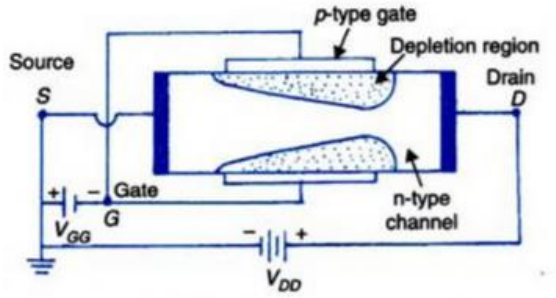
Subject : Basics of electronics engineering

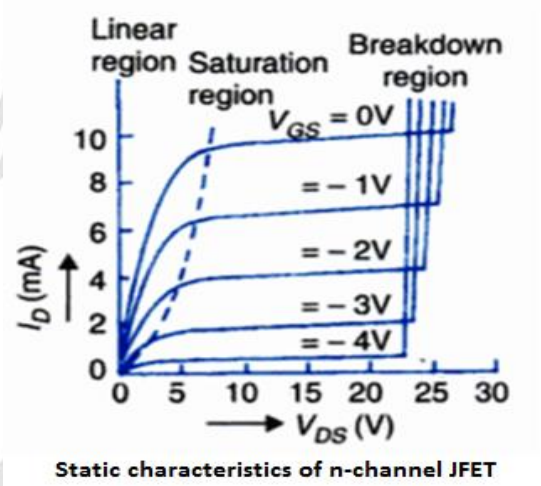
Question : In JFET, How current increases linearly when V_{DS} is increased and the resistance is also increased?

Answer :

The behaviour of I_D versus V_{DS} can be studied in the static characteristics of JFET.



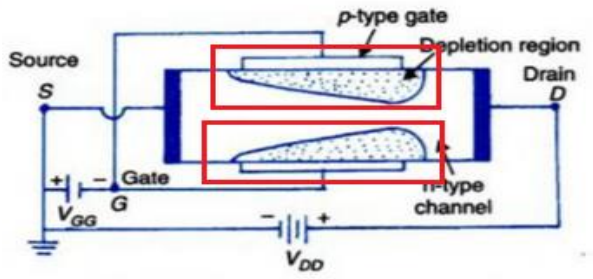
Basic structure of JFET



Static characteristics of n-channel JFET

V_{GS} = V_{GG} = gate to source voltage
V_{DS} = V_{DD} = drain to source voltage
I_D = Drain current

- When no voltage is applied to any one of terminals, the width of the depletion region remains very small. So, the semiconductor bar will behave like a simple resistor.
- Since the width of the depletion region remains very small, the drain current Id increases linearly with respect to V_{DS} when V_{DS} is increased gradually from zero, keeping V_{GS} = constant.



- If V_{DS} is further increased keeping V_{GS} = constant, the width of the depletion region starts to increases, which in turn narrows down the channel opening.
- This will result in the increase of channel resistance and drain current Id will increase less than linearly with respect to V_{DS}.