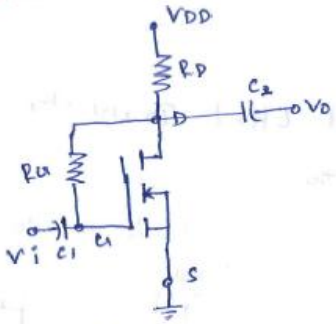
2. EMOSFET

* It's similar to the circuit used for JFET biasing.
* The primary difference b/w the two is the fact that Enhancement type MOSFETS also permits operating points with positive value of V_{GS} for n-channel & negative values of V_{GS} for p-channel.
* To have positive values of V_{GS} the n-channel & negative value of V_{GS} for p-channel self bias circuit is unsuitable.
* Here, we will discuss only feedback bias & voltage divider bias circuit.

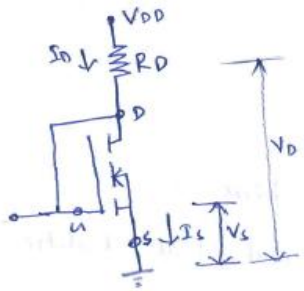
1. Feed Back Bias



Dc Analysis :

* For dc Analysis we can replace coupling capacitors by open circuit & replace the R_G by a short circuit equivalent. Since $I_G = 0$.
* The Drain & Gate Terminals are shorted.

$$V_D = V_D \quad \& \quad V_{DS} = V_{GS} \quad \because V_S = 0$$



* Apply KVL to the Drain - source junction

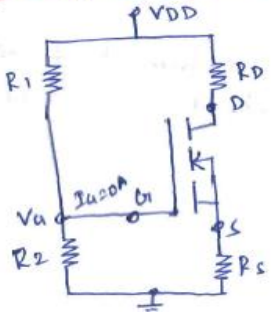
$$V_{DD} - I_D R_D - V_{DS} = 0$$

$$\therefore V_{DS} = V_{DD} - I_D R_D$$

(or)

$$V_{GS} = V_{DD} - I_D R_D$$

2. Voltage Divider Bias



* The biasing resistors R_1 & R_2 are designed to provide positive gate to source voltage.
* Apply KVL to the Gate - source junction

$$V_G - V_{GS} - V_S = 0$$

$$\therefore V_{GS} = V_G - V_S$$

$$V_{GS} = V_G - I_S R_S = V_G - I_D R_S \qquad \because I_D = I_S$$

$$\therefore V_{GS} = V_G - I_D R_S$$

* Apply KVL to Drain - source junction

$$V_{DD} - I_D R_D - V_{DS} - I_S R_S = 0$$

$$\therefore V_{DS} = V_{DD} - I_D R_D - I_S R_S$$

$$= V_{DD} - I_D R_D - I_D R_S \qquad \because I_D = I_S$$

$$\therefore V_{DS} = V_{DD} - I_D (R_D + R_S)$$

Comparision of BJT & FET

Parameters	BJT	FET
1. Control Element	Input current I_B control o/p current I_C	I/p voltage V_{GS} control o/p current I_D
2. Device Type	Current flow due to both majority & minority carriers	Only majority carriers.
3. Type	npn & pnp	n-channel & p-channel
4. Configuration	CE, CB, CC	CS, CG, CD
5. I/p Resistance	Low compared to JFET	high compared to BJT
6. Thermal stability	Less	More
7. Thermal Runaway	present	Not present
8. Relation b/w i/p & o/p	linear	Non. linear
9. Ratio of o/p to i/p	$\beta = \frac{\Delta I_C}{\Delta I_B}$	$g_m = \frac{\Delta I_D}{\Delta V_{GS}}$
10. Gain Bandwidth product	High	Low