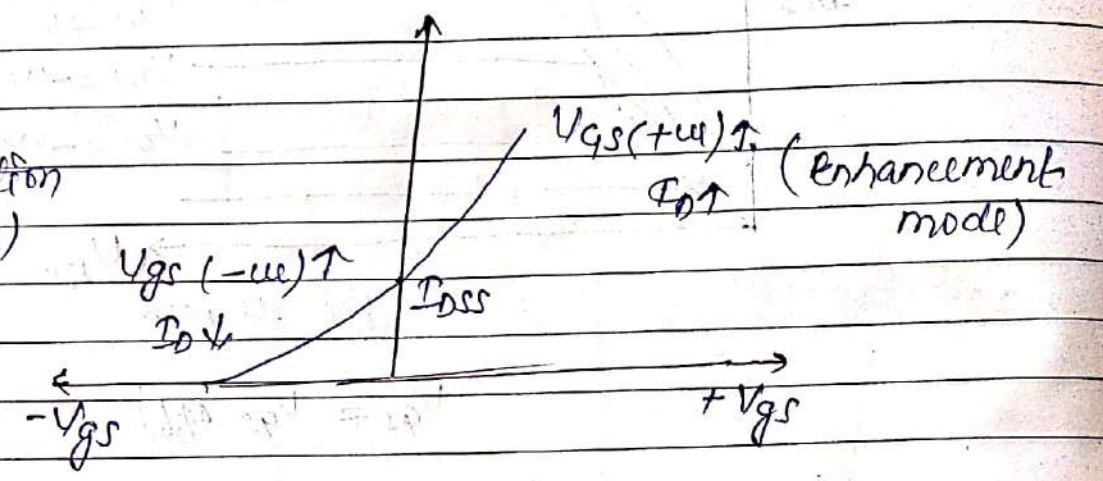
Peacock
Page No.
Date : / /

cut-off region :- At $V_{gs} = V_{gs\ off}$, $I_D = 0$ and curve lies on horizontal axis.

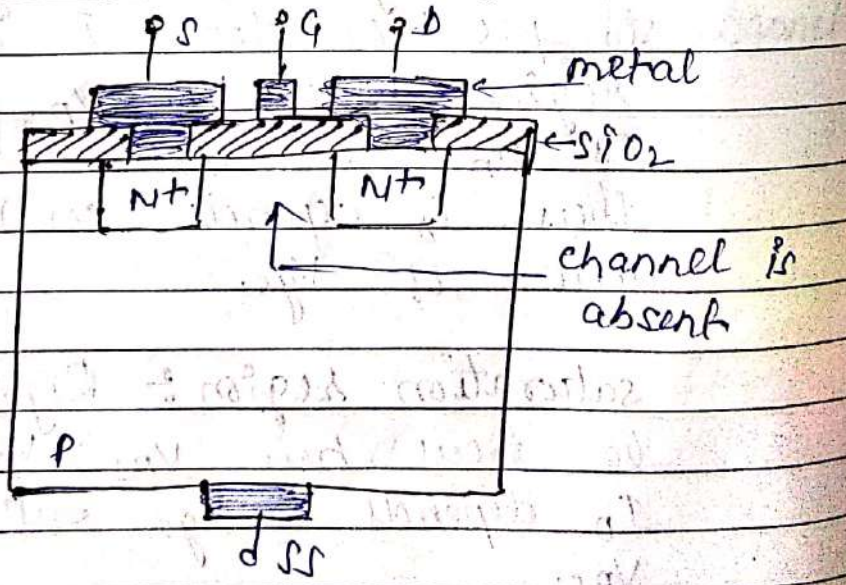
Transfer curve for N-CH MOSFET :-



It's a plot b/w I_D and V_{gs} for constant V_{DS}. In enhancement mode I_D increases and in depletion ~~target~~ mode I_D decreases

Enhancement MOSFET :- It is of two types.
- P-CH EMOSFET and
- N-CH EMOSFET.

