NAME NOOR-UL-WAHAB

ID 12395

Subject Electronic Circuit Design

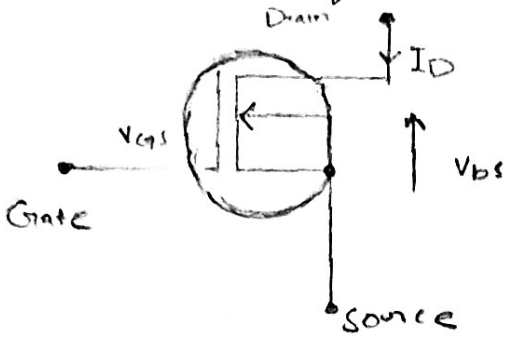
Semester 10th

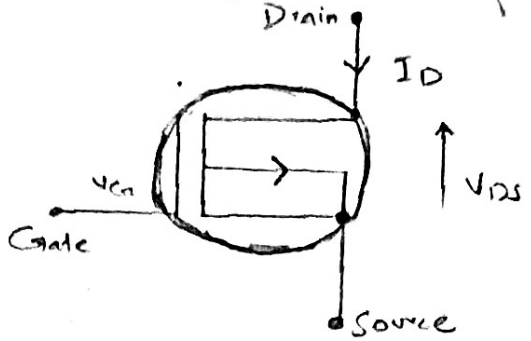
Instructor Engineer Sir Mujtaba

Date 14/April/2020

Q: No. 1 (a) Explain the drain characteristic curve of D. MOSFET. given below.

Ans: 1a



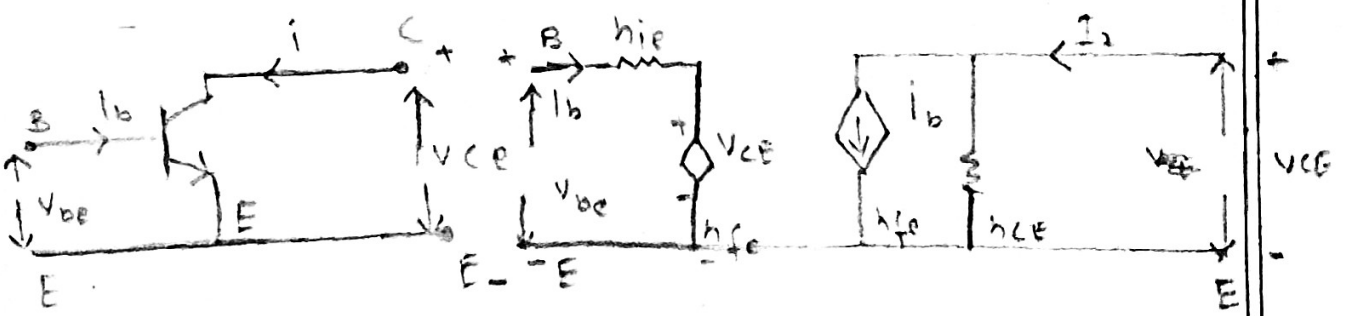


The characteristic mainly gives us the relationship between drain source voltage (V_{DS}) and drain current (I_D). The small voltage at the gate control the current flow through the channel. The channel between drain and source act as a good conductor with zero bias voltage at gate terminal. The channel width

and drain current increase if the gate voltage is positive, and these two decrease if the gate voltage is negative.

Q(1) (b) Sketch The Hybrid model and write equations for the transister in common emitter configuration.

Ans:- Transister Hybrid Model CE configuration:



CE

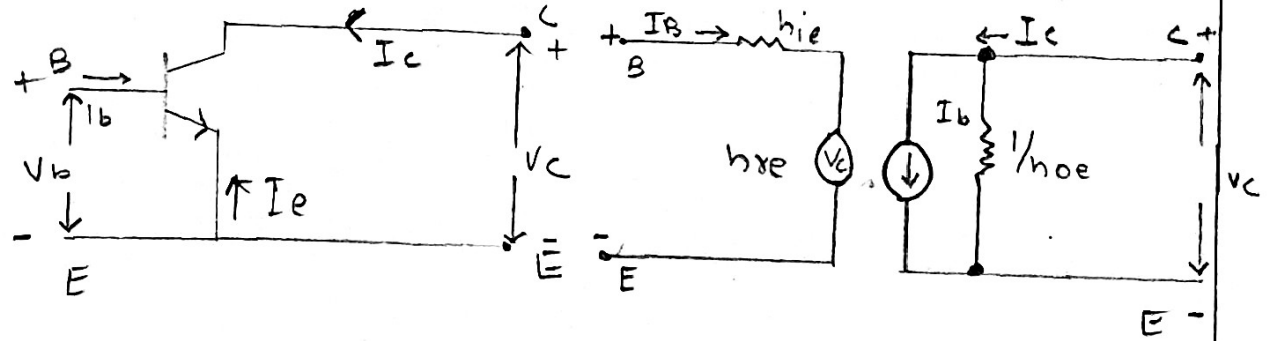
Transister Hybrid Model (E configuration:-

