ASSIGNMENT-4

Full Marks: 50

Q1. [CO1] 10

a) **Show** the IV characteristics graph of both MOSFET and BJT. Identify the different operating regions in the graphs.

b) **Draw** the VTC of a NOR gate using MOSFET S model.

Q2. [CO3] 10

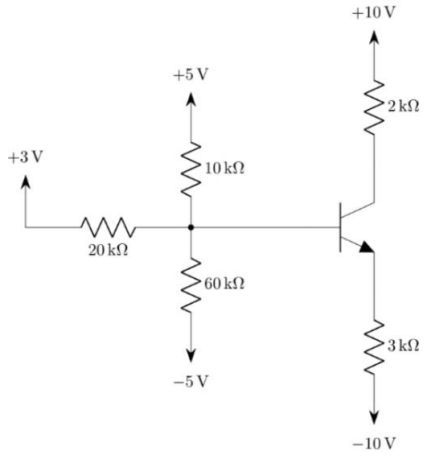
Design a circuit using both MOSFETs and BJTs to implement the following expressions.

a) f =$(\overline{\bar{A}+B}).C$

b) f = $\overline{(A+B)}+A+CD$

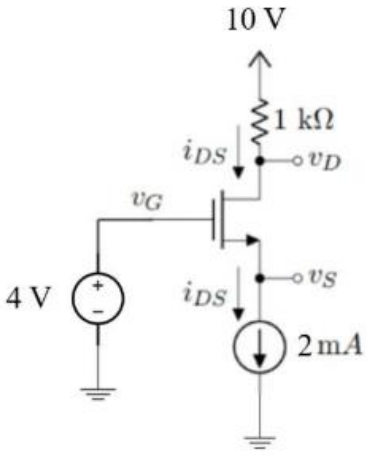
Q3. [CO2] 10

For the transistor $\beta = 100$,
$V_{BE,\ Active}$ = 0.7V, $V_{BE,\ Sat}$ = 0.8V and
$V_{CE,\ Sat}$ = 0.2V. Determine the operating region of the transistor.



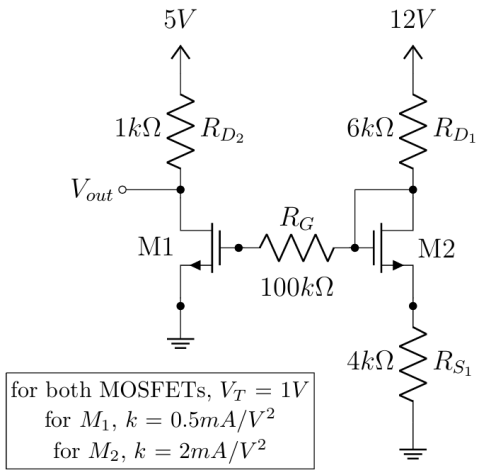
Q4. [CO2] 10

Analyze the circuit to find V_D , use method of assume state. You must validate your assumptions. For the MOSFTET, V_T = 1v and k = 4mA/v^2.



Q5. [CO2] 10

Calculate the value of V_{OUT}, I_{RD1} and I_{RD2} using the method of assumed state. You must validate your assumptions.



for both MOSFETs, $V_T = 1V$
for M_1, $k = 0.5mA/V^2$
for M_2, $k = 2mA/V^2$