Construction of N-CH EMOSFET :-



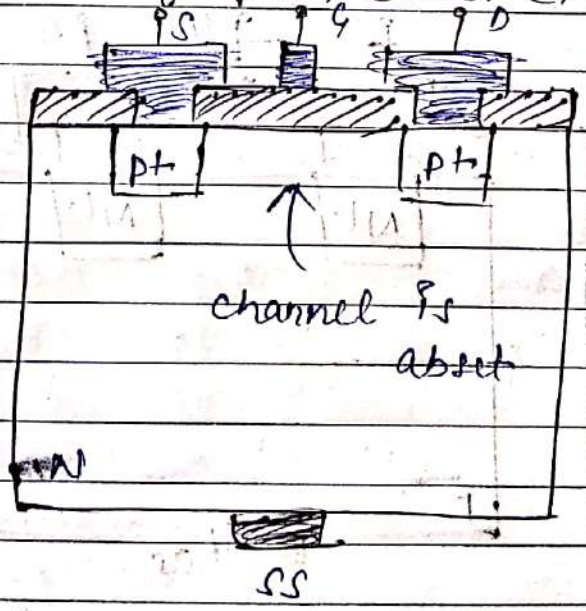
Signature.....

Page No.
Date : / /

- A slap of p- type semi-conductor is used as substrate
- The drain and source terminals are connected N^+ doped region through metal contact.
- channel is physically absent.
- SiO_2 layer is present which isolates gate terminal from the substrate.

The construction is very similar to that of depletion-type MOSFET the only diff. is that channel is absent.

construction of p-ch EMOSFET :-



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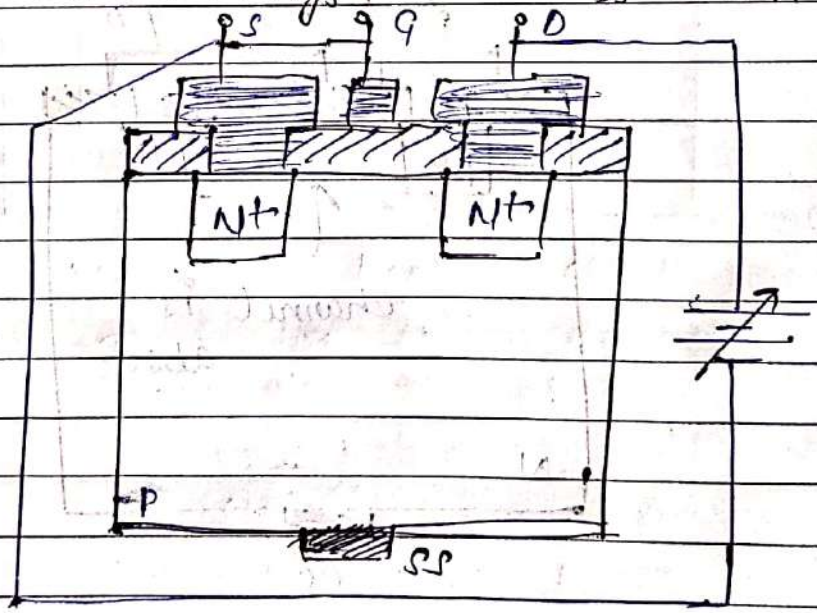
Peacock
Page No.
Date : / /

working of N-ch EMOSFET :-

case 1 :- when $V_{gs} = 0$ and V_{ds} is applied.



