

How to login on Cadence virtuoso

- ① csh
- ② source CSHRC
- ③ virtuoso &

Exp - 2

0 - cutoff

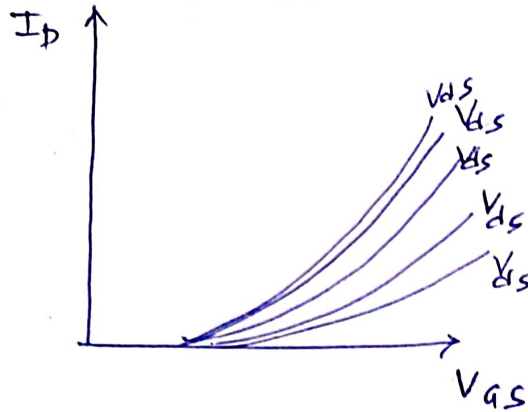
1 \rightarrow linear

2 \rightarrow Saturation

3 \rightarrow Subthreshold

Analog CMOS Lab

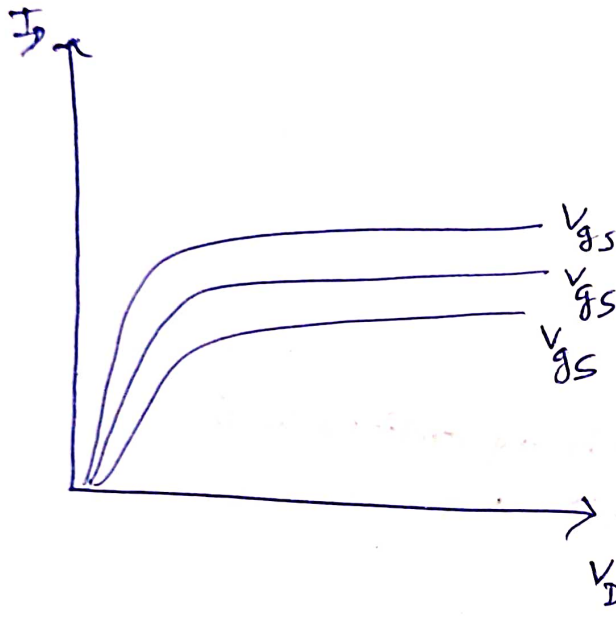
EXP(1) NMOS & PMOS dev



this will vary from 0 to 1.8 V

Tool → Parametric analysis

V_{dc} 0 to 1.8 Step size = 5



This will vary from 0 to 1.8 V

Analysis → choose → dc

Select component :

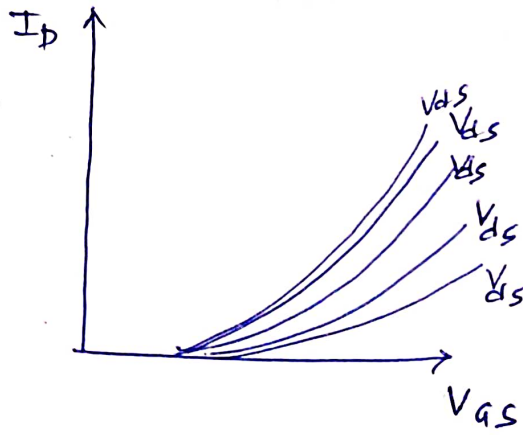
फिर figure में जाएँ

V_{ds} select कर लेंगे

[मतलब जहाँ बैटरी का symbol है वहाँ V_{ds} लिखा होगा उस पर click कर देंगे]

