Session

Koneru Lakshmaih Education Foundation

(DEEMED TO BE UNIVERSITY)

Department of ECE

AY 2024-2025 :: EVEN SEM

VLSI DESIGN
23EC2211A

TOPIC

CO-3-4-5

Faculty

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CO-3

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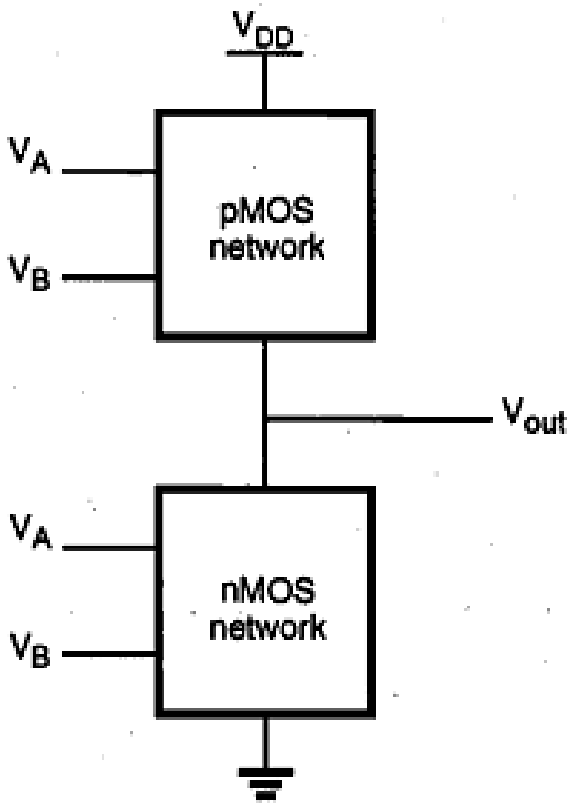
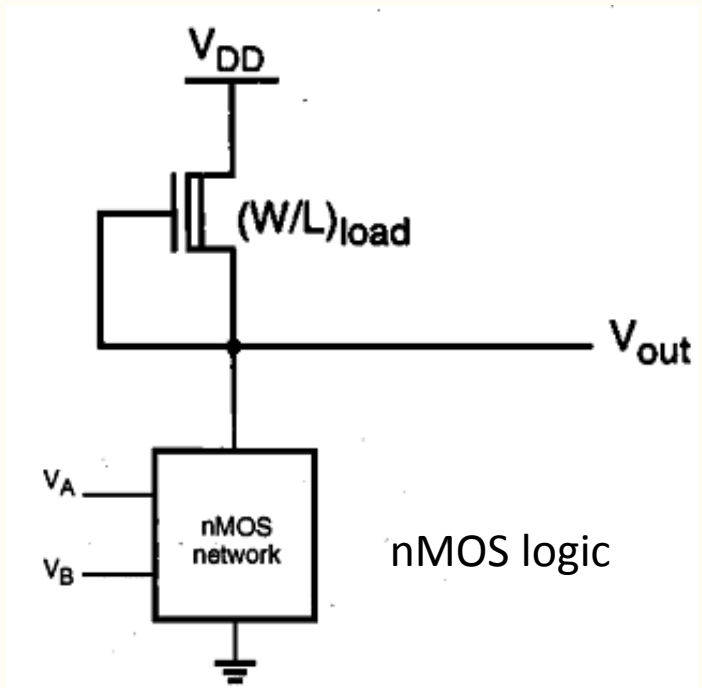
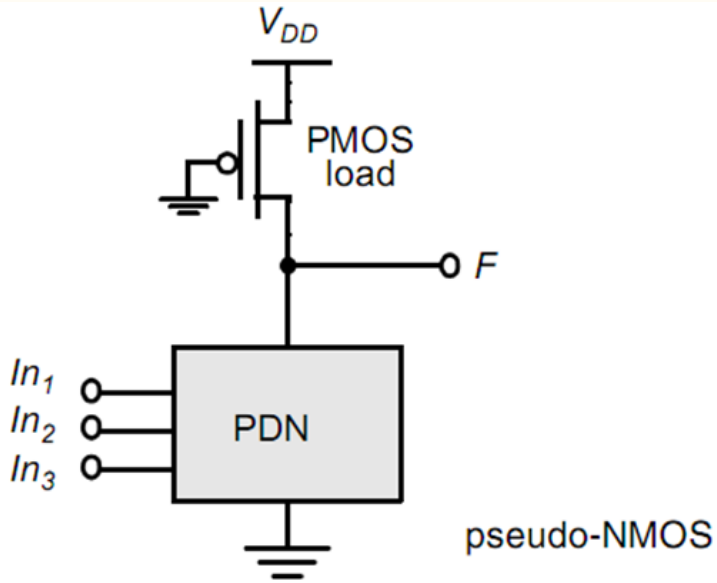
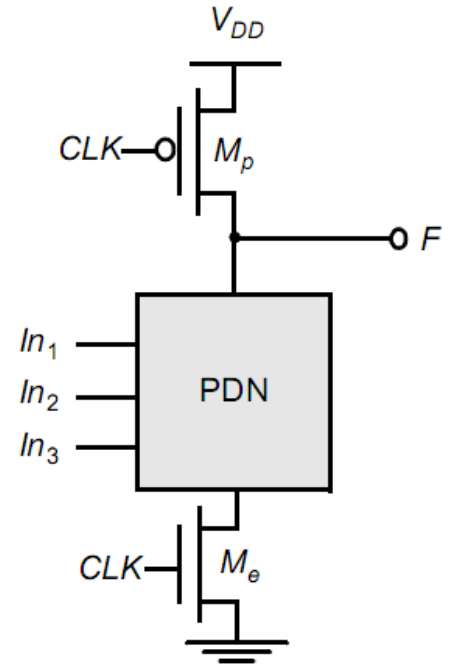




