



<b>Reg.No</b>	19BEC0358		
<b>Student Name</b>	ARPIT PATAWAT		
<b>Course Code</b>	ECE3002	<b>Slot &amp; Semester</b>	L43+L44 WINTER -- 2021-22
<b>Course Name</b>	VLSI system design		
<b>Program Title</b>	Lab Assignment 4		
<b>Faculty</b>	Dr. Ragunath G		

**School of Electronics Engineering ,VIT, Vellore**

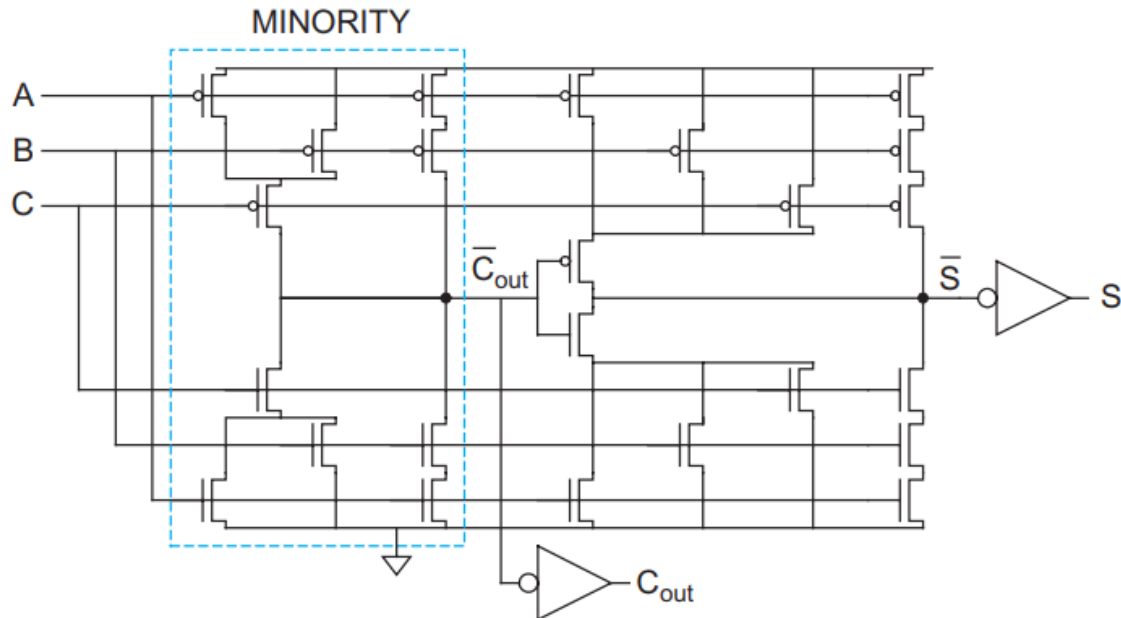
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1. Design a Full adder in Static CMOS logic with proper sizing of transistors.
2. Verify with inputs and outputs.
3. Create a symbol for the full adder.
4. Design a Four-bit ripple carry adder using symbol of the full adders
5. Verify with inputs and outputs

