D-MOSFET

MOSFET DC BIASING

prepared by:

Gyro A. Madrona
Electronics Engineer

TOPIC OUTLINE

D-MOSFET Construction

Regions of Operation

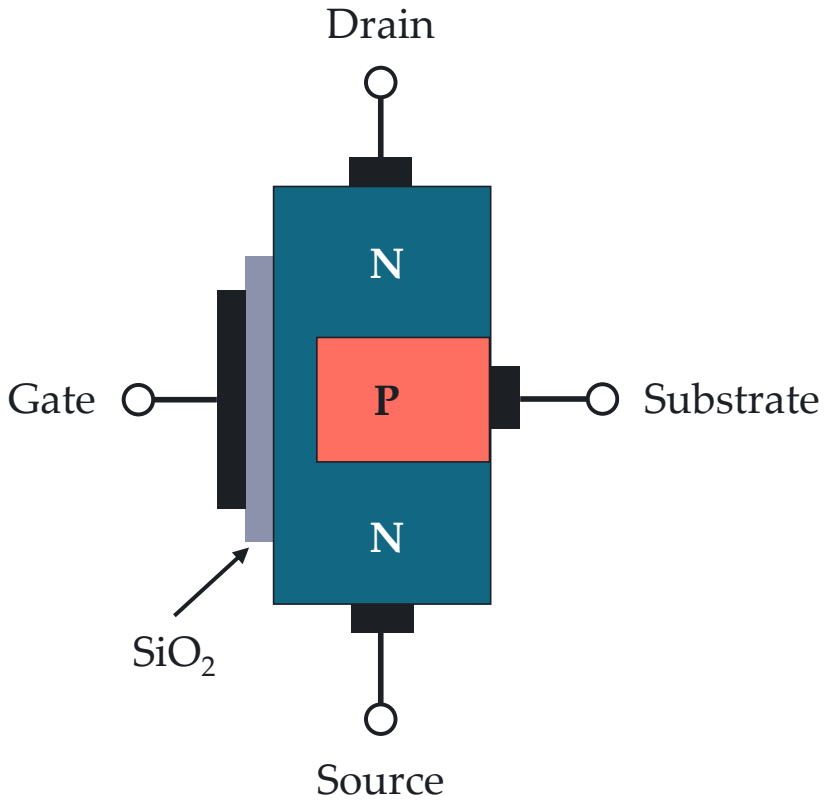
D-MOSFET DC Biasing

D-MOSFET CONSTRUCTION

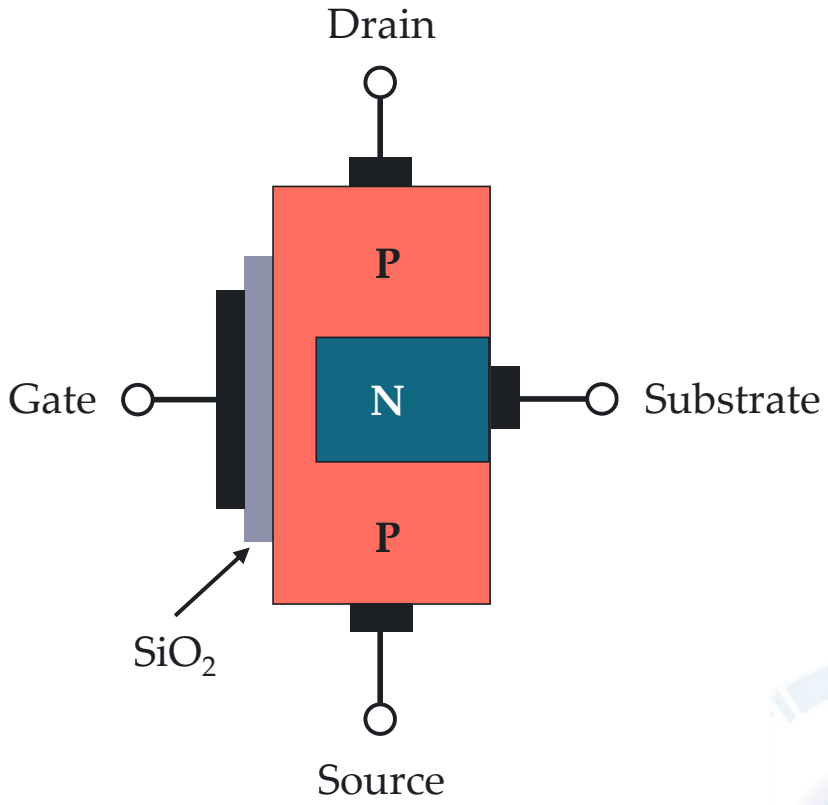
