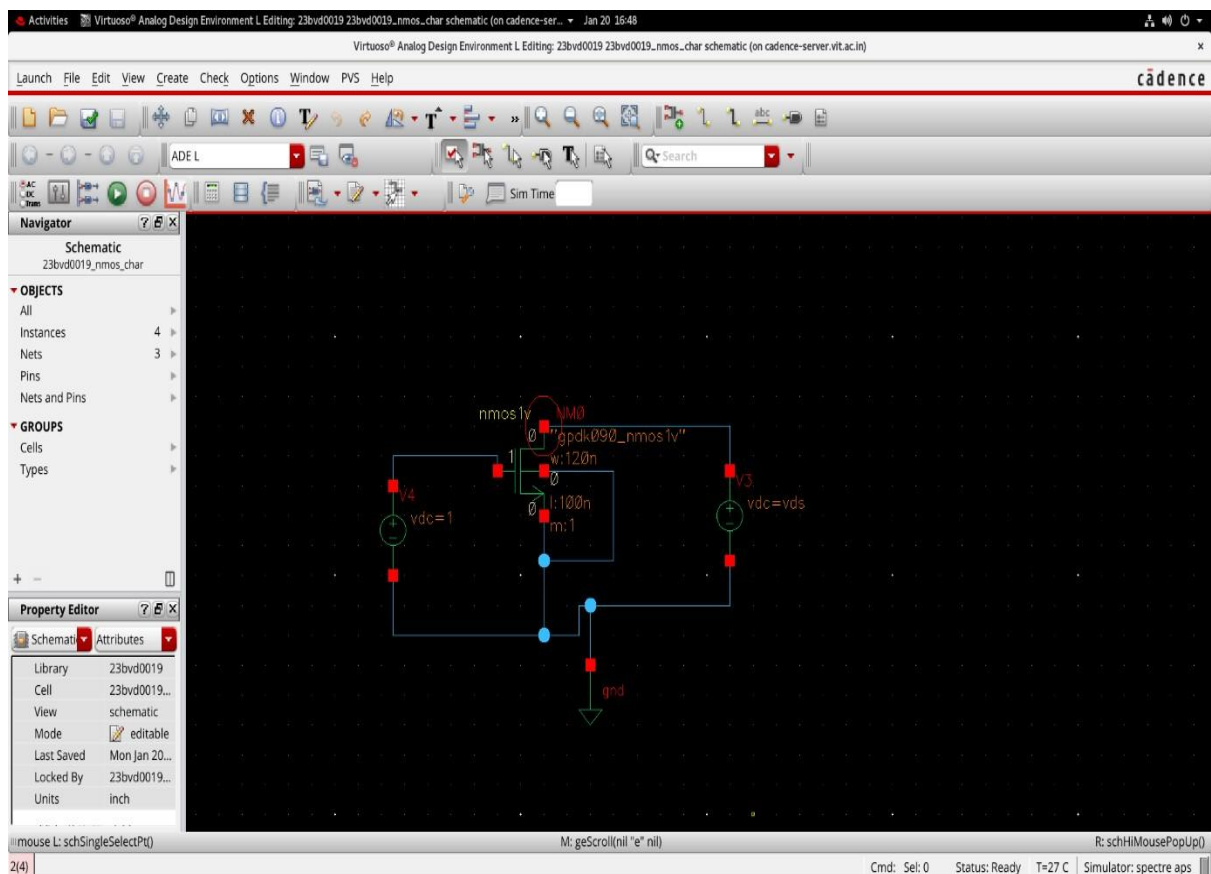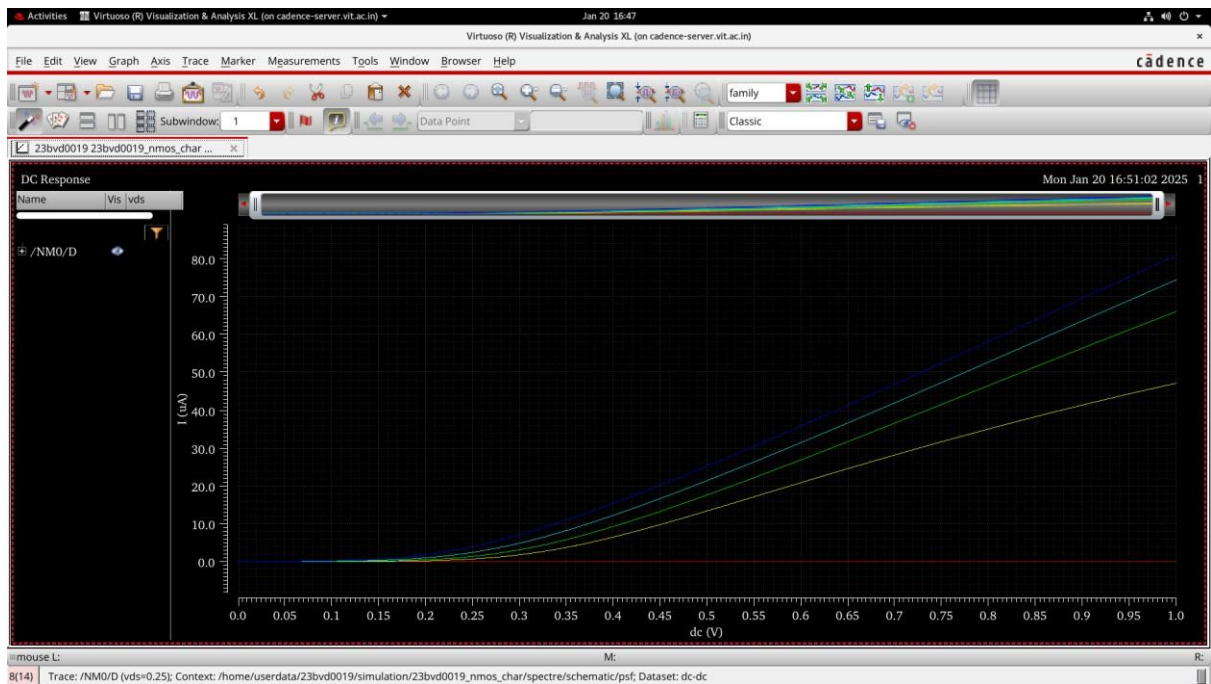# VLSI SYSTEM DESIGN