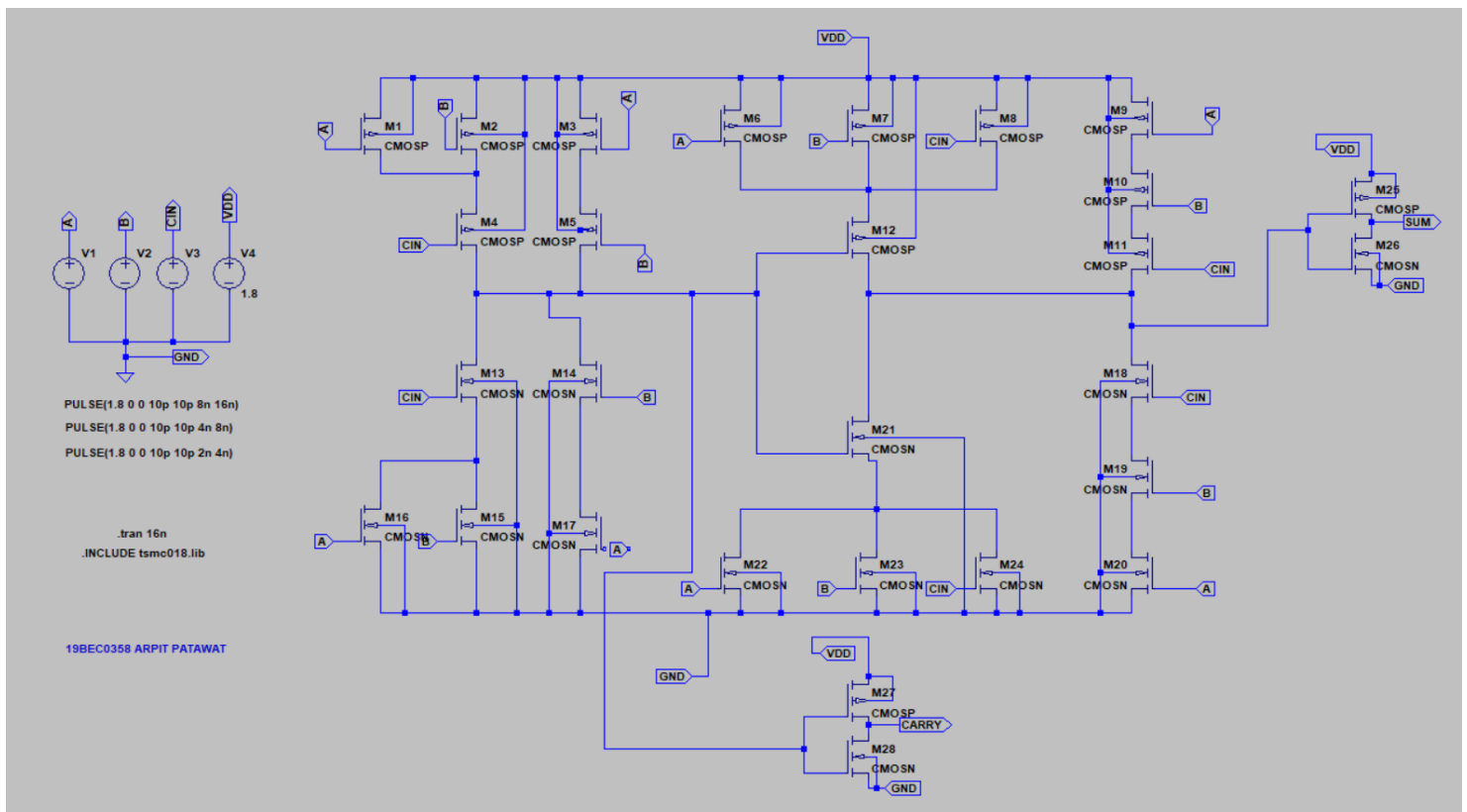
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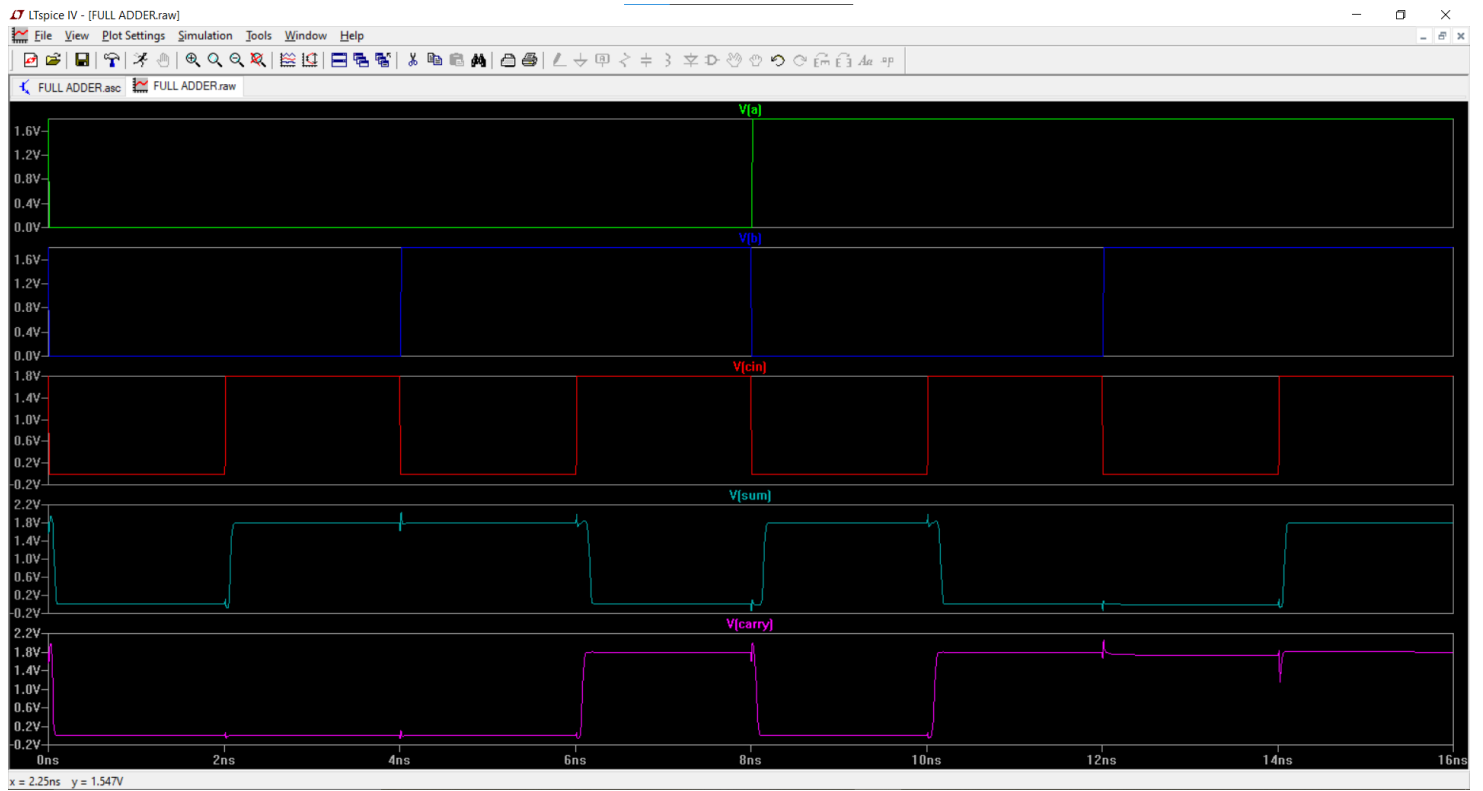
Aim → to design a full adder with proper sizing of transistors