CONSTRUCTION

D-MOSFET

Depletion Mode Metal-Oxide Semiconductor Field-Effect Transistor



N-Channel

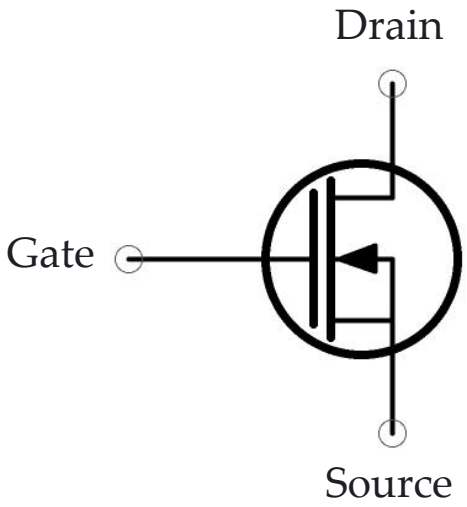


P-Channel

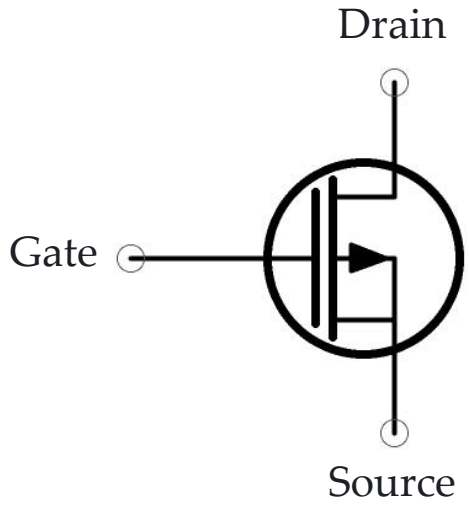
SCHEMATIC SYMBOL

D-MOSFET