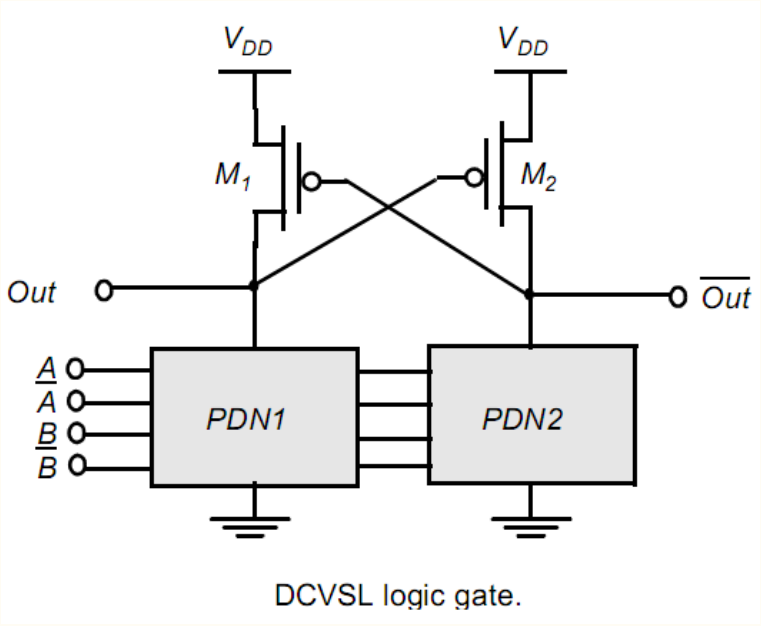
nMOS logic



pseudo-NMOS



Dynamic CMOS logic



DCVSL logic gate.

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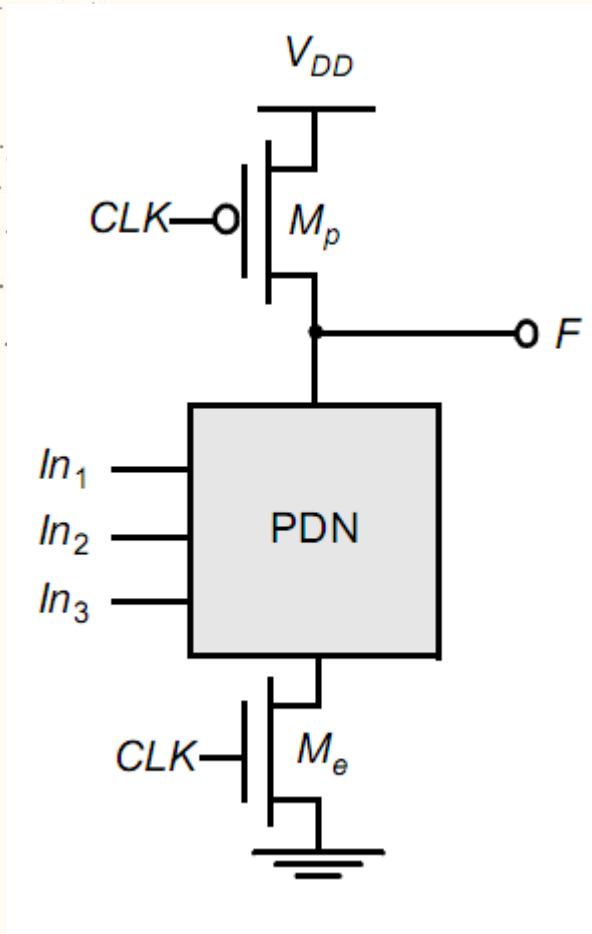
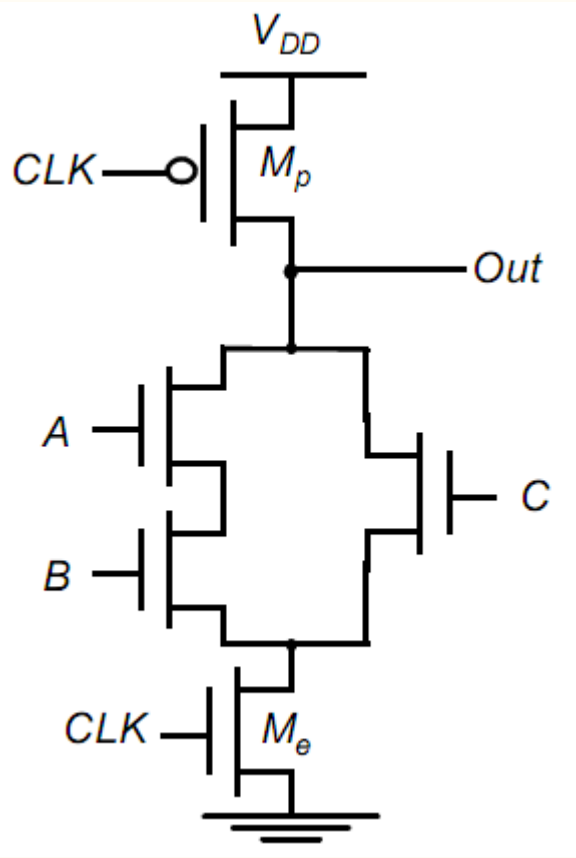
Differential Cascade Voltage Switch Logic (or DCVSL)

Draw and explain Dynamic CMOS Logic using $Y = (\overline{AB + C})$.





this circuit is divided into two major phases: precharge and evaluation, with the mode of operation determined by the clock signal CLK.

