Shri Ramdeobaba College of Engineering and Management, Nagpur-13.
Department of Electronics Engineering
ENP402 –CMOS VLSI Design Lab
Odd Semester – 2023-24

Lab 01

Evaluate the output characteristics for 1um (long channel) and 50nm (short channel)

technology N-channel and P-channel MOSFET.

Name:	Harsh Devendra Mishra
Batch / Roll No.	A2_22
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Date of Performance:	09/09/23
Date of Submission:	16/09/23
Name & Signature of Faculty	P. P. Rane

Lab-01

Aim: Evaluate the output characteristics for 1um (long channel) and 50nm (short channel) technology N-channel and P-channel MOSFET

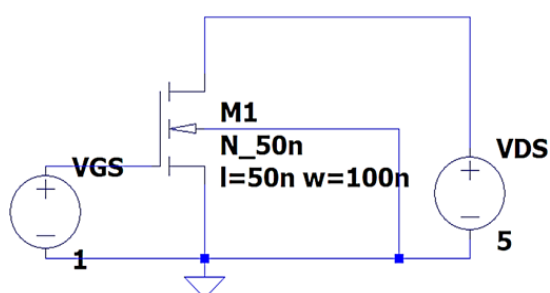✓ **Software Used:** LTspice

✓ **Circuit Diagram:**

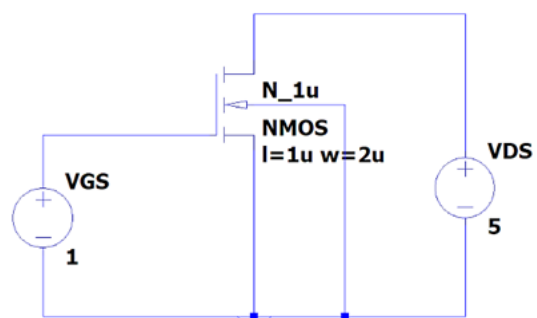**Nmos:**

Fig 1.0 Nmos short channel
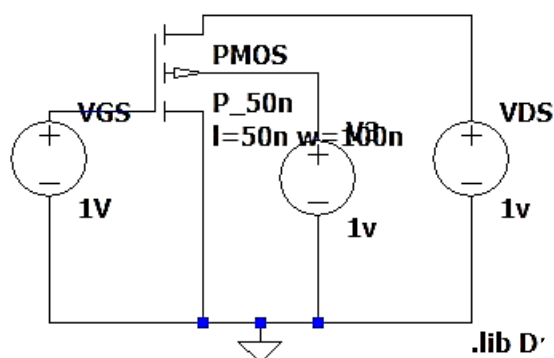

Fig 2.0 Nmos long channel
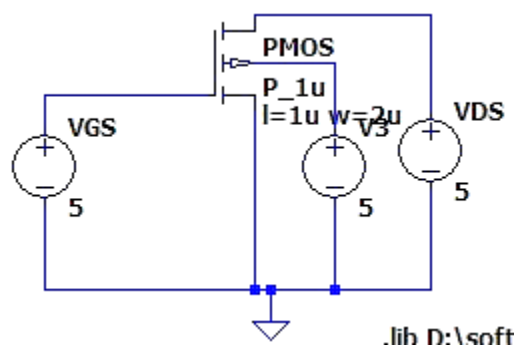
Pmos:

Fig 3.0 Pmos short channel

Fig 4.0 Pmos long channel

Table No. 1: For NMOS (Long Channel)

W/L	Rds.	Region of operation
(W= 2u L= 1u)	73k	Linear
(W=2u L= 1u)	205k	Saturation

Table No. 2: For PMOS (Long Channel)

(W= 2u L= 1u)	11.87k	Linear
(W= 2u L= 1u)	39.23k	Saturation

Table No. 3: For NMOS (Short Channel)

(W= 100n L= 50n)	21.64k	Linear
(W= 100n L= 50n)	121.60k	Saturation

Table No. 4: For PMOS (Short Channel)

