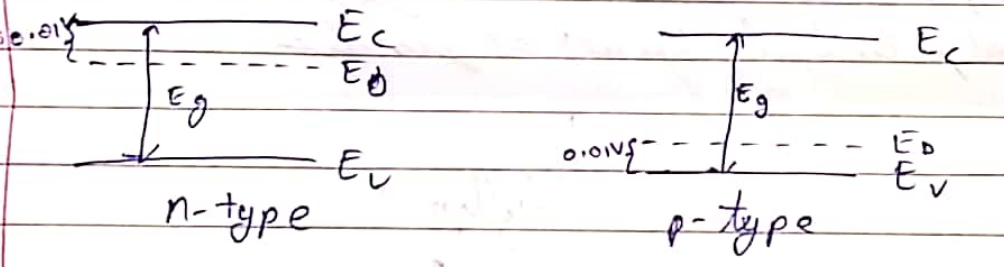
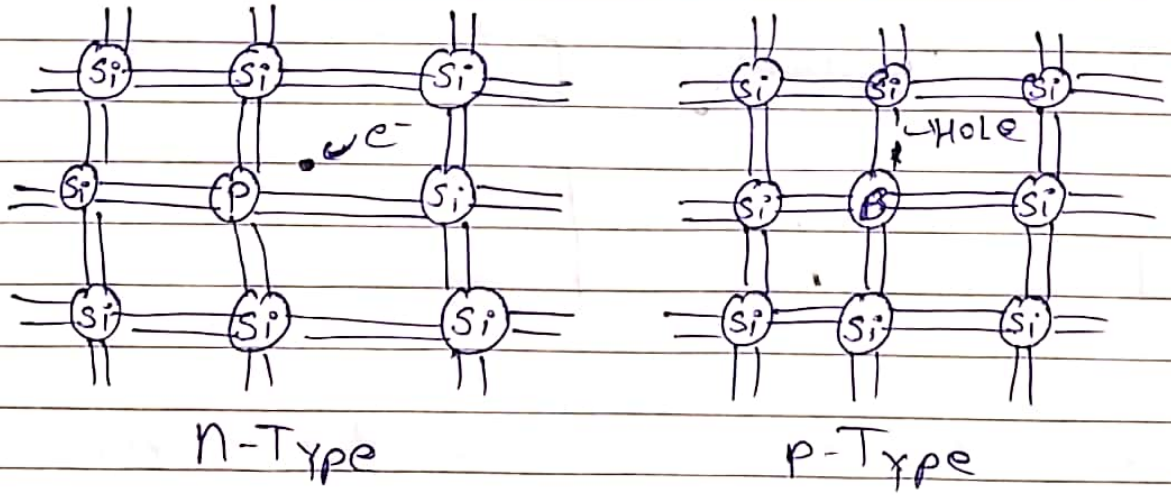
VARUN KHADAYATE A016

Q2 In n-type semiconductor, the semiconductors is doped with pentavalent impurity. The electrons are majority carriers and holes are minority carriers.
In energy band diagram of n-type semiconductor, the donor energy level is slightly below the bottom of conduction band and thus, the electron can move to conduction band.

In p-type semiconductor, the semiconductor is doped with trivalent impurity. The holes are majority carriers and electrons are minority carriers.
In energy band diagram of p-type, the acceptor energy level is slightly above the top of valence band.





Q3. Zero Bias

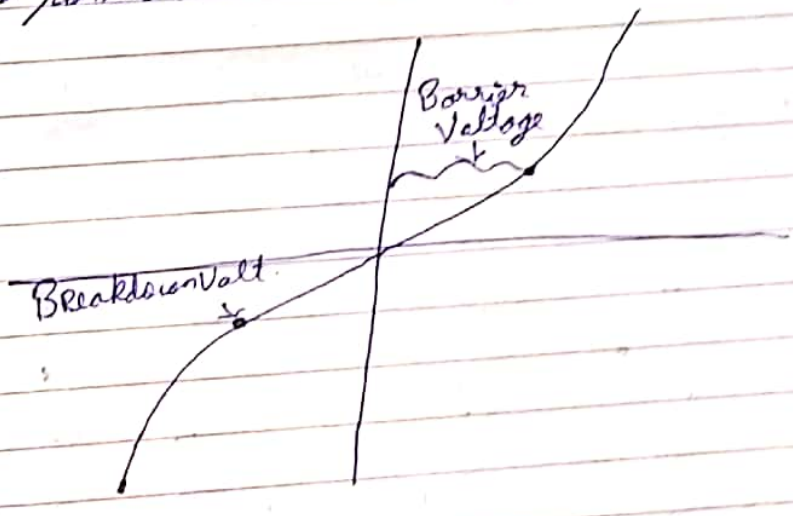
No external voltage is applied to the pn junction, i.e, the circuit is open. Hence, the potential barrier at the junction does not permit current flow.