Nmos output & input characteristics

EXP(1) NMOS & PMOS ch

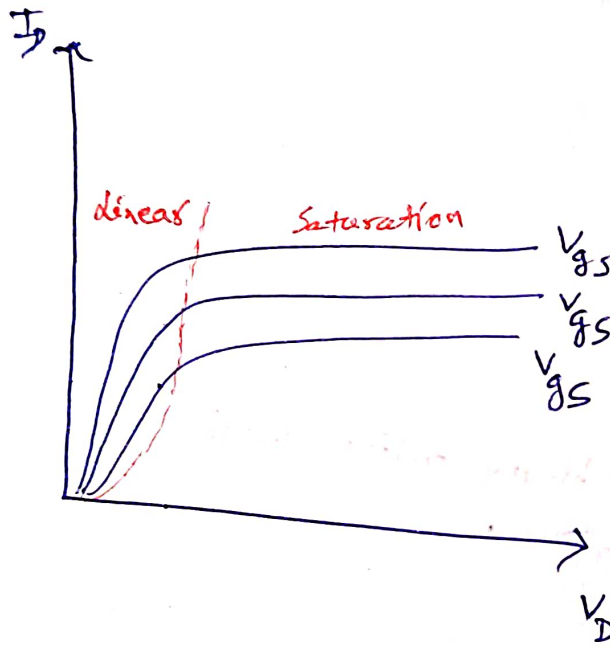


This will vary from 0 to 1.8 V

Tool → Parametric analysis

V_{ds} 0 to 1.8

Step size = 5



linear

Saturation

V_{gs} ↑

This will vary from 0 to 1.8 V

Tool → Parametric analysis

odc
oac

☒ Save DC operating point

☒ Component Parameter

Select Component

start stop start ☐ stop ☒

Sweep type ☒ Linear Step ☐ ☐

[यहाँ पर Figure के बाँके V_{ds} बैटरी पर click कर देंगे]

Analysis → choose → dc

Select Component :

फिर Figure में बाँके

V_{ds} select कर लेंगे

[मतलब जहाँ बैटरी का symbol है]

वहाँ V_{ds} लिखा होगा उस पर

click कर देंगे]

NMOS output & input characteristics

How to login on Cadence virtuoso

① csh

② source CSHRC

③ virtuoso

&

Cutoff	NMOS	$V_{GS} < V_{th}$
	PMOS	$ V_{GS} < V_{th} $ or $V_{GS} > V_{th}$
linear	NMOS	$V_{GS} \geq V_{th}$ $V_{DS} \leq V_{GS} - V_{th}$
	PMOS	$ V_{GS} > V_{th} $ or $V_{GS} < V_{th}$ $ V_{DS} < V_{GS} - V_{th} $ or $V_{DS} > V_{GS} - V_{th}$
Saturation	NMOS	$V_{GS} \geq V_{th}$ $V_{DS} \geq V_{GS} - V_{th}$
	PMOS	$ V_{GS} \geq V_{th} $ or $V_{GS} < V_{th}$ $ V_{DS} \geq V_{GS} - V_{th} $

Exp - 2

NMOS {
Ad
Transient
p DC analysis

0 → cutoff

1 → linear

2 → Saturation

3 → Subthreshold

Press I

I → add instance from the library

add instance

library	ts018_scl_prim
cell	nmcs-18

Press I

library	analog-lib
cell	res

res [Resistor]
Vdc [Vdc voltage]
Vsig [Vsig wave for input]
Cap (Capacitor)

Press **W** for wire

Press **Q**: Edit parameter of selected instance..

मतलब जब हमें किसी element की value को बदलना है तब हम **Q** Press करते हैं [पहले उस element को select करते हैं फिर **Q** Press करते हैं]

Edit object properties

Resistance

18k

Create Pin

Name **Vout**

Direction **Output**

Press P

Edit object properties : [for Input Supply]

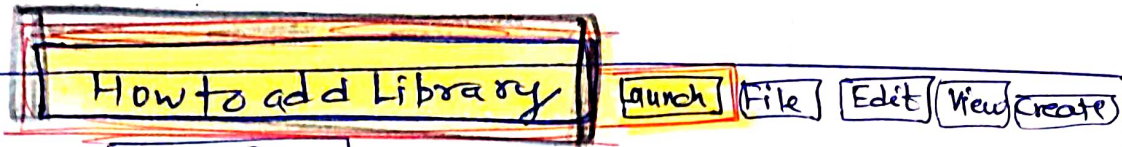
Number of noise / trans parts	0
DC voltage	V _{GS}
AC magnitude	1V
Amplitude	1mV
Frequency	1KHz

