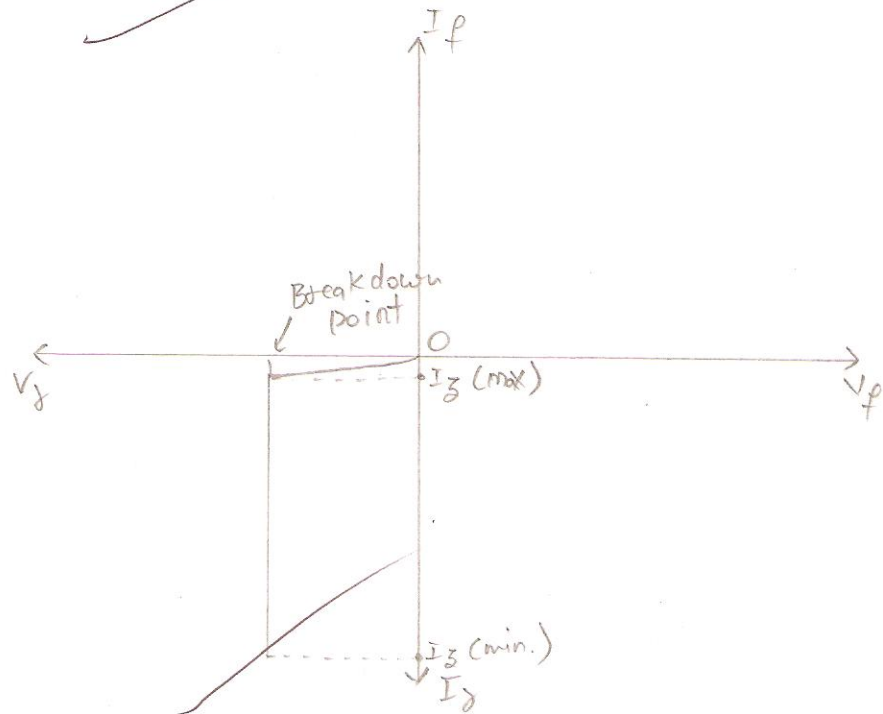
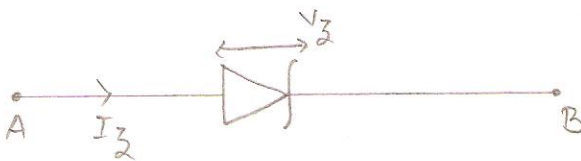
Types:→ (i) Abrupt doping profile.

(ii) Hyper abrupt doping profile.

Depletion region in reverse biased forms a barrier that separates the +ve and -ve charges on each side of the junction.

As the reverse biased (\uparrow), space charge region (\uparrow), capacitance (\downarrow). The silicon diodes optimised for the variable capacitance effect are called varactors.

(b) Zener Diode:→



$$P = V_z \times I_z$$

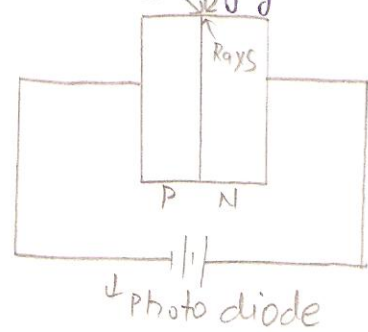
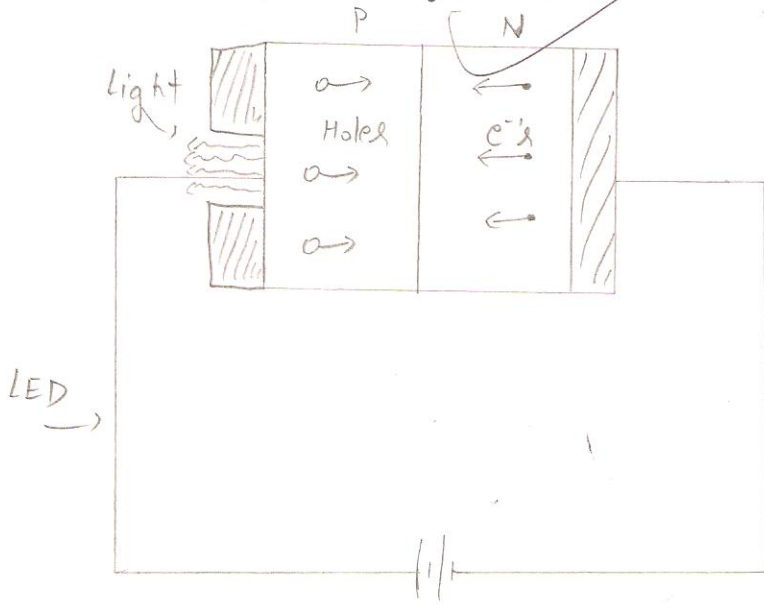
$$\gamma_{ac} = \frac{\Delta V_z}{\Delta I_z}$$

It is a reverse biased heavily doped Si or Ge P-n junction diode i.e. operated in breakdown region. In reverse biased a value is at which current (\uparrow) greatly

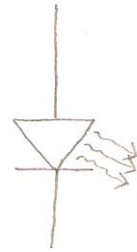
from its normal cut off value. This is breakdown voltage or zener voltage V_z . It remains constant. I_z minimum is the minimum I to keep the diode in regulation region. I_z max. at which diode may be damaged.

(c) LED \rightarrow

It is always forward biased made up of GaAs, GaP, GaAsP. It is forward biased p-n junction diode that emits visible light when current is made to pass through it. n-type layer is grown on p-type substrate by the process of diffusion. Metal connections are made on both sides. Light emits when recombination occurs. When an e^- recombine with the holes it falls from C-B to V-B difference in energy is released in form of light and heat.



LED Symbol :-



(d) Photo diode \rightarrow

It is a light sensitive device that operates in reverse biased. Application of the light to the junction will result in a transfer of energy from incident travelling light wave in form of photon to the

atomic structures. Resulting in an (\uparrow) of minority carriers. So reverse current (\uparrow). Dark current is the current that will exist with no applied illumination.

Que-5. What is Schottky diode. Why it is called hot carrier diode.

Ans → Schottky diode :->

It is unipolar. It is used as rectifier at a signal frequency exceeding 300 MHz. It is a metal S/c junction diode without depletion layer. One side is of metal and other side is of n-type dope S/c. When diode is unbiased (no applied voltage) electrons on n-side have lower energy level than electrons in the metal. Hence electrons cannot cross the junction barrier in forward biased e^- s of n-side gain enough energy to cross the junction and enter the metal. These electrons enter the metal with a very high energy. So it is known as hot carrier diode.