Forward Bias

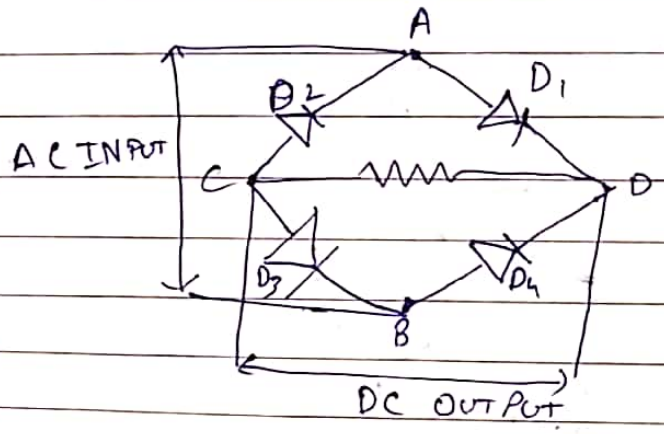
p-type is connected to +ve terminal and n-type is connected to -ve terminal of external voltage. This results in reduced potential barrier.

Reverse Bias

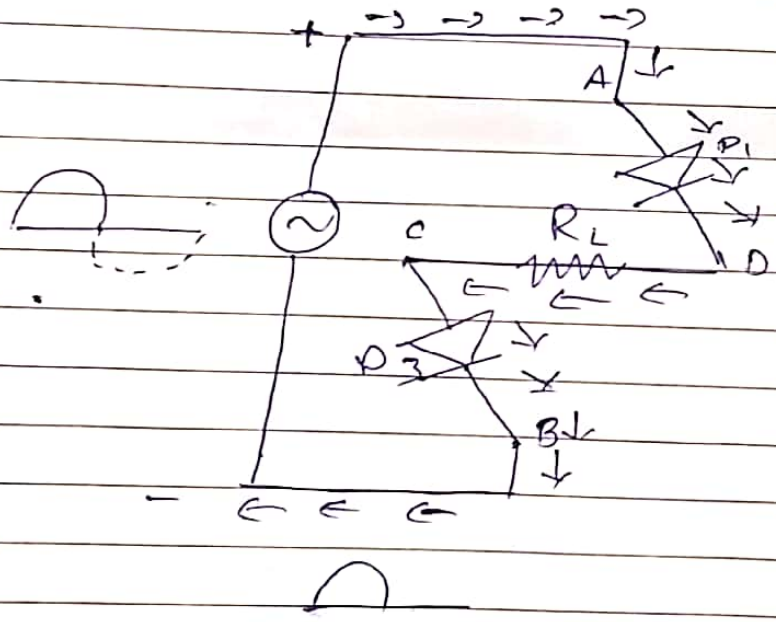
p-type is connected to -ve terminal and n-type is connected to +ve terminal of external voltage. This results in increased potential barrier at junction



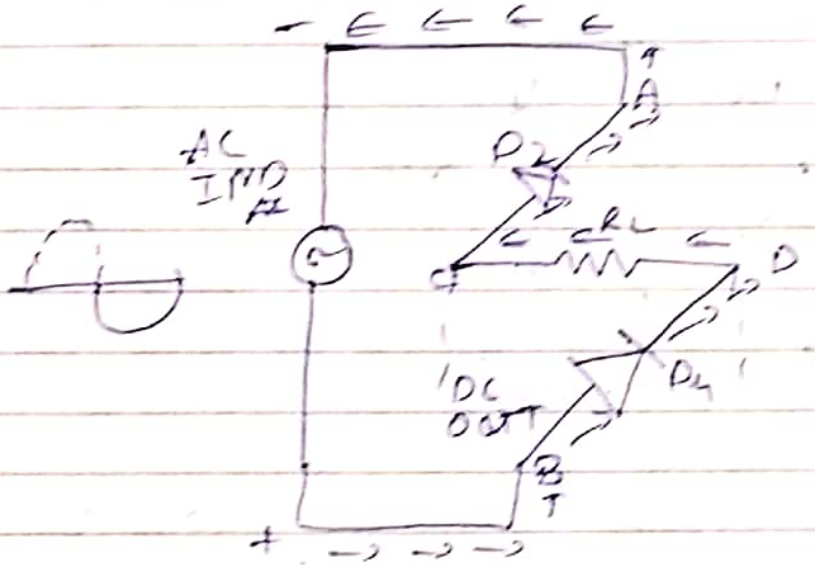
Q4.



During +ve half cycle A becomes +ve and B becomes -ve which makes D_1 & D_3 is forward bias and D_2 and D_4 is reverse bias.



During -ve half cycle A becomes -ve and B becomes +ve which makes D_2 and D_4 is forward bias and D_1 and D_3 in reverse bias.



Q1. Diode capacitance is made of 2 components [Junction capacitance and Diffusion capacitance.

Junction Capacitance: It comes from the depletion layer region, it is present in both forward and reverse bias and capacitance is higher in forward bias.

Diffusion Capacitance: It only exists in forward bias, it is a non-linear capacitor and is difficult to model.

Q2. Capacitance of the depletion region changes with the change in applied voltage. So, when a reverse biased voltage is applied to p-n junction diode is increased, a large number of holes from p side and electrons from n-side is move away from from p-n junction diode. As a result the width of depletion layer increases when the p-type and n-type plate decreases.

Q3. Varactor Diode: diode whose internal capacitance varies as the ~~voltage~~ reverse voltage increases, it is mostly used to store charge.