→ $V_{GS} = 0.672V$
you can write V_{GS}
as a variable

*When circuit is completed we will click on check and save icon

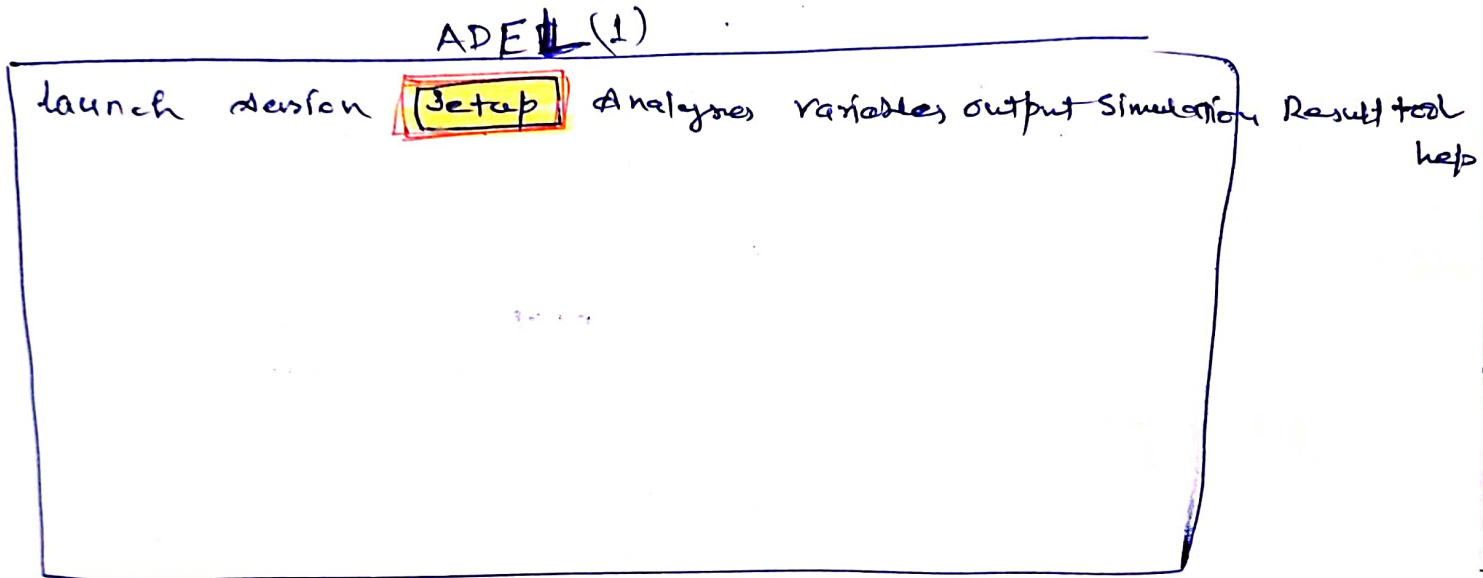


F → fit to screen. Auto zoom the schematic to the size of your window.