Circuit Diagram →



Note: - Circuit referred from book CMOS VLSI DESIGN page – 432

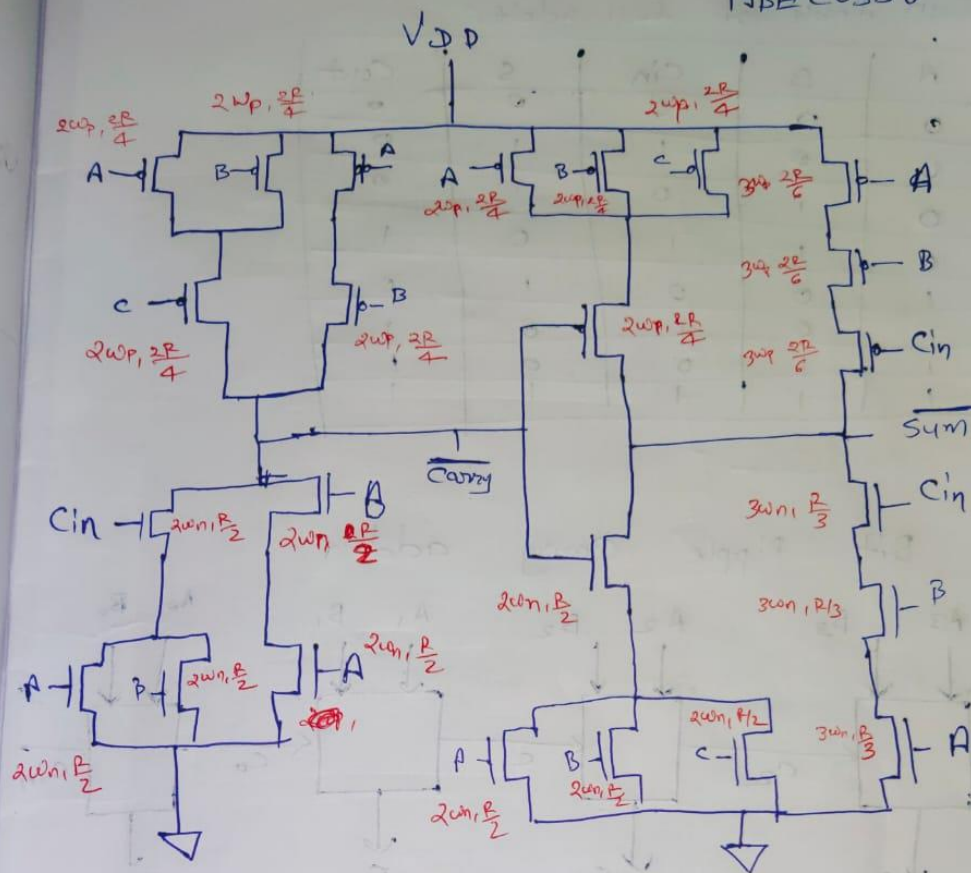




TRUTH TABLE →

INPUTS			OUTPUTS	
A	B	CIN	SUM	CARRY
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