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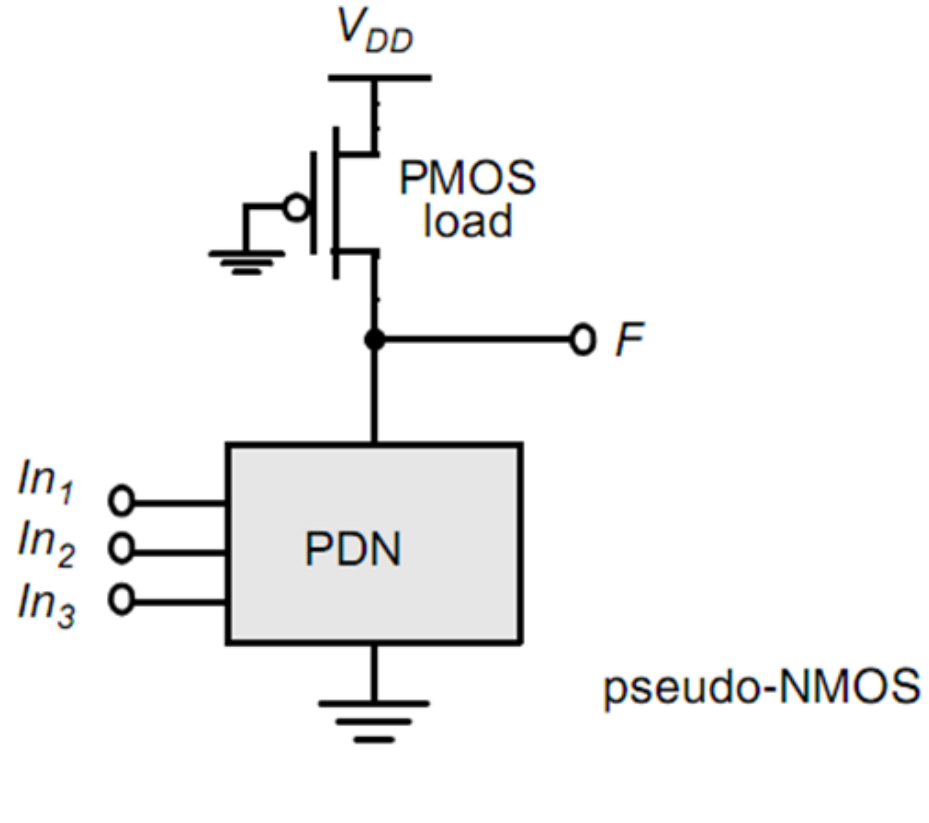
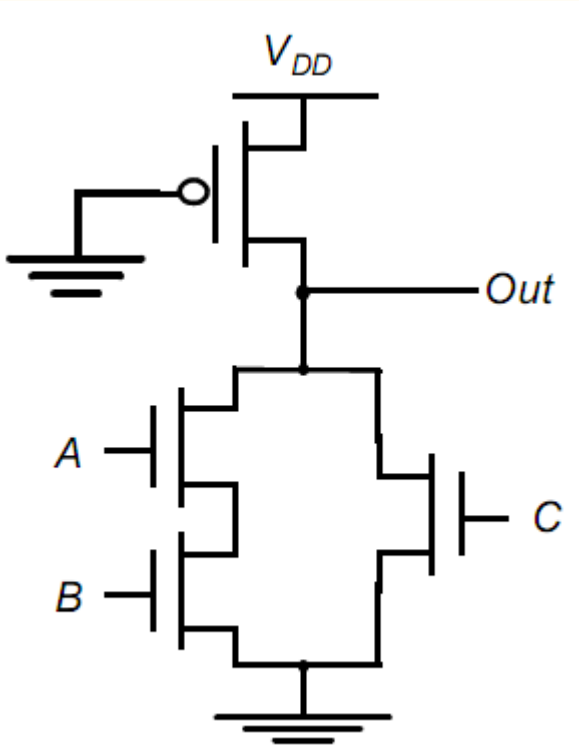
