

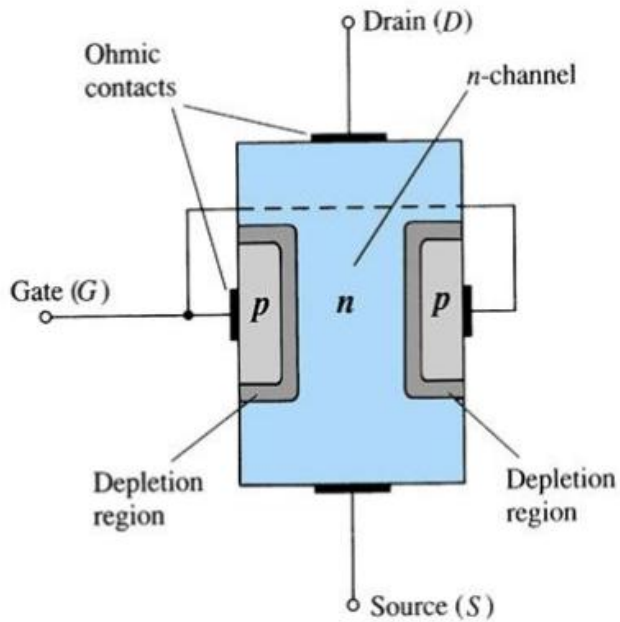
Subject : Basics of electronics engineering

Question : In JFET at pinch off voltage current is maximum as resistance is large why?

Answer :

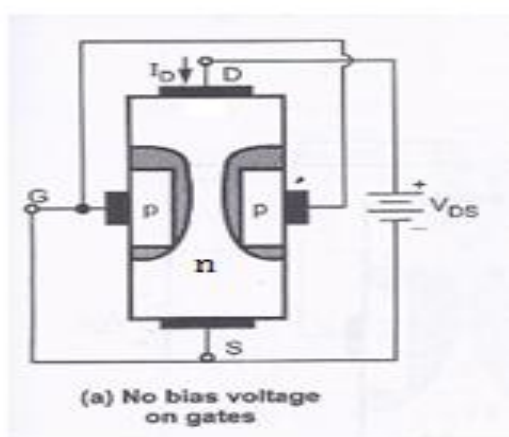
Consider N-type JFET, in this N-type silicon bar act as channel, the heavily doped p-type material is diffused in the N-type bar act as a gate. It will form the PN junction. This junction is uniform in size.

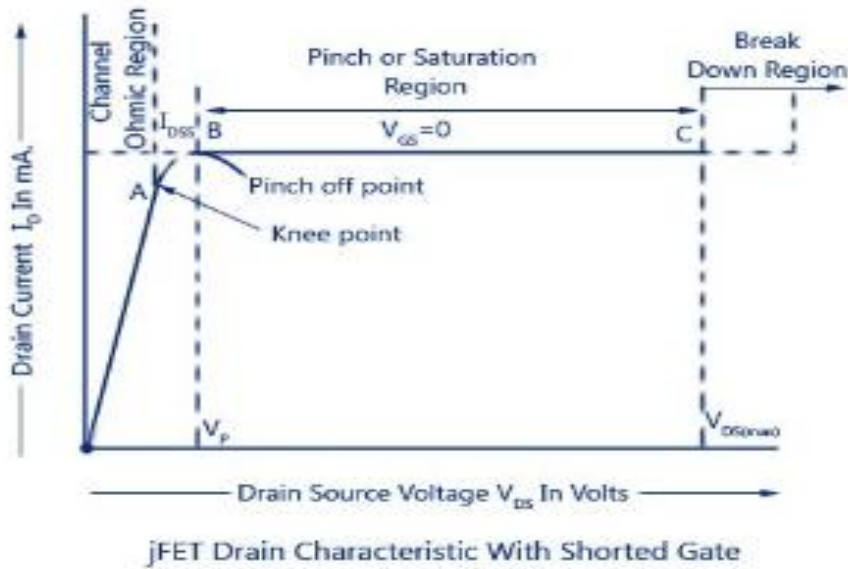
In N-type bar one terminal act as source and another terminal act as a Drain. Gate terminal is represented as G. As shown in the below figure.



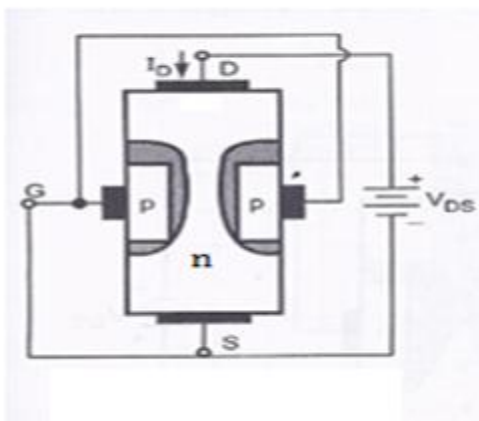
Ask A Doubt

When there is no voltage is applied to the terminals, the N-type silicon bar has its own resistance. It will act as a simple resistor. Now, maintain the gate source voltage V_{GS} as constant and apply the Drain source voltage V_{DS} . In the N-type semiconductor, bar electrons are the majority carrier. If the V_{DS} voltage is applied, electrons start to flow from source to drain. This will increase the currents linearly as shown in the below characteristics curve.





If the applied V_{DS} voltage is increased further, more number of electrons are present at source terminal. At the same time the holes are combined to electrons at the Drain terminal side. So, the depletion region get increased at the drain side and reduced at the source side. As shown in the below figure.



These depletion regions introduce some resistance to the flow of electrons from source to drain. Now, the resistances get increased in the silicon bar. So, the current flow is constant. This voltage is called Pinch off voltage.

This is the answer for, at pinch off voltage the current increases linearly also the resistance of the silicon bar also increase.