If $V_{gs} = 0$ and a +ve ~~charge~~ voltage is applied b/w drain and source then due to absence of n-type channel, $I_D = 0$

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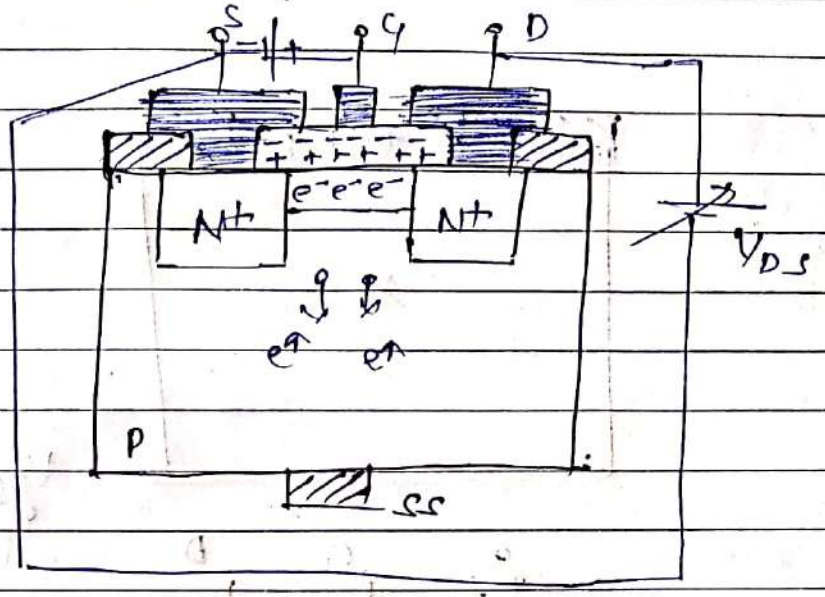
Case 2 :- when $V_{GS} > 0$ (+ve value)



when V_{GS} is +ve, +ve terminal of gate will repel holes present in p-type substrate and electron from p-type substrate will be attracted towards gate terminal and gather near the surface of SiO_2 layer. As V_{GS} increases electron concentration increases to such amount that it creates an induced n-channel which connects both n+ type region now drain current starts flowing through the induced channel.

The minimum value of V_{GS} at which channel and conduction layer begins is called threshold voltage. V_{TH}.

Case 3 :- Effect of V_{DS}

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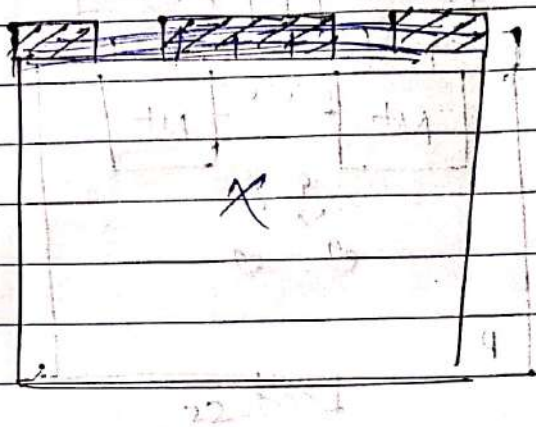

