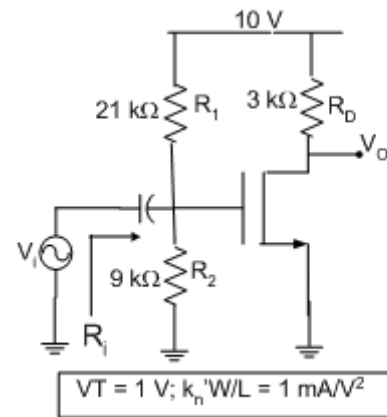


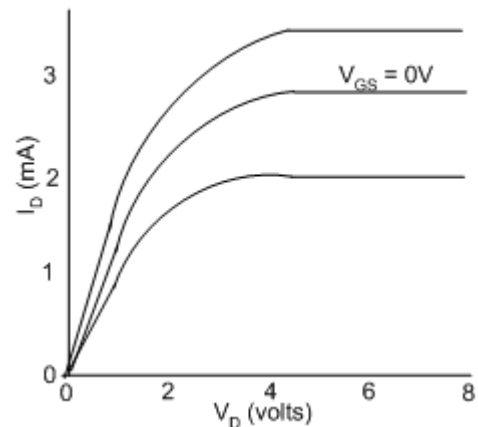
1. Determine the following for the MOSFET amplifier (Assume $\lambda = 0.05 \text{ V}^{-1}$):

- a) Drain current $I_D =$ _____
- b) Output Voltage $V_o =$ _____
- c) Trans-conductance $g_m =$ _____
- d) Voltage gain $A_v =$ _____
- e) Input resistance $R_i =$ _____
- f) Output Resistance $R_o =$ _____



2. Examine the following I-V Characteristics and determine the following and explain why? (i.e. explain the reason in each case):

- a) Is this an n-MOSFET or a p-MOSFET?
- b) Is this a depletion or enhancement type MOSFET?
- c) Which I-V curve corresponds to $V_{GS} = 2 \text{ V}$?
- d) Which I-V curve corresponds to $V_{GS} = -1 \text{ V}$?
- e) Is this a normally off or normally on MOSFET?
- f) Estimate a threshold voltage for this MOSFET ? Why?



3. Examine the IV characteristics of the MOSFET with $\frac{W}{L} = \frac{10}{2}$, and answer the following

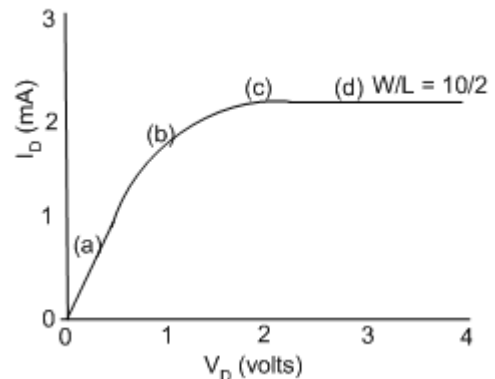
i) Sketch the shape of the channel at points (a), (b), (c), and d on the IV characteristics. Sketch each case separately.

ii) Copy the IV characteristics to your answer sheet and sketch on the IV curves for:

(a) $\frac{W}{L} = \frac{10}{1}$ and (b) $\frac{W}{L} = \frac{5}{2}$

ii) What is the trans-conductance and gain at $V_{GS} = 4\text{V}$, if

$V_T = 1 \text{ V}$, $k_n' \frac{W}{L} = 10 \mu\text{A}/\text{V}^2$ and $R_D = 5 \text{ k}\Omega$.



4: For the BJT amplifier shown to the right determine following:

- Voltages at E, B, and C
- small signal parameters
- Voltage gain A_V
- Current gain A_i
- Input resistance R_i
- Output Resistance R_o