Inhere, $h_{ie} = (\partial f_1/\partial i_B)V_c = (\partial \partial V_B/\partial i_B)V_c = (\Delta V_B/\Delta I_B)V_c = (V_b/I_b)V_c$

$h_{re} = (\partial f_1/\partial V_c)I_B = (\partial V_B/\partial V_c)I_B = (\Delta V_B/\Delta V_c)I_B = (V_b/V_c)I_B$

$h_{fe} = (\partial f_2/\partial I_B)V_c = (\partial i_c = \partial i_B)V_c = (\Delta I_c/\Delta I_B)V_c = (i_c/i_b)V_c$

$h_{oe} = (\partial f_2/\partial V_c)I_B = (\partial i_c/\partial V_c)I_B = (\Delta i_c/\Delta V_c)I_B = (i_c/V_c)I_B$



$V_b = h_{ie} I_b + h_{re} V_c$

$I_c = h_{fe} I_b + h_{oe} V_c$

Q.(2) A certain operational amplifier has a common mode gain of 0.6 and an open loop differential voltage gain of 400,000. Evaluate the CMRR and express it in decibels.

Ans (2)

Given :-

A_{OL} = open loop differential voltage gain = 400,000

A_{CM} = Common mode gain = 0.6

Required :-

CMRR = ?

Solution :-

Formula is as $CMRR = A_{OL}/A_{CM}$

$CMRR = 400,000 / 0.6$

$CMRR = 666,666$

CMRR in decibles :-

Formula:

$$CMRR = 20 \log (A_{OI}/A_{CM})$$

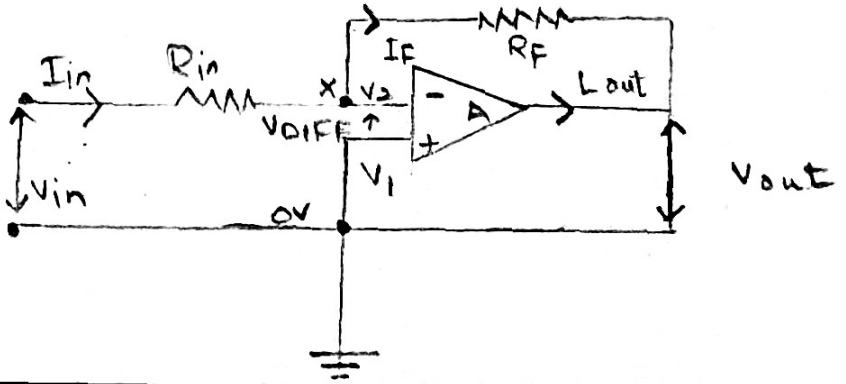
$$= 20 \log (666,666)$$

$$= 116.4 dB$$ (Ans)

Q 3(a) Explain the concept behind negative feedback in operational amplifier?

Ans 3(a) Inverting Operational Amplifier.

Negative feedback is the process of "feeding back" a fraction of the output signal back to the input, but to make the feedback negative we must feed it back to the negative or "inverting input" terminal of the operational amplifier using an external Feedback Resister called Rf.



Q.3(b) State the following statment as True or False and give the reason for your answer.

"The output of summing amplifier is Positive".

Ans (b)

False

Although the out of a summing amplifier can be positive in the non-inverting summing amplifier. But it can be negative in inverting amplifier.

Reason :-

The statement is false, because when the summing point is connected to the inverted input of the op-amp the circuit will produce the negative sum of any number of input voltages, likewise when the summing input is connected to non-inverting input of the op-amp it will produce the positive sum of input voltages.