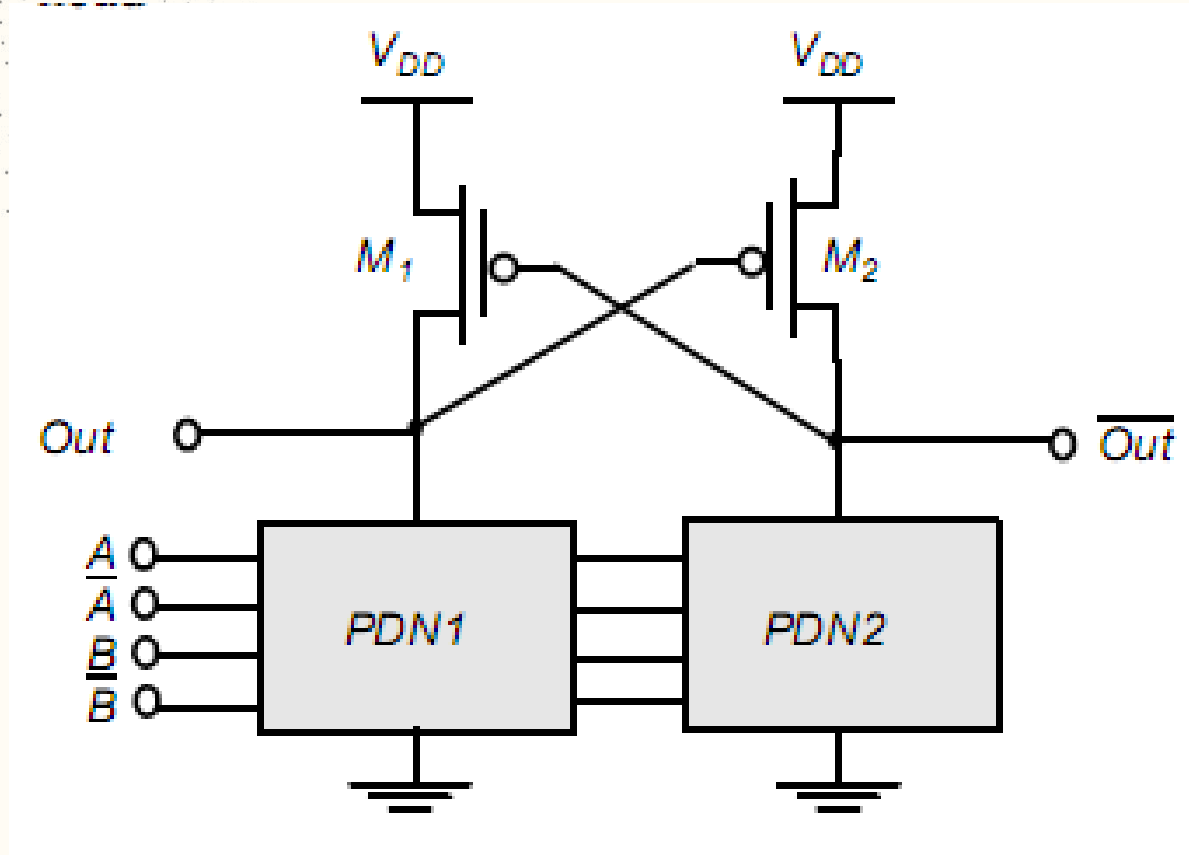
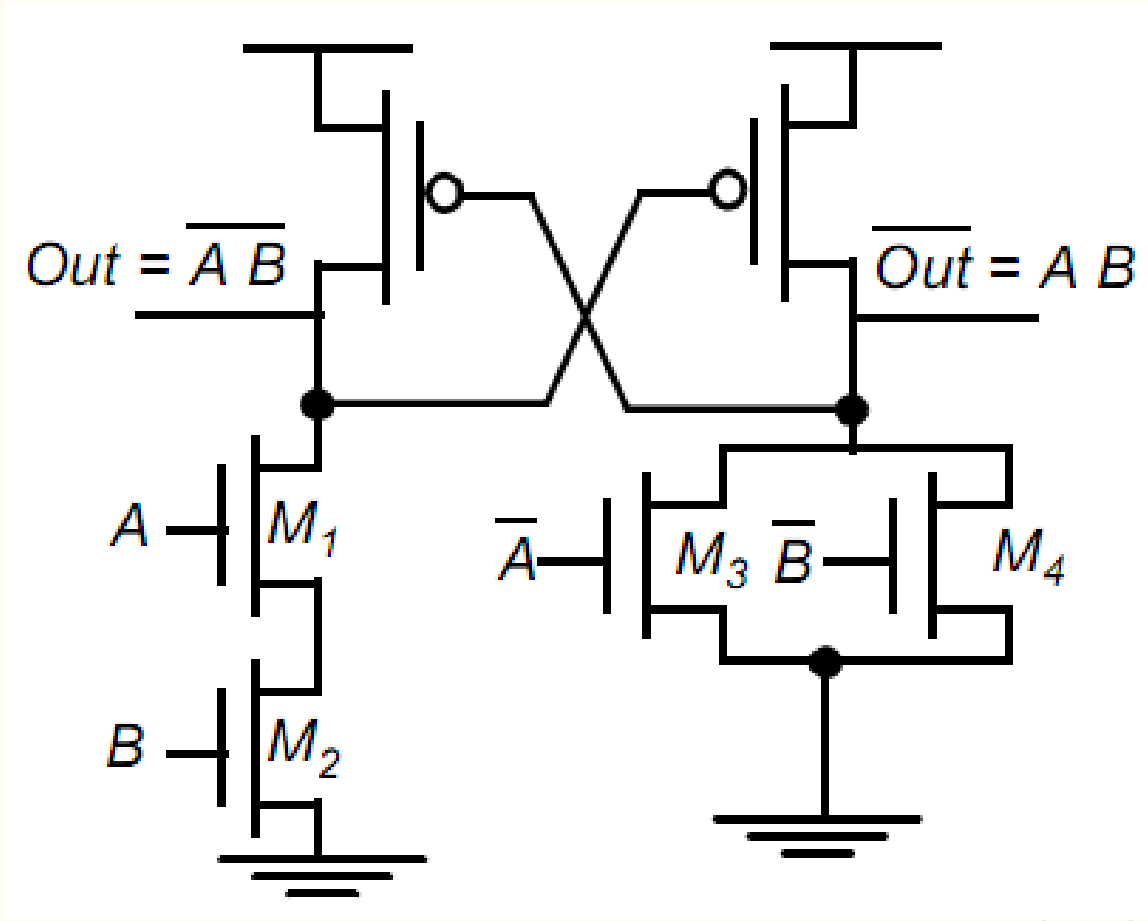
Draw and explain pseudo-NMOS logic using $Y = (\overline{AB + C})$.