(W= 100n L= 50n)	26.33k	Linear
(W= 100n L= 50n)	28.76k	Saturation

✓ **Calculations:**

○ The formula used to calculate **Rds** is $= (slope)^{-1}$

✓ **Obtained Waveforms/Simulation Results:**

Nmos:
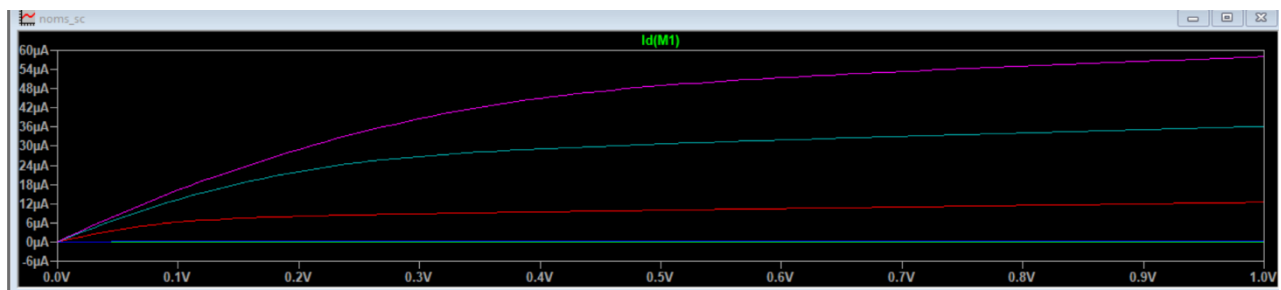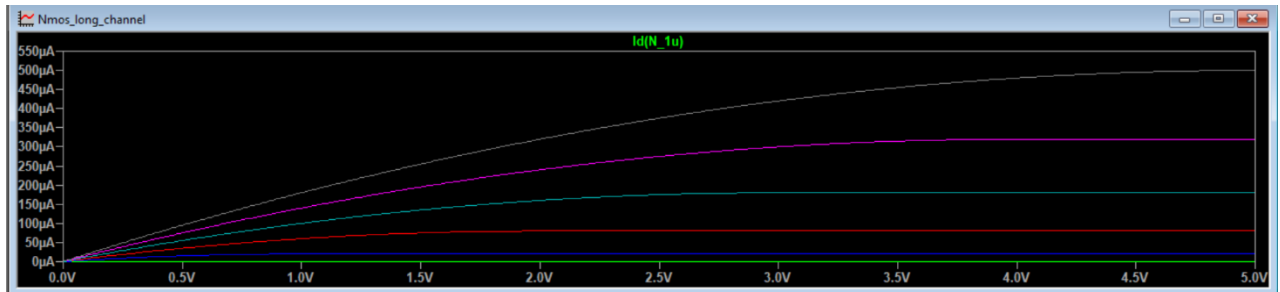

Fig 1.1 Nmos short channel

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Fig 2.1 Nmos short channel

Pmos:
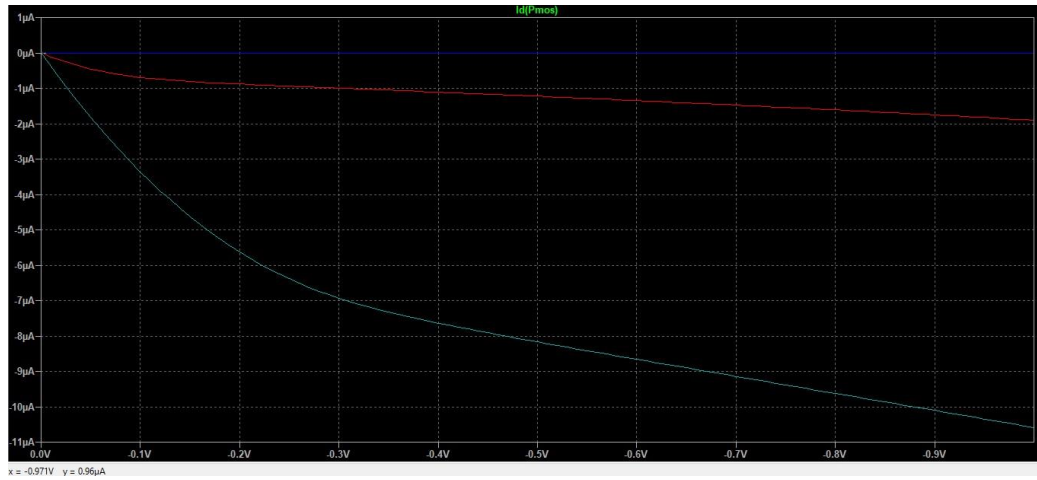
Fig 3.1 Pmos short channel

Fig 4.1 Pmos long channel

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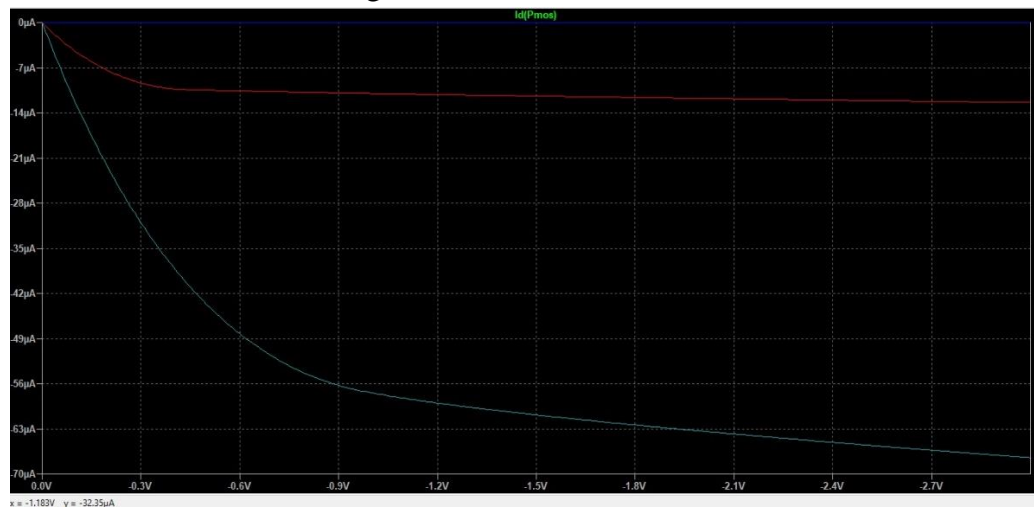
✓ Discussion and Conclusion:

- o Linear Region: Vds<Vgs-Vt
- o Saturation Region: Vds>=Vgs-Vt

Value of output resistance is more in saturation region and less in linear region for both Nmos and Pmos.

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