Depletion Mode Metal-Oxide Semiconductor Field-Effect Transistor



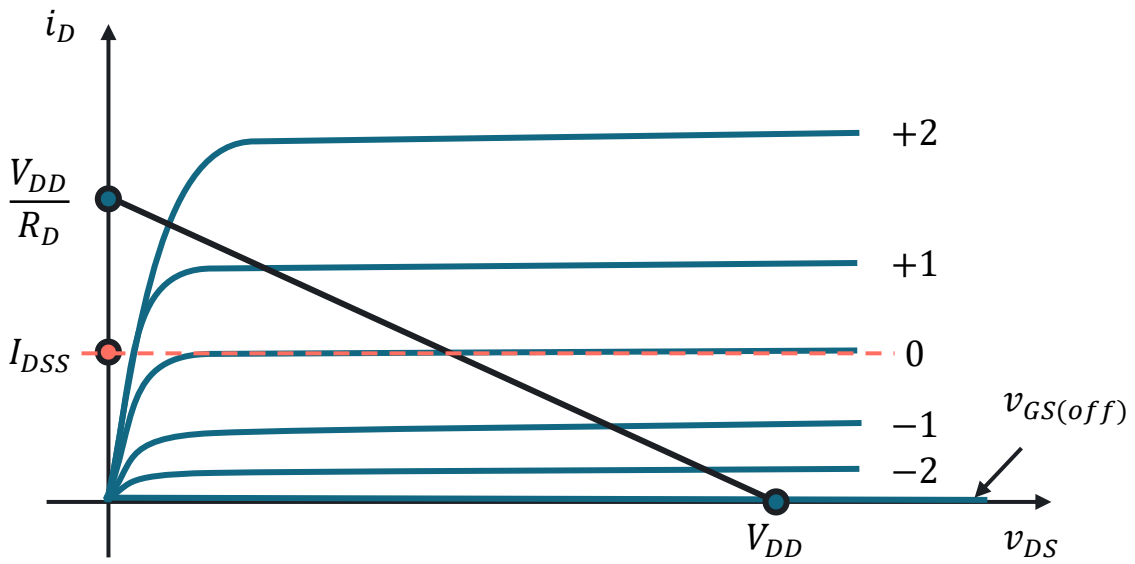
N-Channel



P-Channel

REGIONS OF OPERATION

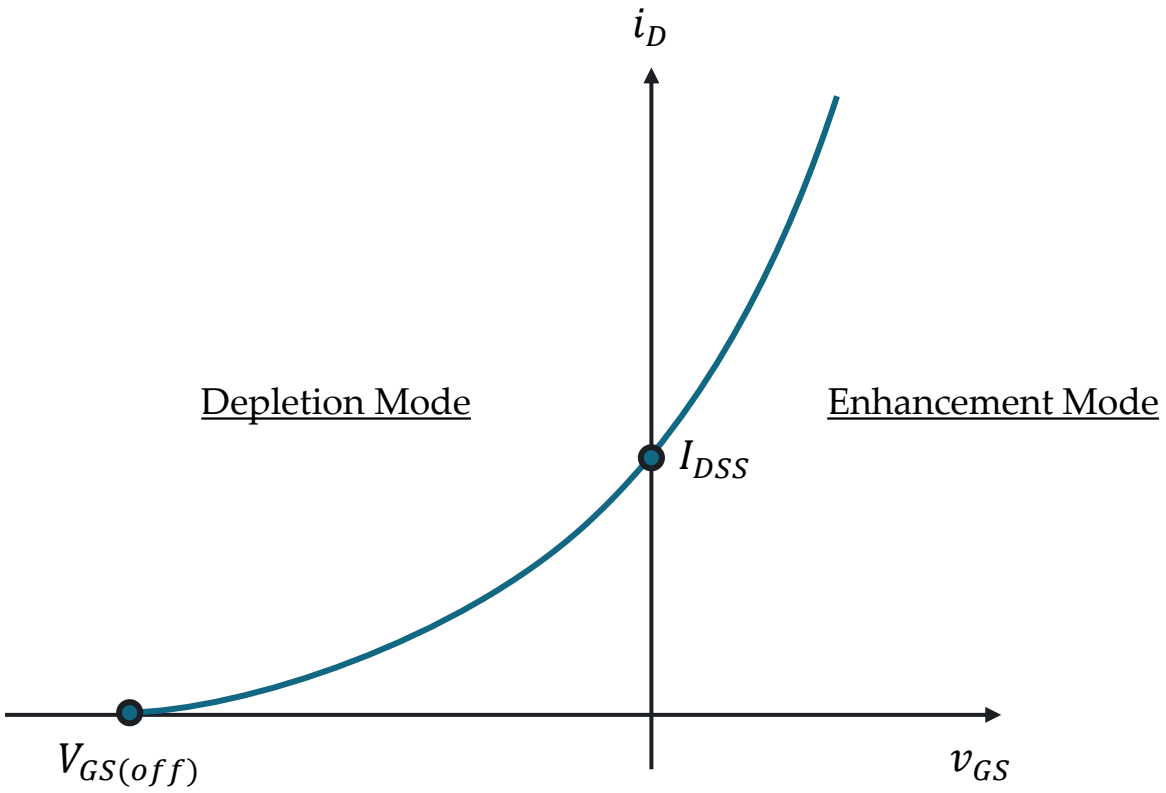
DRAIN CURVE



As with a JFET, when $v_{GS} = 0$ V, the drain current will equal I_{DSS}.