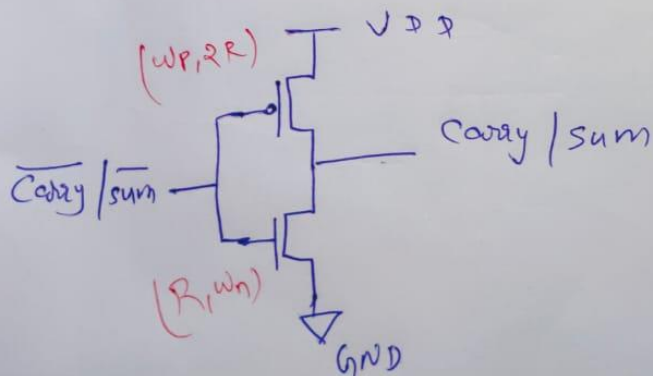
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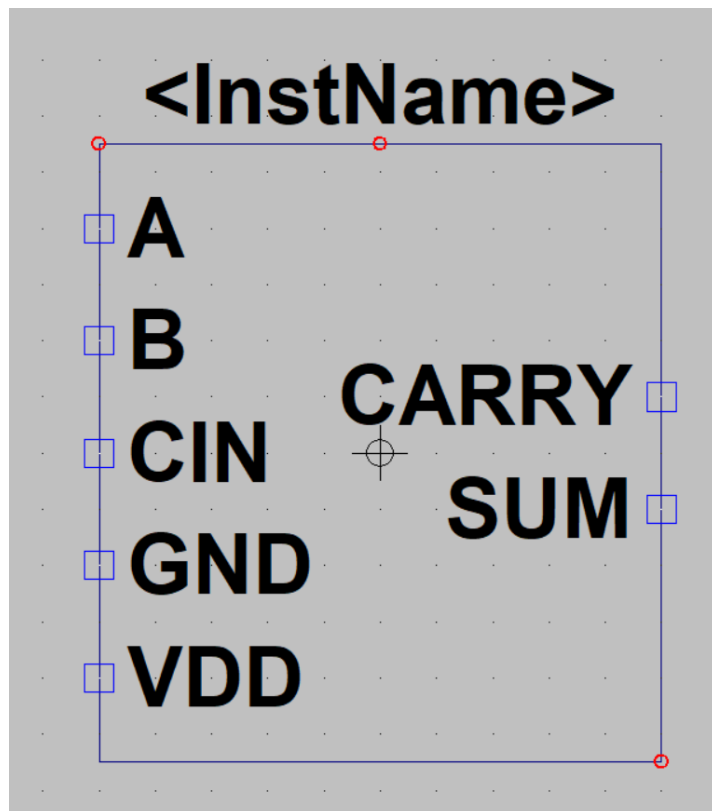
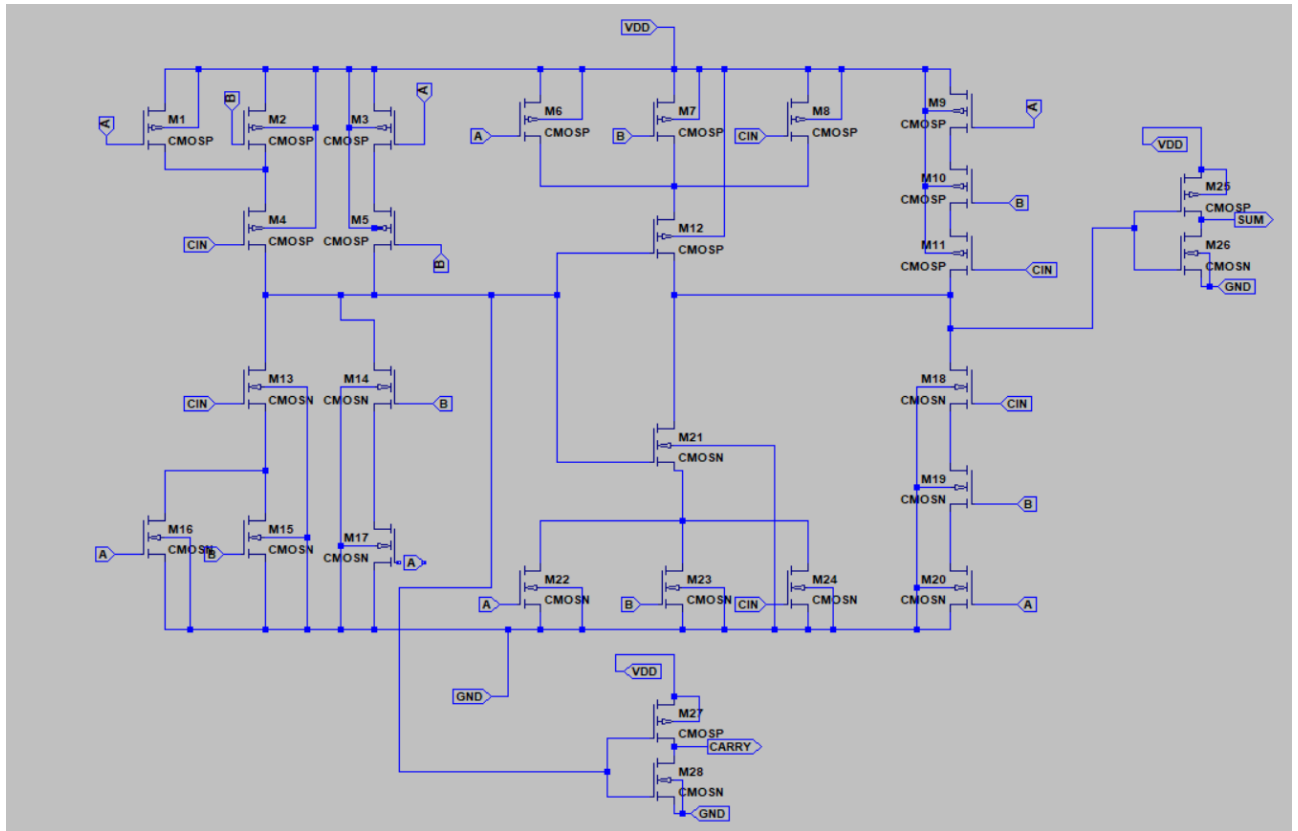
$$C_{out} = C_{in}(A+B) + AB$$