Draw and explain Differential Cascode Voltage Switch logic (DCVSL) using NAND and AND.

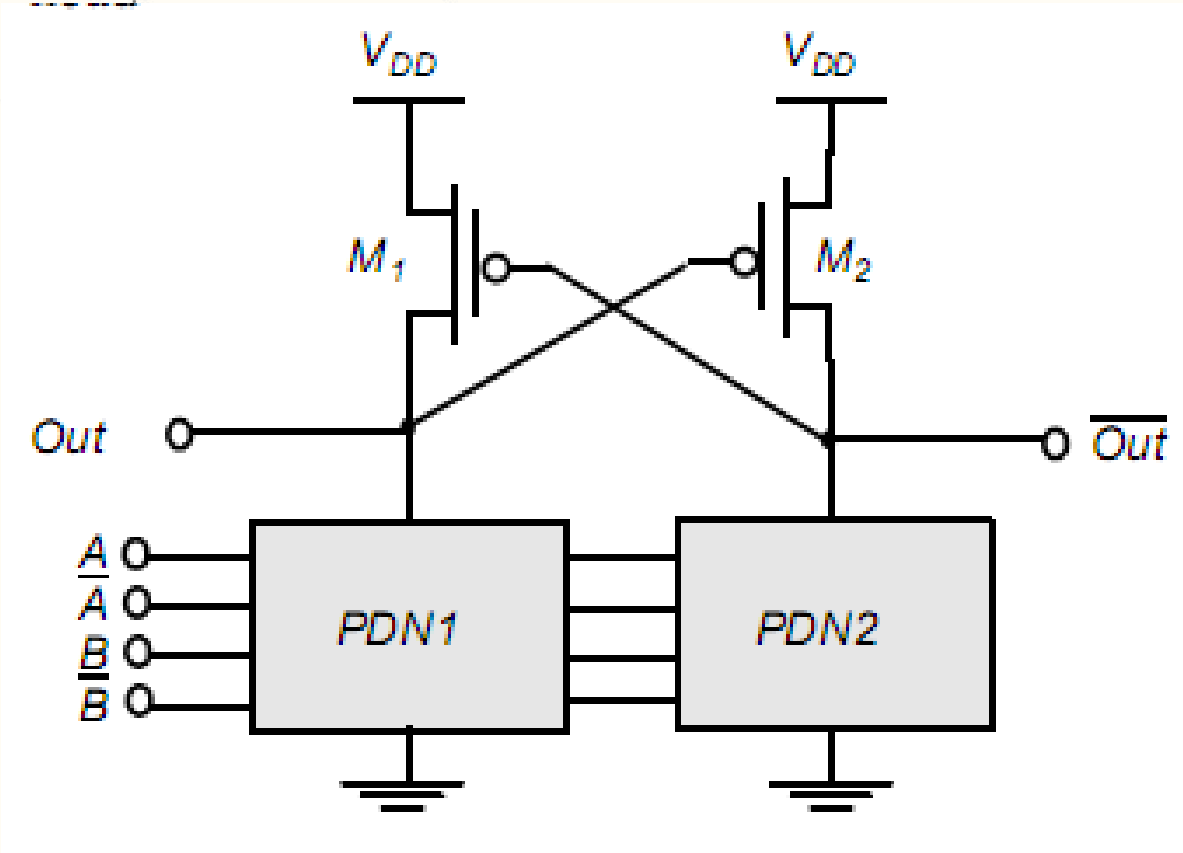


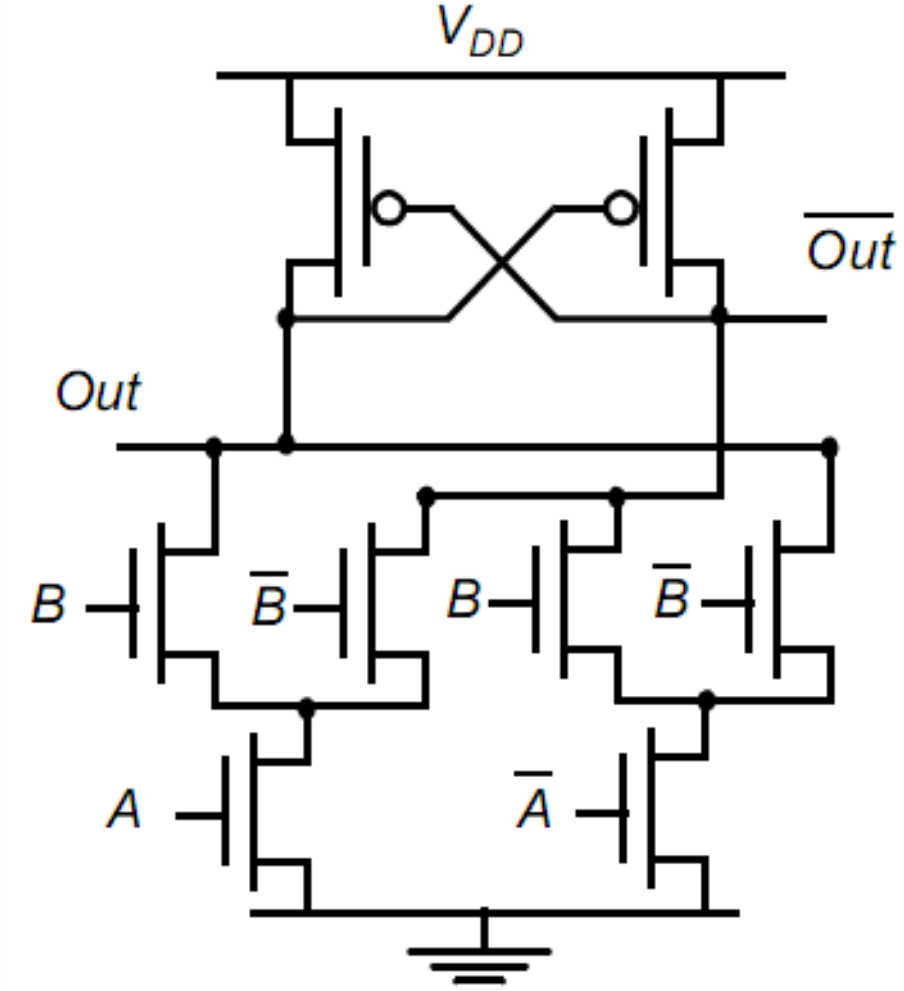


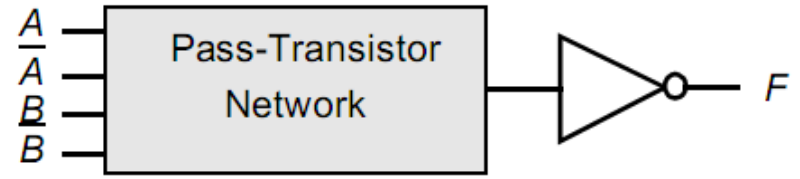
Draw and explain Differential Cascode Voltage Switch logic (DCVSL) using XOR-XNOR.