This demonstrates that the D-MOSFET is a **normally on** device

TRANSCONDUCTANCE CURVE



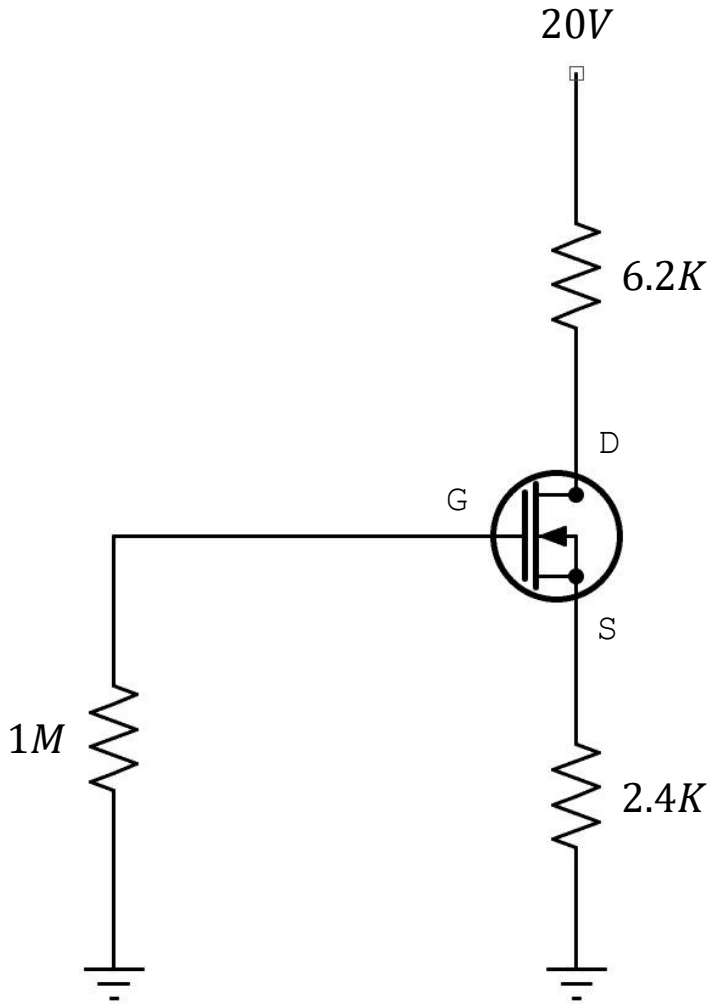
The primary difference between JFET and D-MOSFET is that D-MOSFETs permit operating points with **positive values** of v_{GS} and levels of i_D that **exceeds** i_{DSS}.