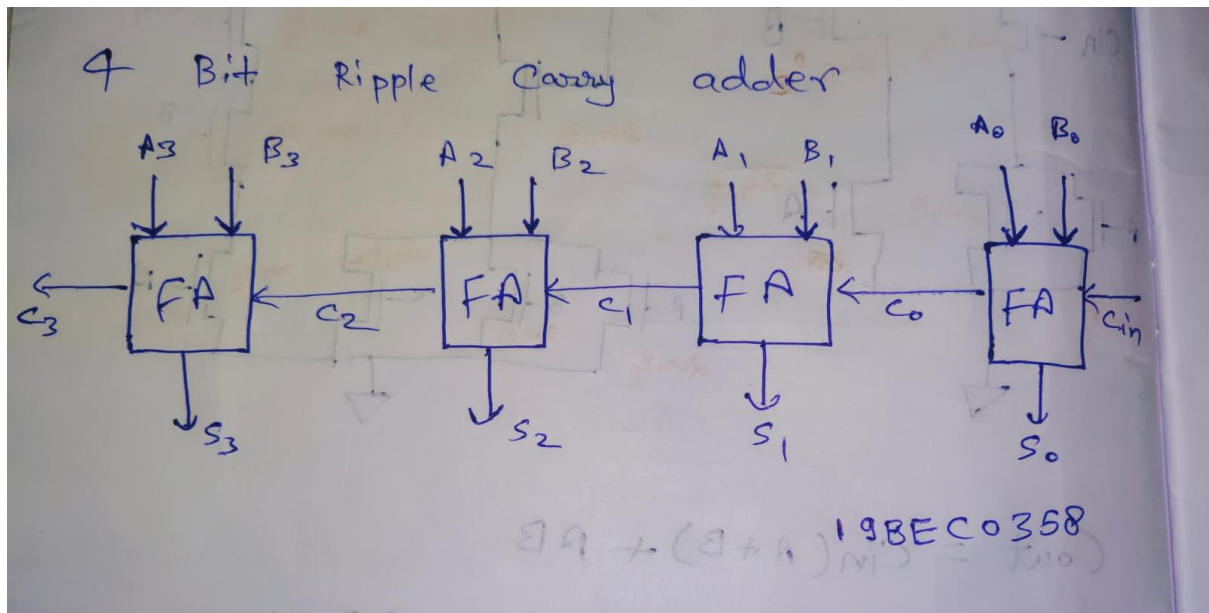
$$Sum = \overline{C_{out}}(A+B+C_{in}) + AB C_{in}$$