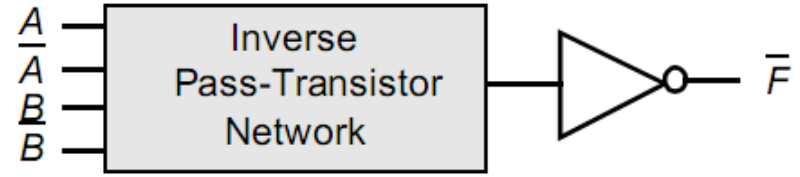
$\bar{A}B + A\bar{B}$ XOR

$\bar{A}\bar{B} + AB$ XNOR

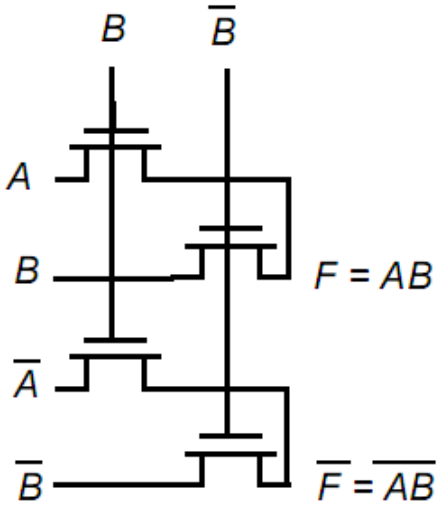




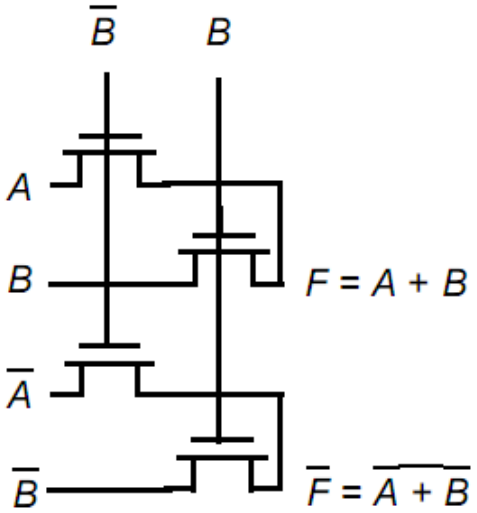




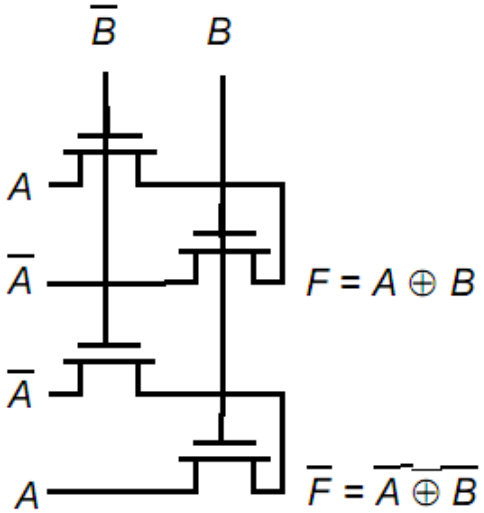
(a) Basic concept



AND/NAND



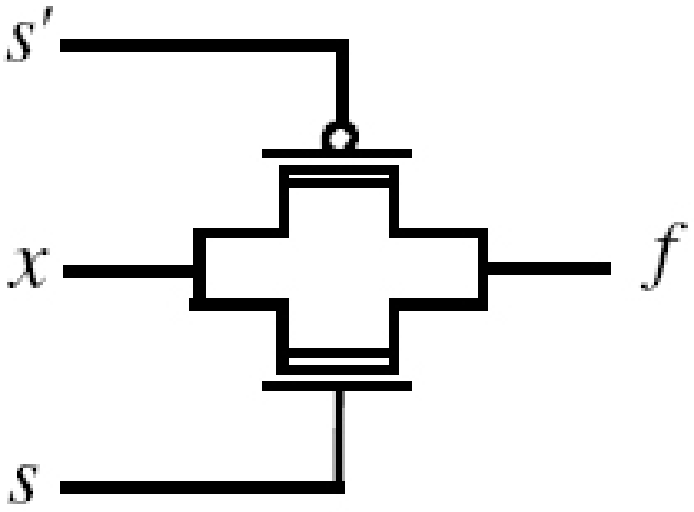
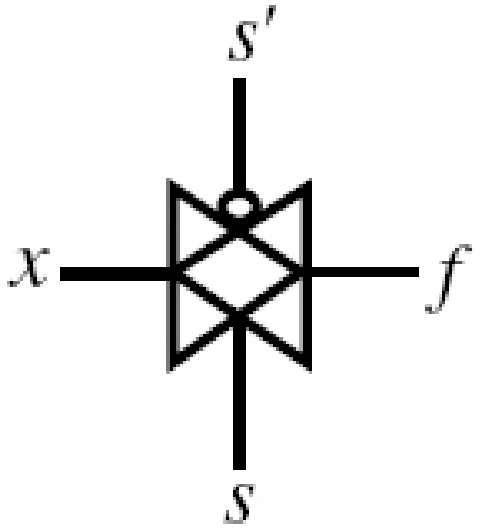
OR/NOR



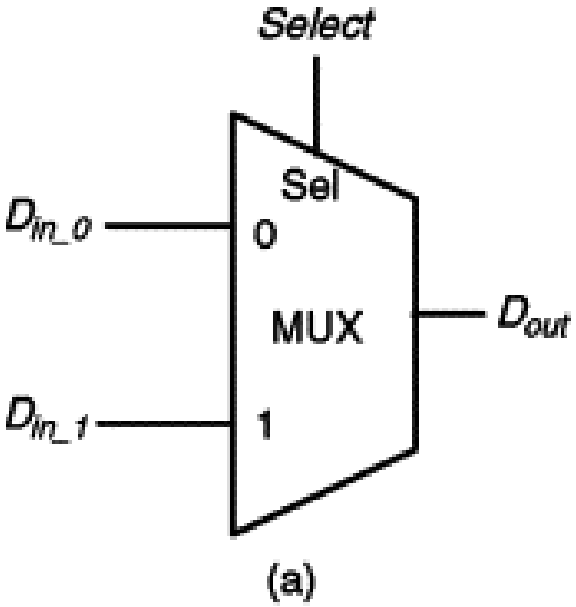