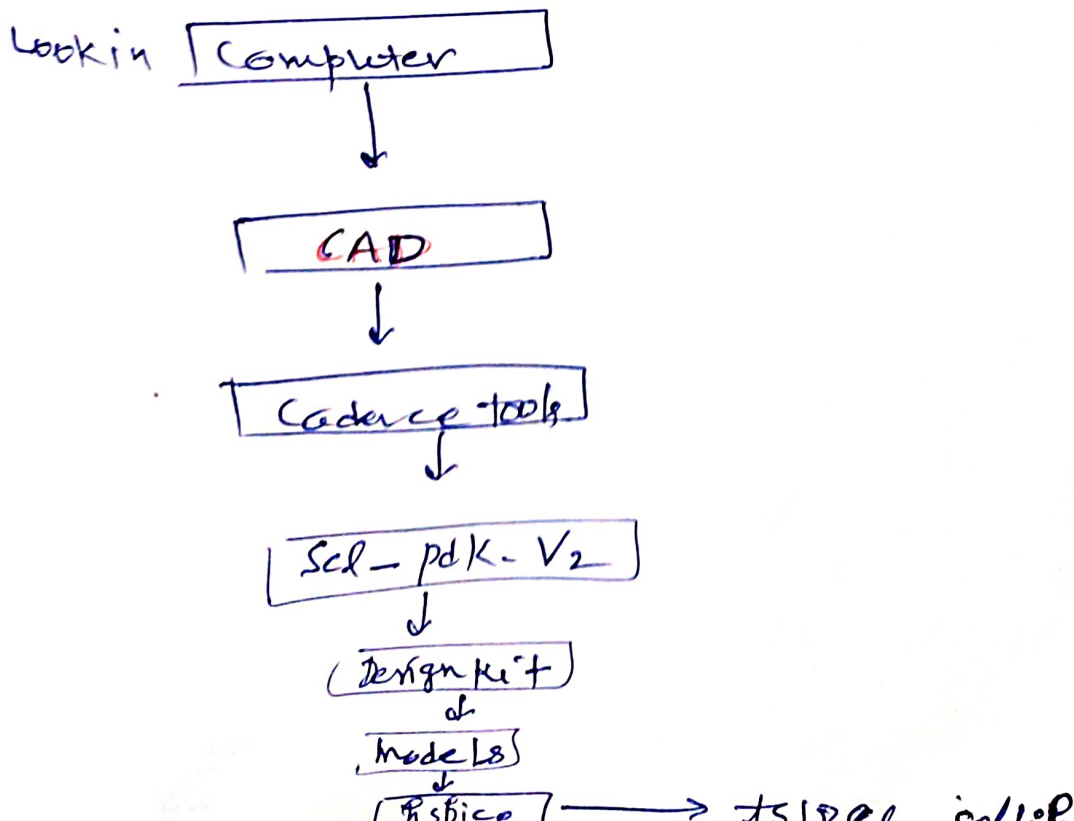


Go go Launch → AD&EL

Below pop will open. It has title ADE L(1).



In ADLE window go to Setup → Model Libraries



Section	
<input checked="" type="checkbox"/> CAD/cadence tool / / ts183e schlib	tt-18

AC Analysis

~~Choose~~ analyses → Choose →

Analysis

otran odc ● ac

sweep variable

● frequency


sweep range

● start stop start step

Sweep type

Logarithmic

● Points per decade

Now by selecting above setup on ADLE just Press on .
It will ~~run~~ ^{simulate} the model.