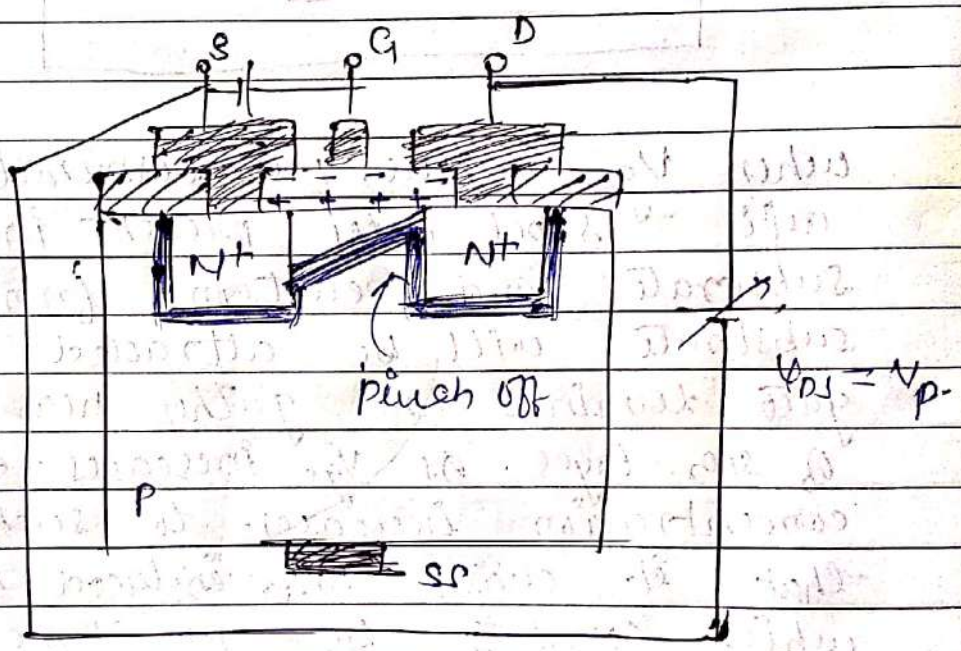

If $V_{GS} \geq V_{TH}$ and kept constant and V_{DS} increases gradually the induced channel becomes narrow at drain end.

If V_{DS} increases the channel width will be reduced to a point of pinch off. and a saturation condition will be established. In this case current I_D becomes constant and independent of V_{DS}.

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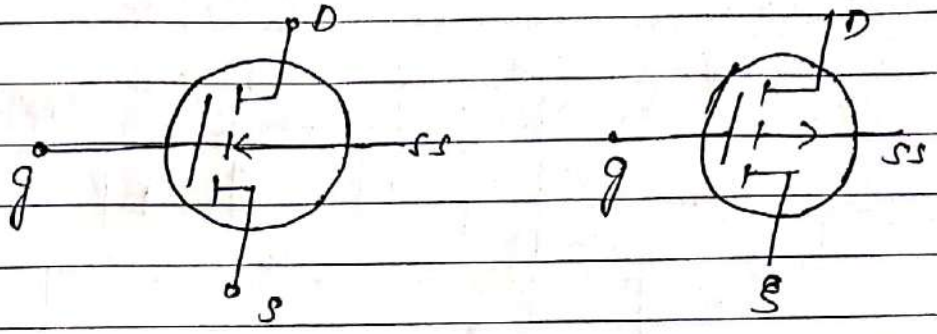
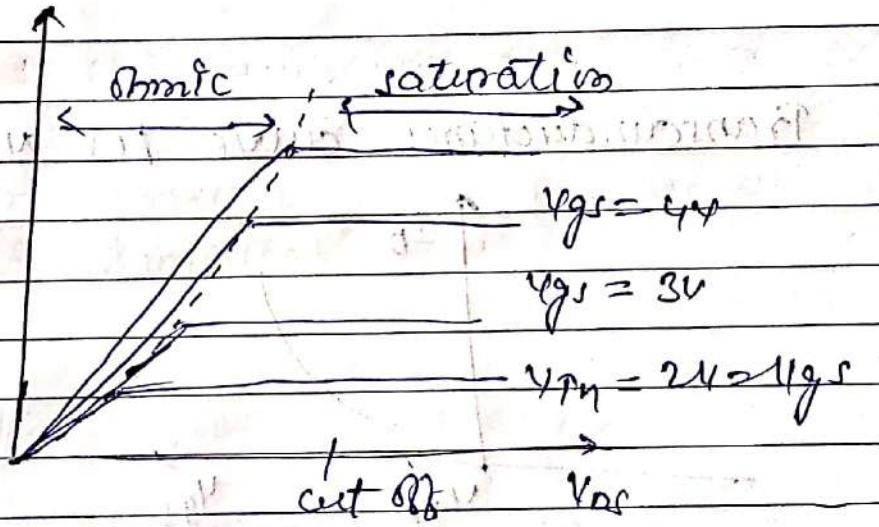
Peacock
Page No.
Date : / /

circuit symbols :-



N-CH EMOSFET P-CH EMOSFET.

o/p characteristic curve for N-CH EMOSFET :-



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