Shockley's Equation

$$i_D = I_{DSS}\left(1 - \frac{v_{GS}}{V_{GS(off)}}\right)^2$$

D-MOSFET DC BIASING

EXERCISE



$I_{DSS} = 8\ mA$

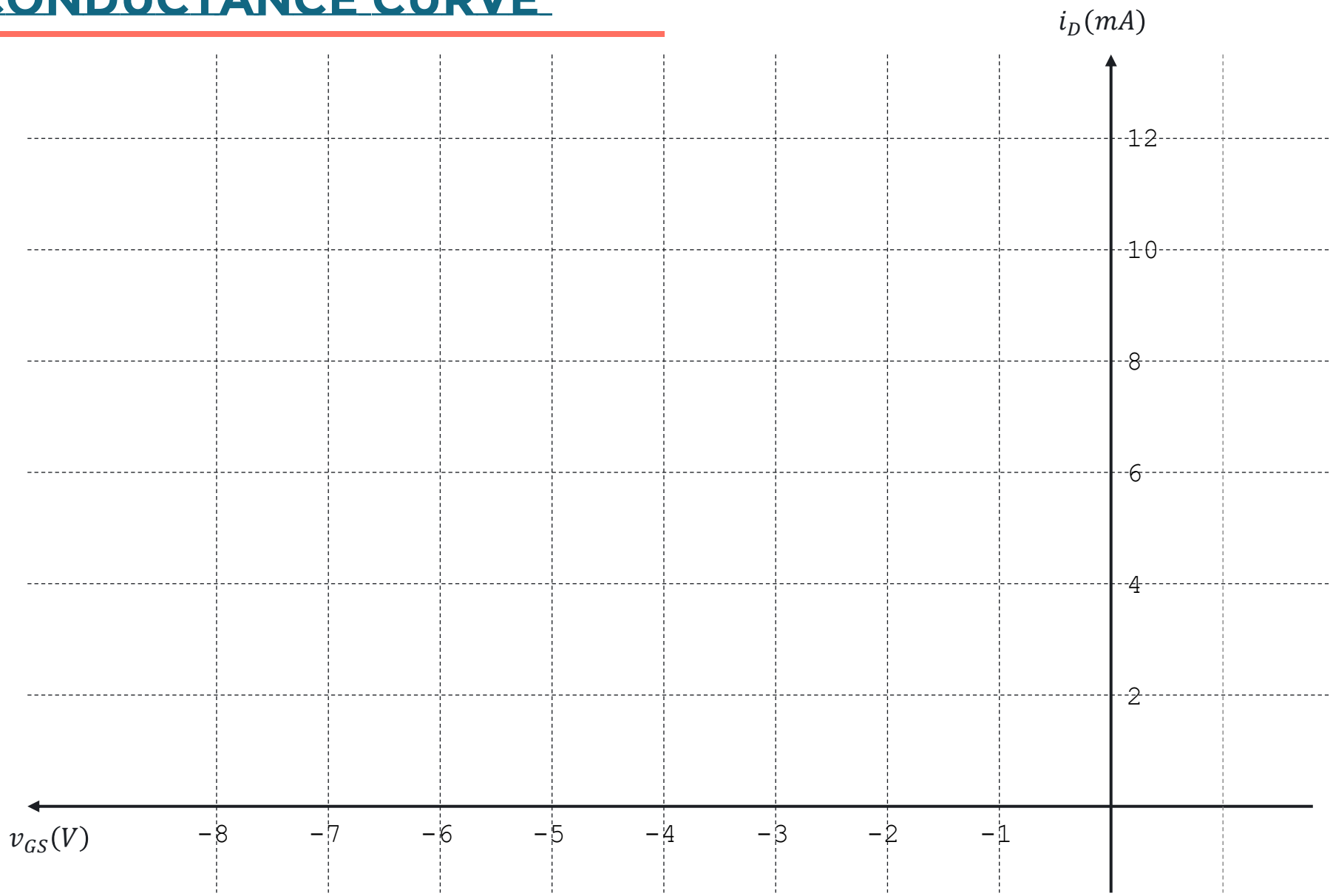
$V_P = -8\ V$

For the given network, determine the following:

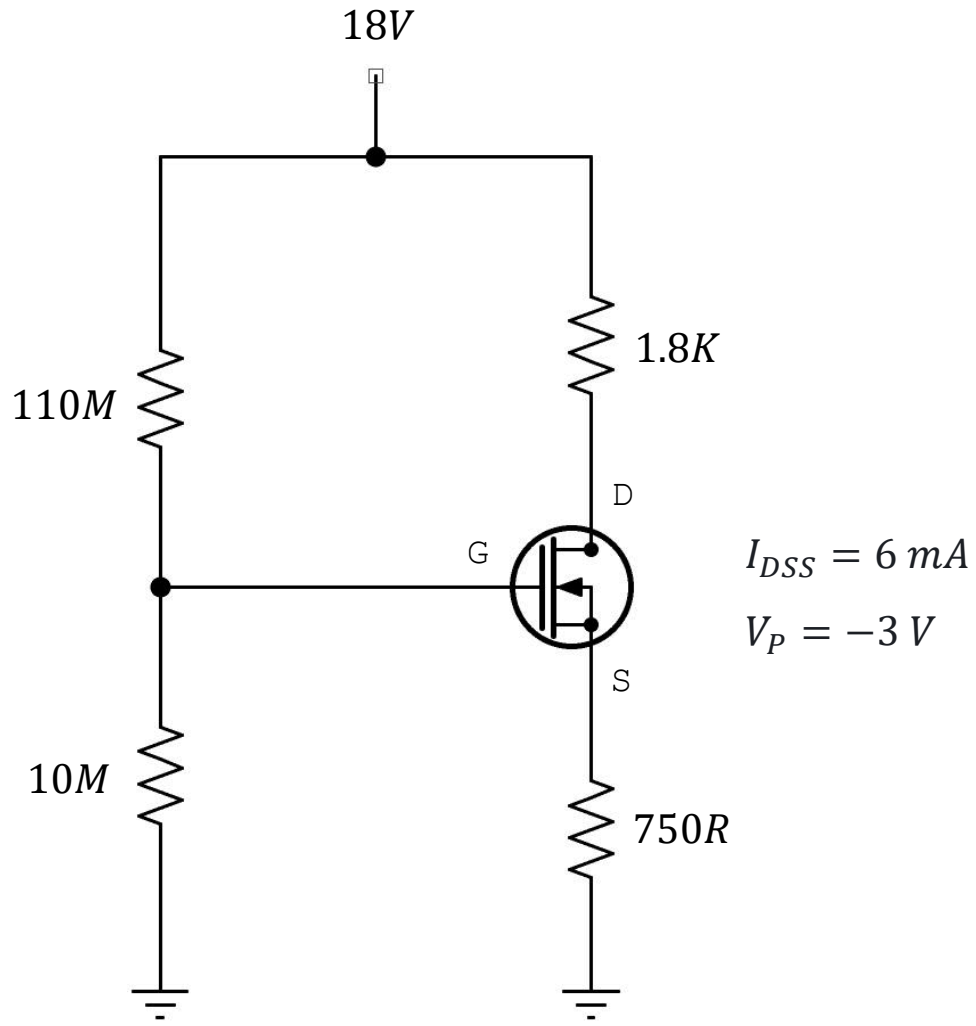
- Gate-source voltage (v_{GSQ})
- Drain current (i_{DQ})
- Drain voltage (v_D)

and sketch the transconductance curve.