Green in
Colour

Results



Direct plot



AC gain & phase

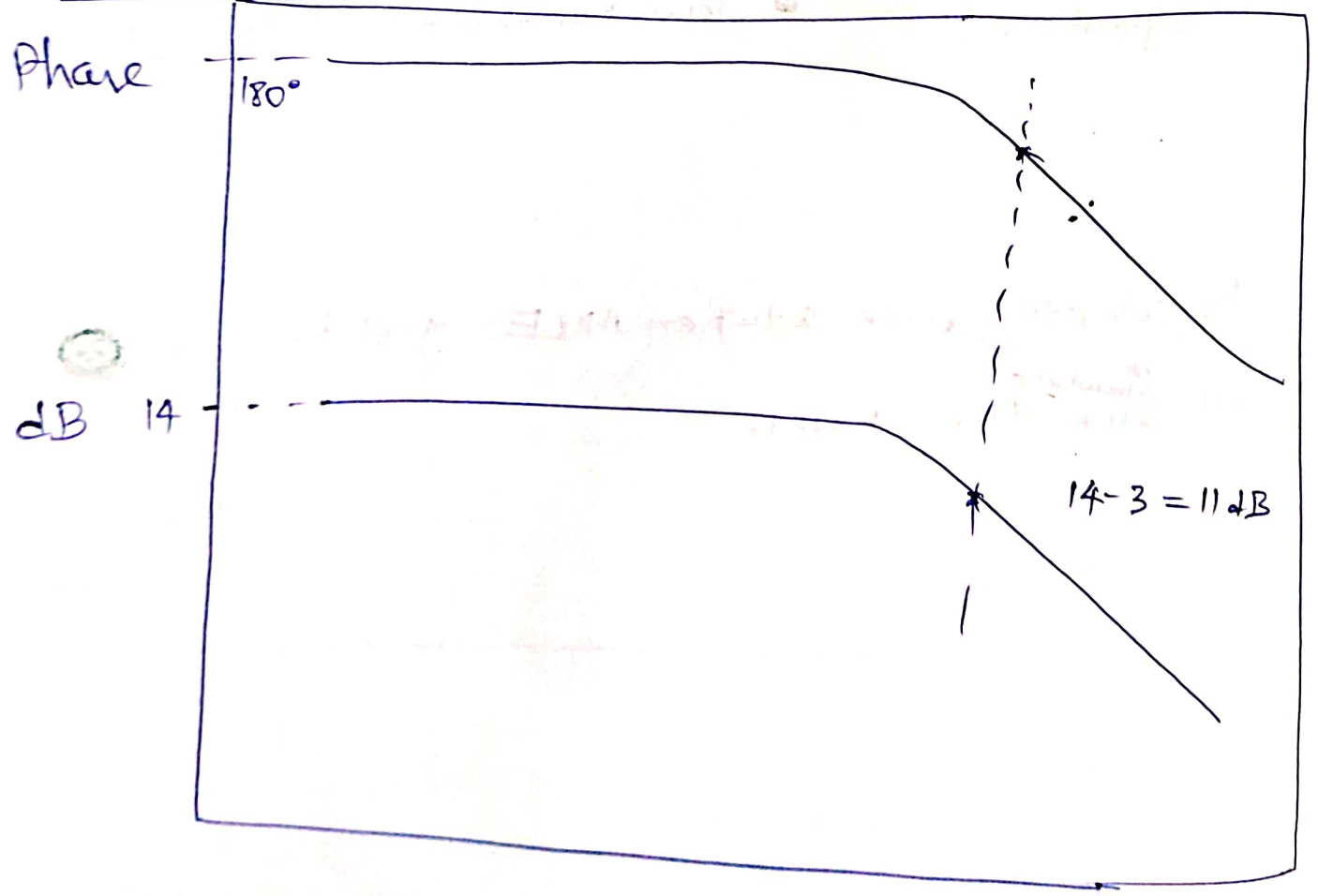


Now at the figure click on



line and click on wire connecting the V_1 to NMOS.