Aim: *Plot I-V characteristics for NMOS and PMOS. Determine Vth, Lambda, body bias effect*

## *NMOS CHARACTERISTICS:*

1)**IDS Vs. VGS (for different values of VDS)** *Schematic:*
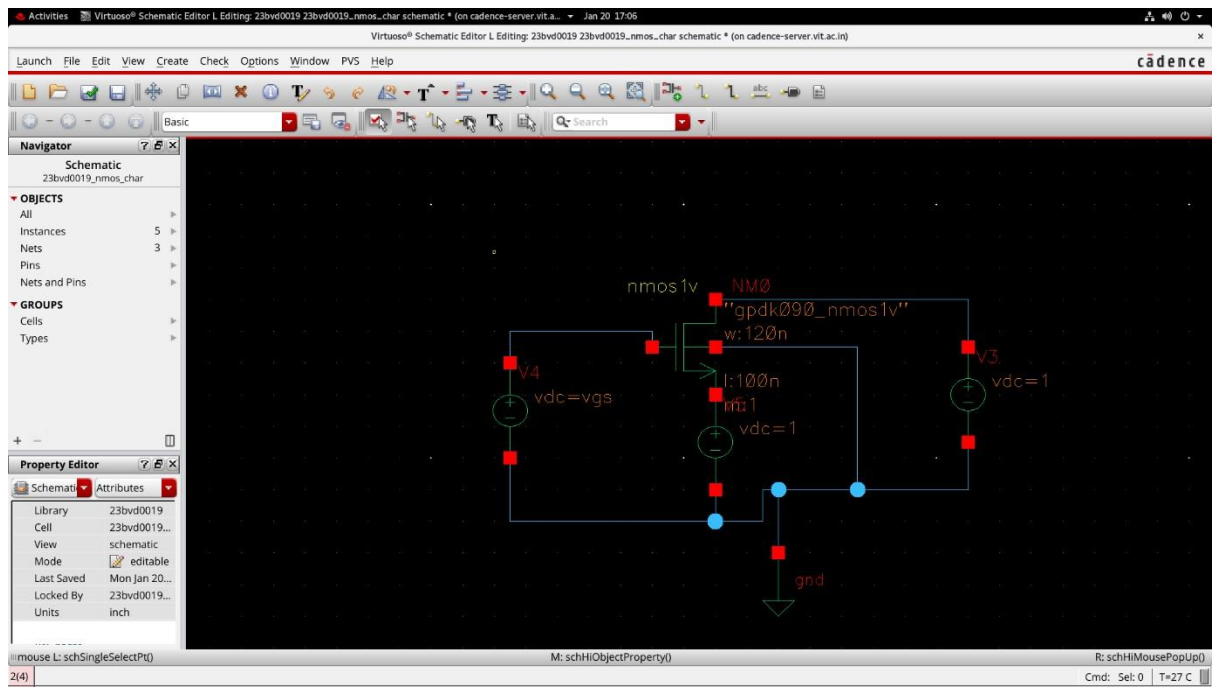