XOR/NXOR

(b) Example pass-transistor networks

Figure 6.37 Complementary pass-transistor logic (CPL).

Transmission Logic Circuit	*Graphical Symbol*
	

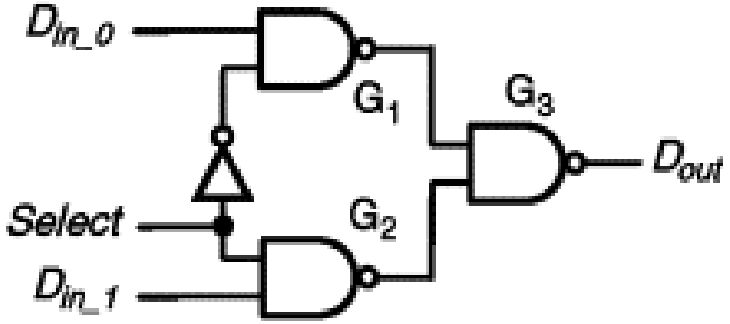
CMOS transmission gate (TG)



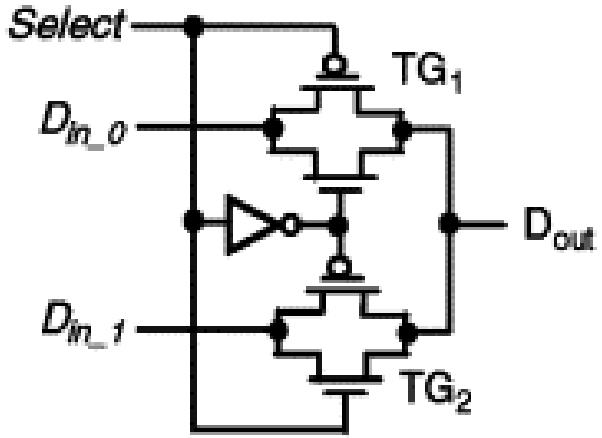
(a)

Select	D_{out}
0	D_{in_0}
1	D_{in_1}

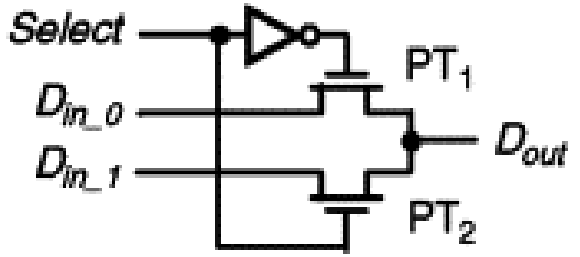
(b)