TRANSCONDUCTANCE CURVE



EXERCISE

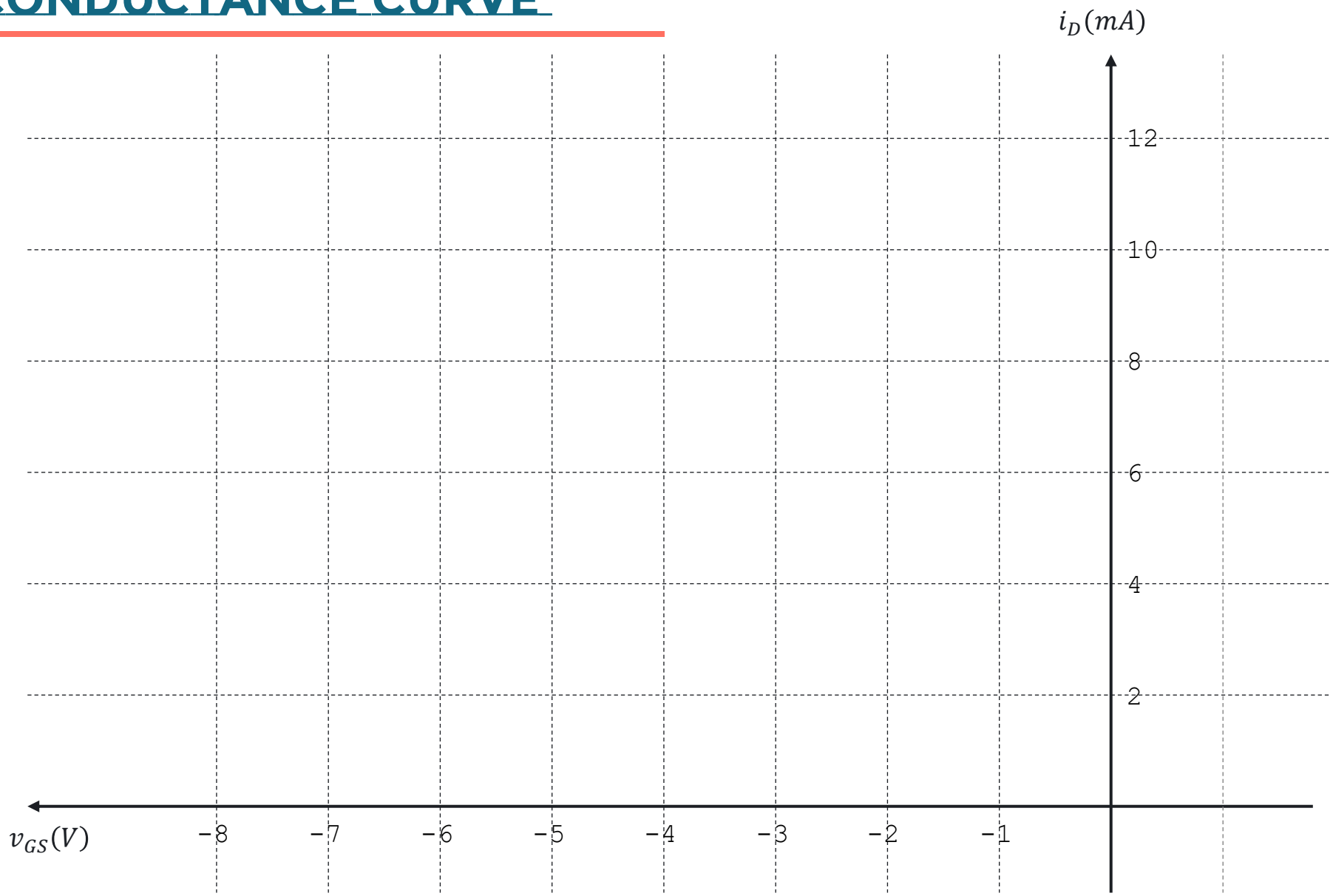


For the given network, determine the following:

- Gate-source voltage (v_{GSQ})
- Drain current (i_{DQ})
- Drain voltage (v_D)

and sketch the transconductance curve.

TRANSCONDUCTANCE CURVE



LABORATORY