*Input characteristics:*

## VTH (Threshold values):



| vfbeff | vdsat | vth | vgd | vdb | vgb | vbs | vds | vgs | isub | ids |
|---|---|---|---|---|---|---|---|---|---|---|
| -942.306m | 396.675m | 237.978m | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |
| -942.306m | 402.585m | 209.012m | 750m | 250m | 1 | 0 | 250m | 1 | 6.35715z | 47.2206u |
| -942.306m | 408.101m | 180.046m | 500m | 500m | 1 | 0 | 500m | 1 | 94.5834z | 66.1546u |
| -942.306m | 413.249m | 151.081m | 250m | 750m | 1 | 0 | 750m | 1 | 5.19853f | 74.5632u |
| -942.306m | 418.054m | 122.115m | 0 | 1 | 1 | 0 | 1 | 1 | 17.8626p | 81.0427u |

## 2)IDS Vs VDS (for different values of VGS)

## Schematic:

## Output Characteristics:
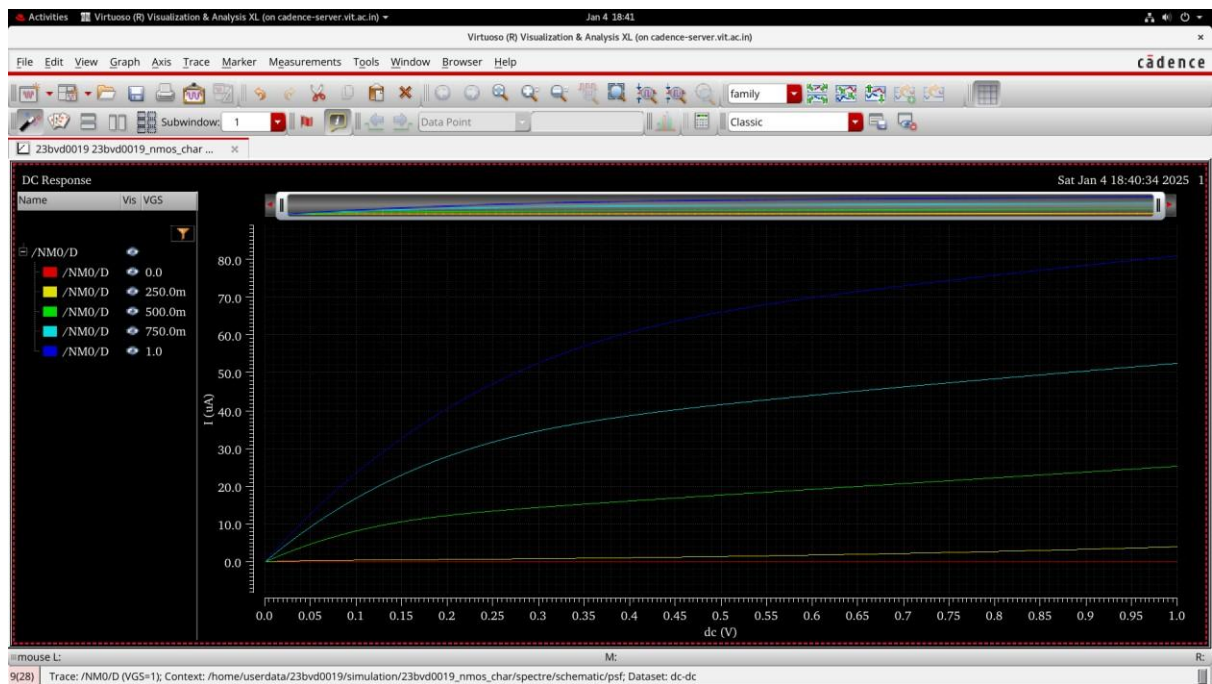


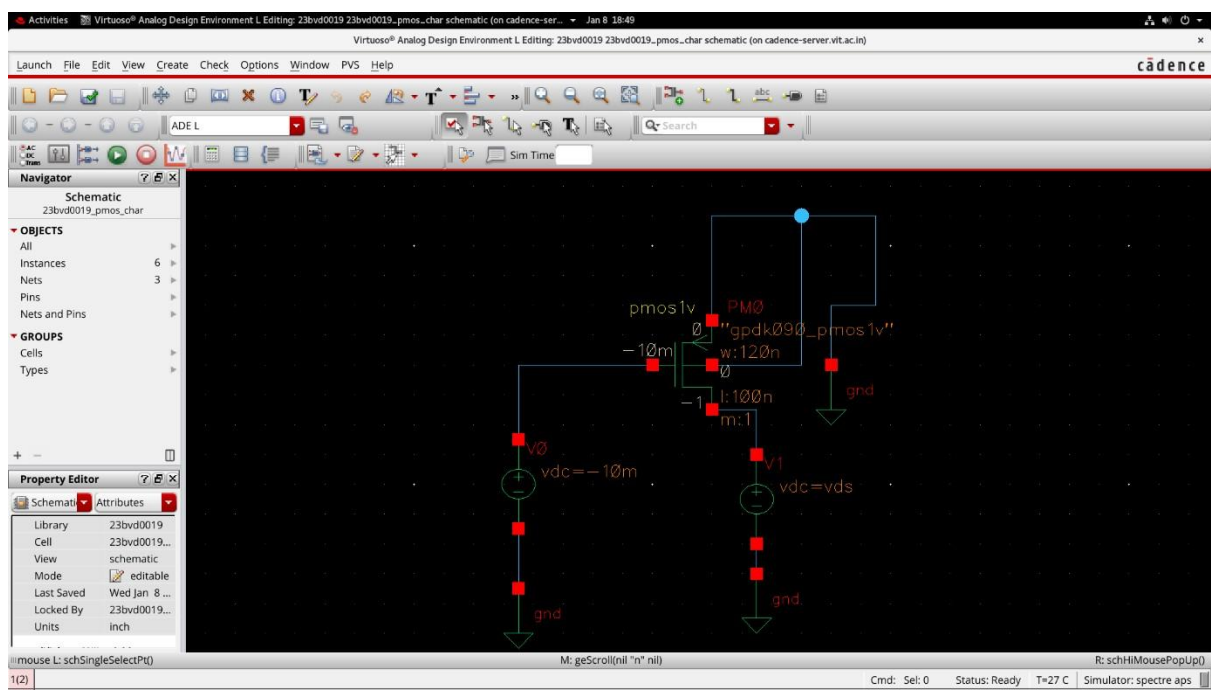## 3)IDS VS VGS (for different VSB values) Schematic:
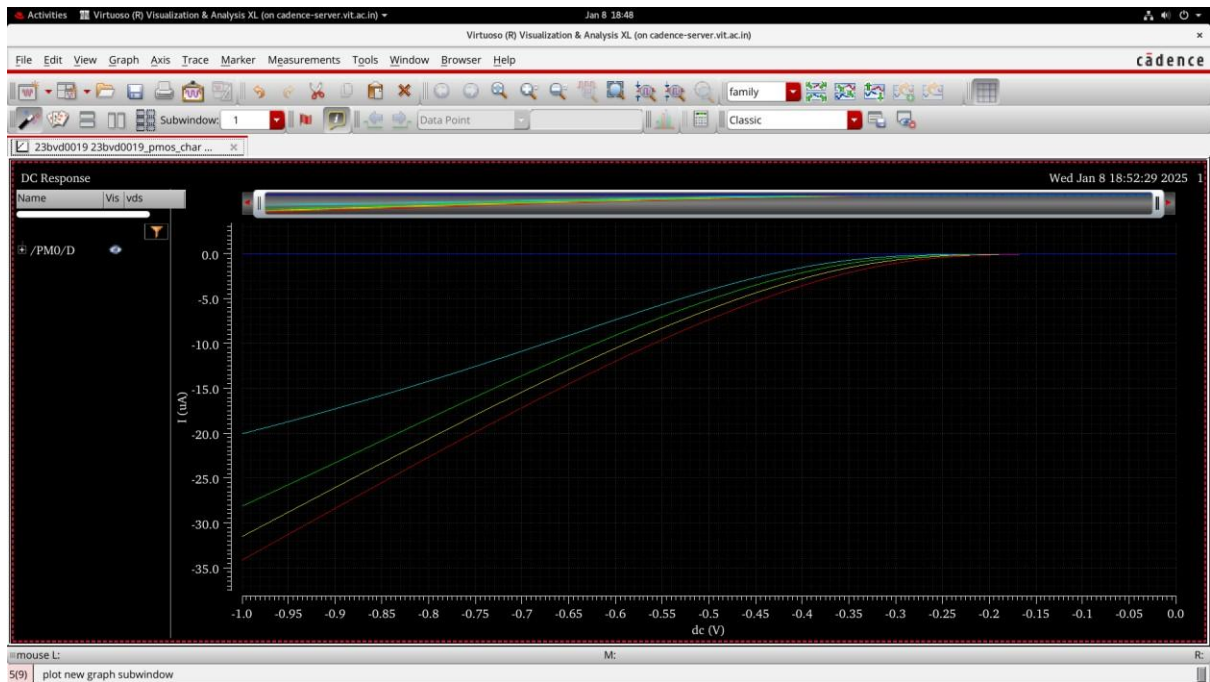
## Waveform:



## Vth Values:

## PMOS CHARACTERISTICS:

## 1)IDS Vs. VGS (for different values of VDS)

## Schematic:

# Input Characteristics:



# Vth Values:



| | vth | vgd | vdb | vgb | vbs | vds | vgs | isub | ids | trise |
|---|---|---|---|---|---|---|---|---|---|---|
| 839m | -231.841m | 990m | -1 | -10m | 0 | -1 | -10m | -66.7296a | -194.462p | NaN |
| 859m | -250.519m | 740m | -750m | -10m | 0 | -750m | -10m | -1.27483a | -82.0075p | NaN |
| 949m | -269.196m | 490m | -500m | -10m | 0 | -500m | -10m | -1.00415z | -34.2131p | NaN |
| 076m | -287.874m | 240m | -250m | -10m | 0 | -250m | -10m | -2.03496e- | -14.0275p | NaN |
| 226m | -306.552m | -10m | 0 | -10m | 0 | 0 | -10m | -0 | -0 | NaN |

# 2)IDS Vs VDS (for different values of VGS)

# Schematic:
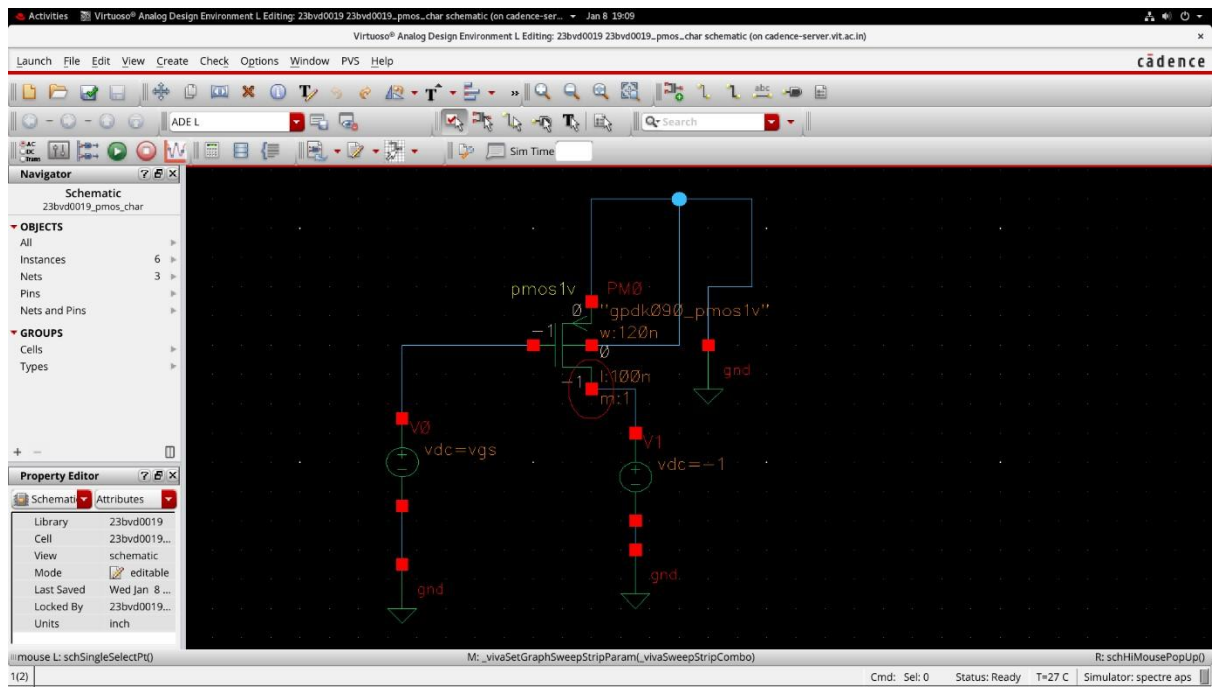
## Output Characteristics:
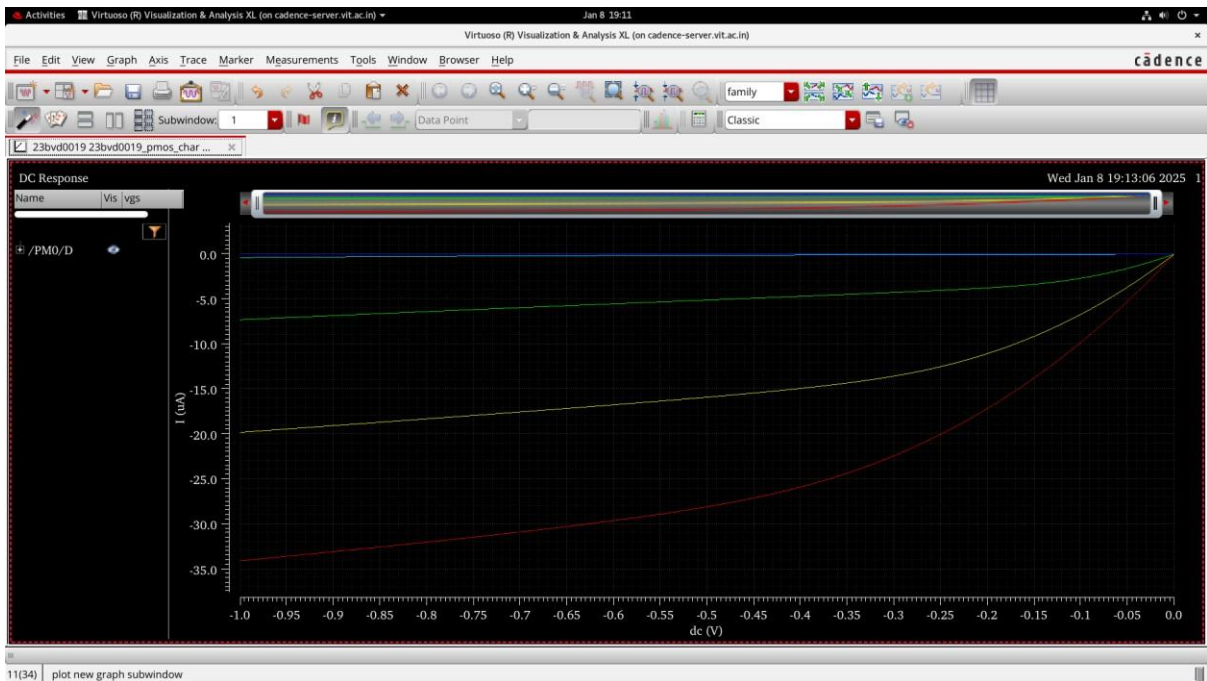