AC Response



→ frequency

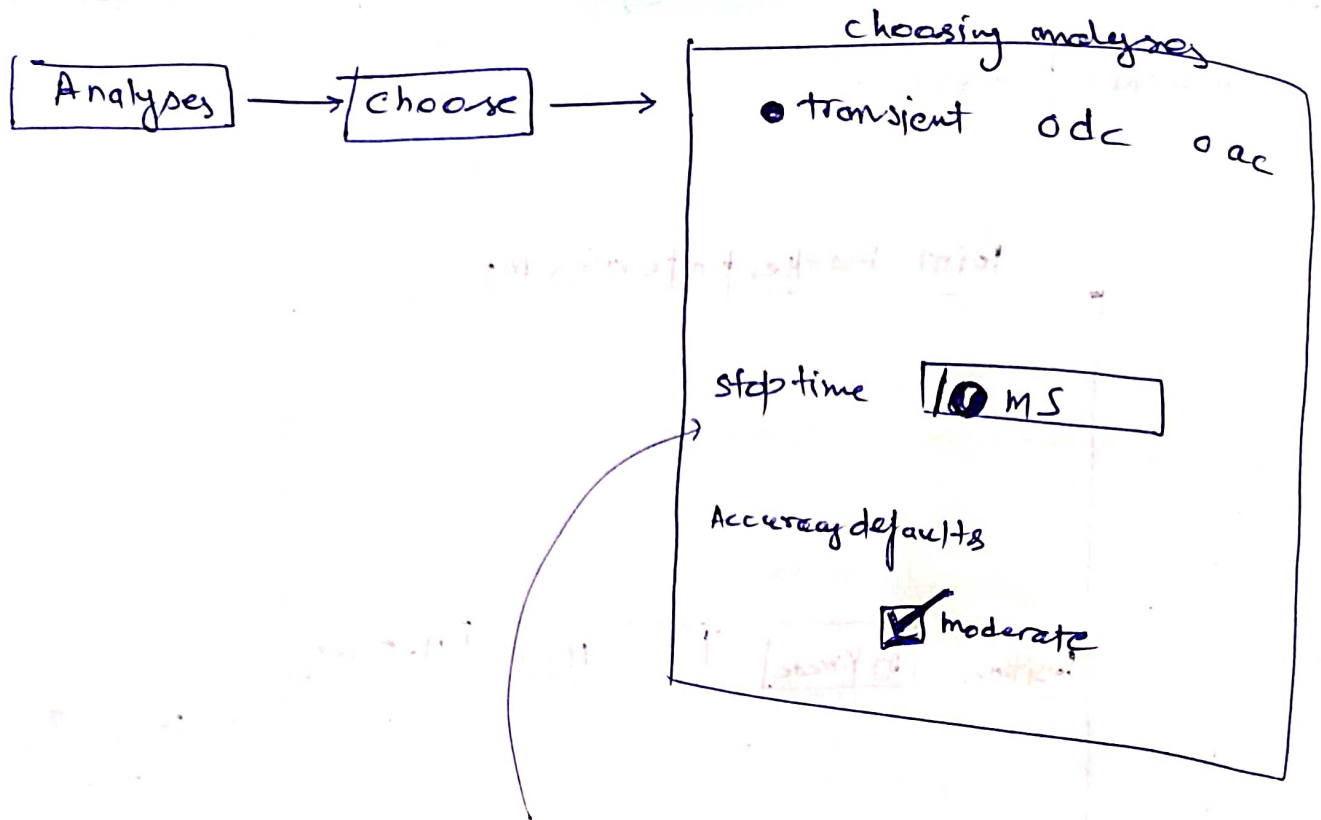
click on dB line, Press M, We will find a marker. Press
on marker press Q.

Point marker properties M1

Position	by Y mode	Hz	11.39 dB
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$$\rightarrow (14.39 - 3) = 11.39 \text{ dB}$$

Transient Response

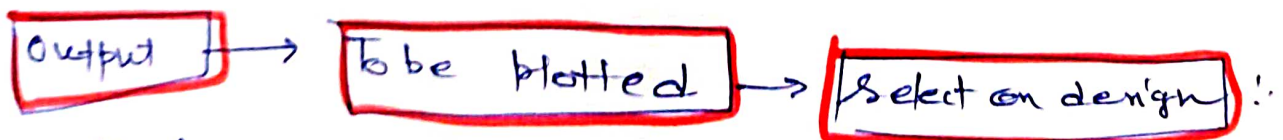


$$f = 1\text{kHz} \therefore t = \frac{1}{1000} = 1\text{ms}$$

• At ADEL :

uncheck || ac ☐

(g) transient ☒



We have to go on figure and select output wire and input wire on figure.