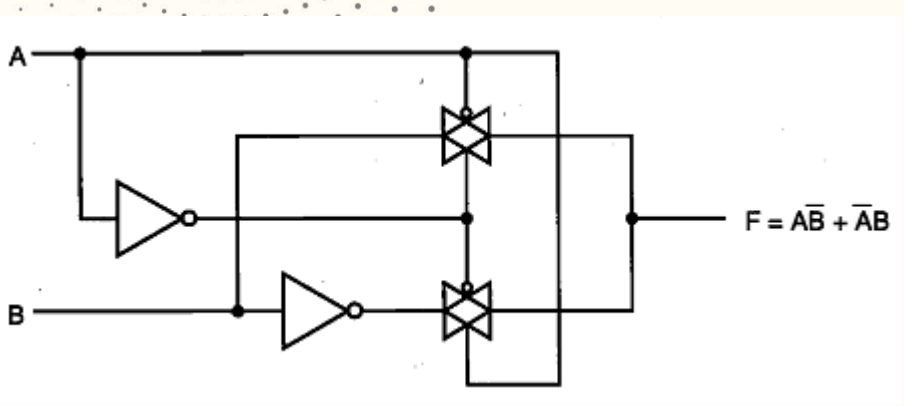
(c)

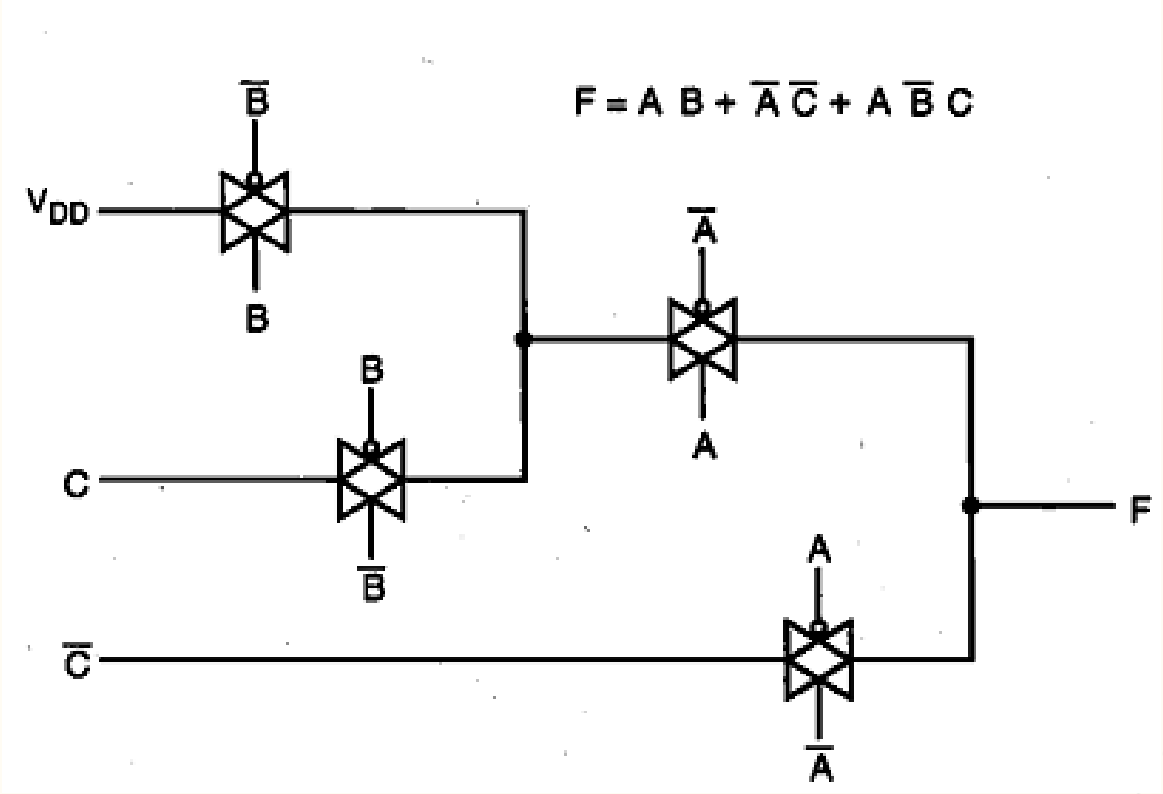


(d)



(e)


A
B
F = AB̄ + ĀB


F = A B + Ā C̄ + A B̄ C
V_DD
B̄
B
Ā
A
B
B̄
C
C̄
A
Ā
F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Construct CMOS complex logic circuit for given Boolean function $Y = \overline{(D + E + A)\,(B + C)}$ and find an equivalent CMOS inverter circuit for simultaneous switching of all inputs, assuming that (W/L)p = 15 for all pMOS transistors and (W/L)n = 10 for all nMOS transistors.

$$\left(\frac{W}{L}\right)_{p,eq} = \frac{1}{\frac{1}{\left(\frac{W}{L}\right)_D} + \frac{1}{\left(\frac{W}{L}\right)_E} + \frac{1}{\left(\frac{W}{L}\right)_A}} + \frac{1}{\frac{1}{\left(\frac{W}{L}\right)_B} + \frac{1}{\left(\frac{W}{L}\right)_C}}$$

$$= \frac{1}{\frac{1}{15} + \frac{1}{15} + \frac{1}{15}} + \frac{1}{\frac{1}{15} + \frac{1}{15}} = 12.5$$

$$\left(\frac{W}{L}\right)_{n,eq} = \frac{1}{\frac{1}{\left(\frac{W}{L}\right)_D} + \left(\frac{W}{L}\right)_E + \left(\frac{W}{L}\right)_A} + \frac{1}{\left(\frac{W}{L}\right)_B + \left(\frac{W}{L}\right)_C}$$

$$= \frac{1}{\frac{1}{30} + \frac{1}{20}} = 12$$