## Value of Lambda
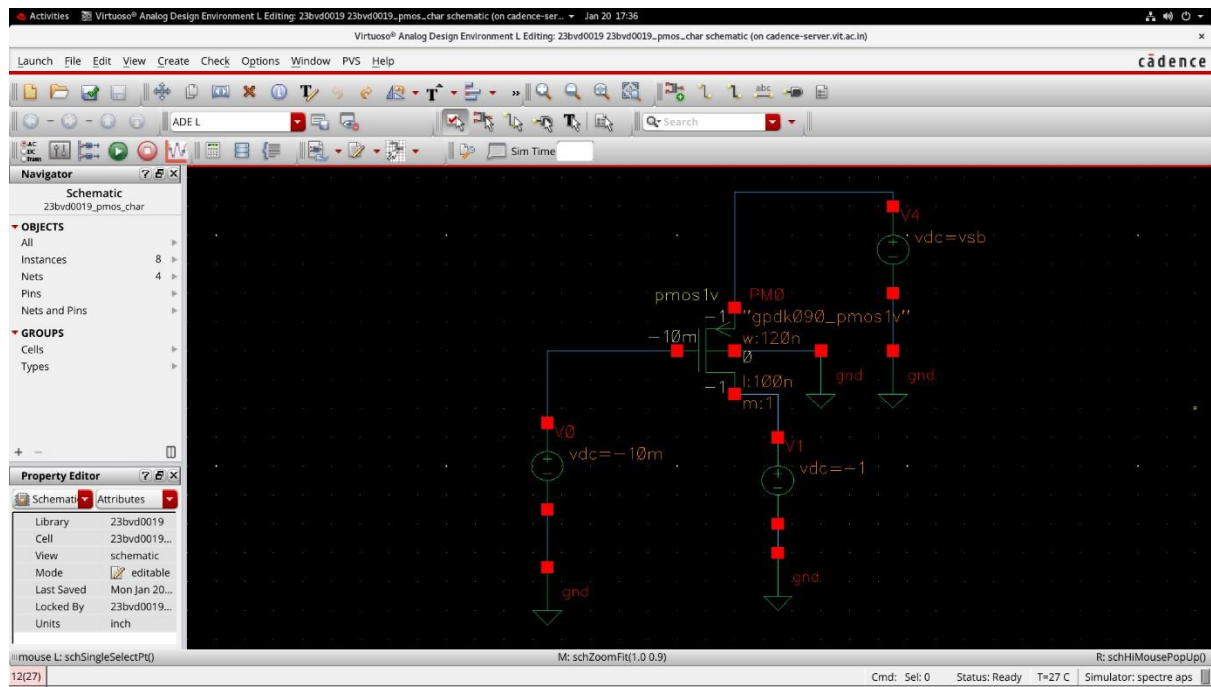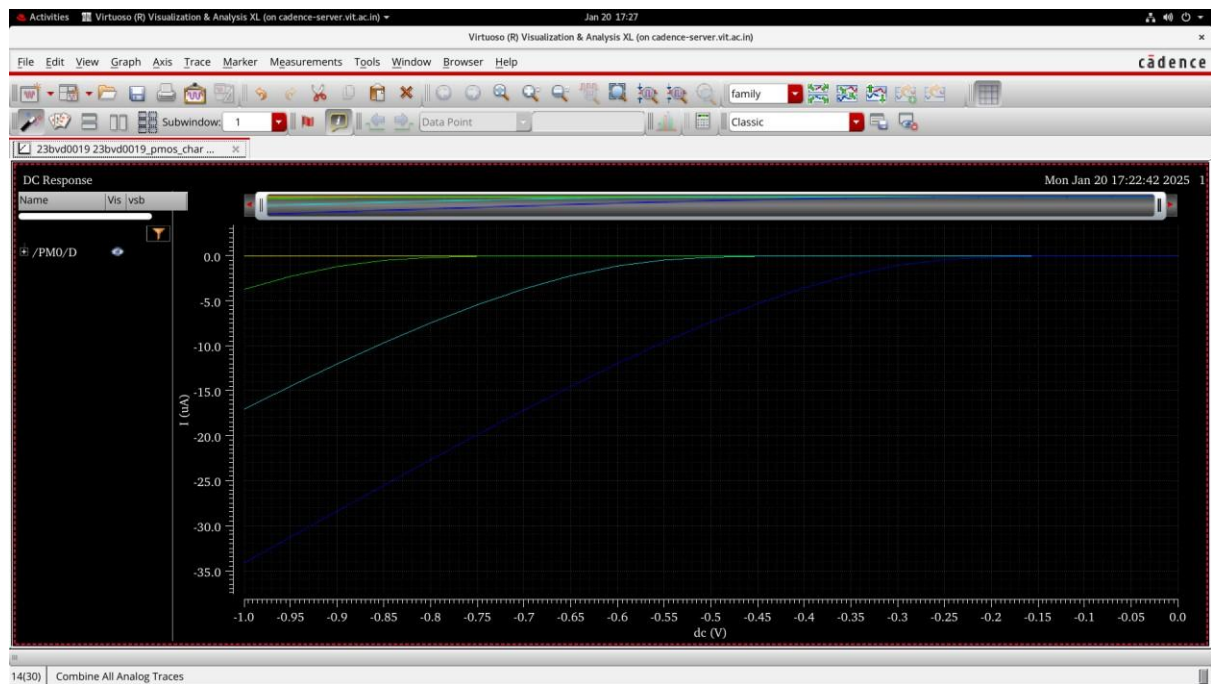
## 3)IDS VS VGS (for different VSB values)

## Waveform:



## Values of Vth

Results Display Window (on cadence-server.vit.ac.in)

Window   Expressions   Info   Help

cādence

| | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" | OP("/PM0" "??" |
|---|---|---|---|---|---|---|---|---|---|---|
| | vth | vgd | vdb | vgb | vbs | vds | vgs | isub | ids | trise |
| 839m | -231.841m | 990m | -1 | -10m | 0 | -1 | -10m | -66.7296a | -194.462p | NaN |
| 859m | -250.519m | 740m | -750m | -10m | 0 | -750m | -10m | -1.27483a | -82.0075p | NaN |
| 949m | -269.196m | 490m | -500m | -10m | 0 | -500m | -10m | -1.00415z | -34.2131p | NaN |
| 076m | -287.874m | 240m | -250m | -10m | 0 | -250m | -10m | -2.03496e- | -14.0275p | NaN |
| 226m | -306.552m | -10m | 0 | -10m | 0 | 0 | -10m | -0 | -0 | NaN |

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