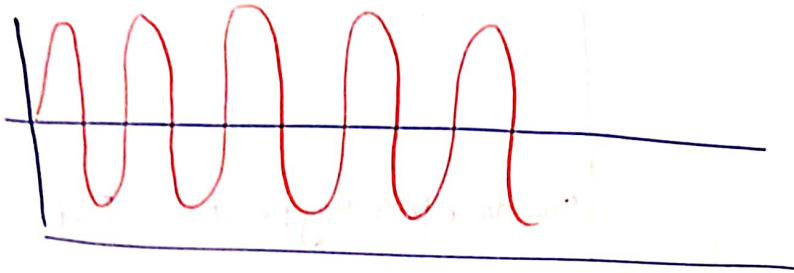
Transient response : Click on



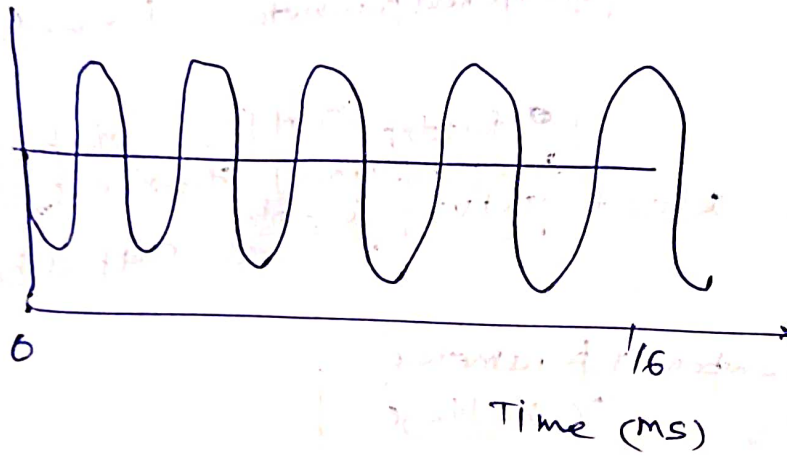
प्लॉट से दोनों plot detached
बाँट दें।

use slide to make the range smaller.

Net1



Vout



DC Analysis (Parametric analysis)

Analyses → choose ~~ana~~ →

• dc

Same DC operating point ☒

☒ Component parameter Select component

• Start/stop sweep type Linear start 10 stop 100 step size 100

Input Supply output Battery ($V_c = 1.5$)

Now go on the figure select

Select this → Select component parameter?

dc	Vdc	DC voltage

Here Input V_{gs} V_{gs} जेठा Because it is varying in nature.

Now go on PDEL Window

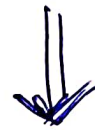
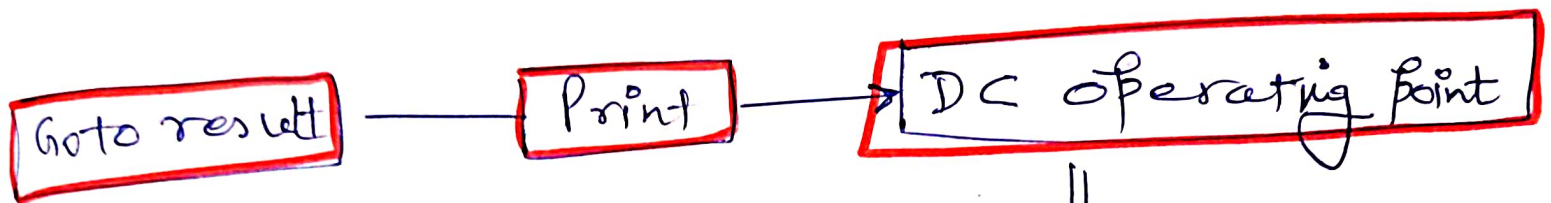
ac ☐

transient ☐

dc ☒

Tools \longrightarrow Parametric analysis

variable	value	from	to	steps
Vgs	0.672	0	1.0	9

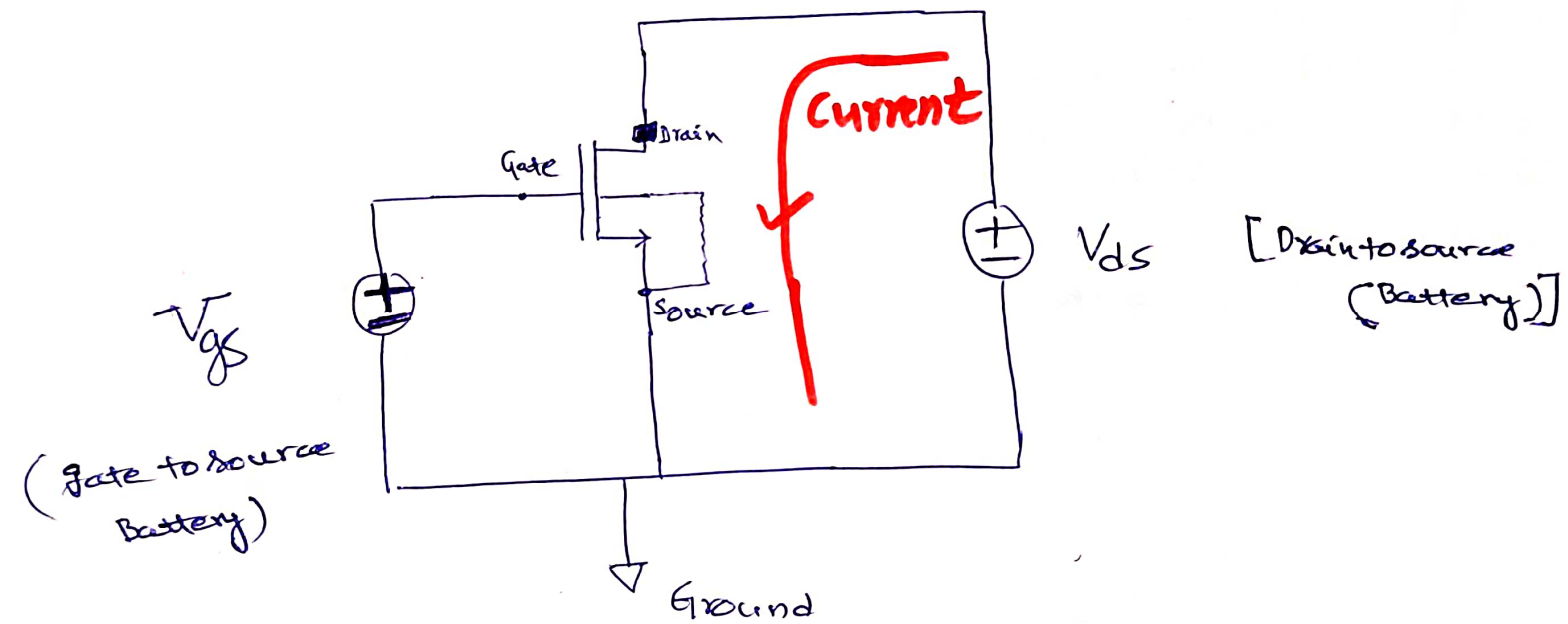


We will click on MOSFET

Result display window

Vgs	
0	
235	
450	
675	
900	
1125	
1575	
1800	

NMOS Characteristics



Analyses → choose

• transient • dc o ac

Same DC operating point ☒

☒ Component parameter

Select Component

• start stop

start

stop

Sweep type

step size

Select Component parameter?

dc Vac Dc voltage

Tool → Parametric analysis

Variable	Value			From	To		Steps
V _{GS}	1.8			0	1.8		5

output → To be plotted → Selection design

[Go at the figure and select the drain terminal of the NMOS