for PMOS, width = 800nm, length = 180nm,  $2R$   
 for NMOS, width = 400nm, length = 180nm,  $R$

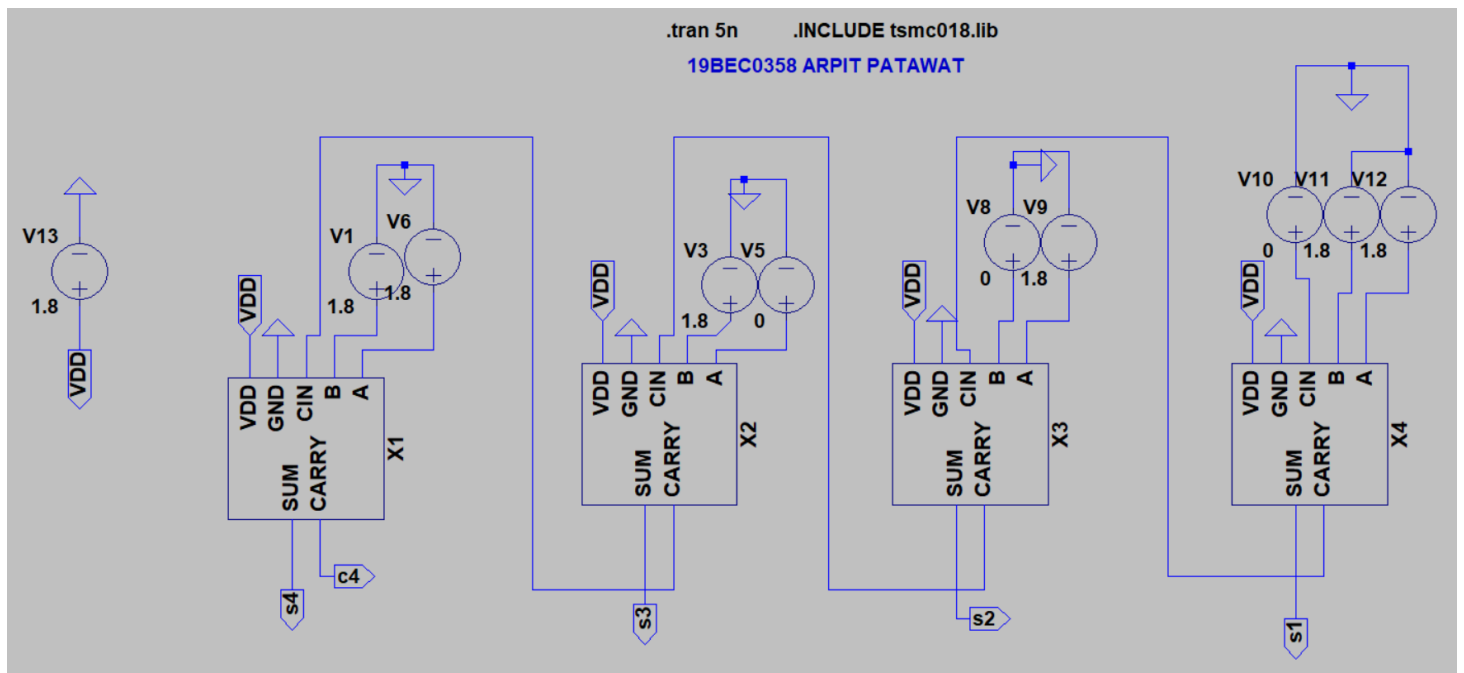


**Symbol Creation** → while creating full adder, before adding all the voltage sources, I copied the circuit for symbol creation into a new file.





$$\begin{array}{r}
 1101 + 1011 \Rightarrow \\
 \begin{array}{cccc}
 & 1 & 1 & 1 \\
 & 1 & 1 & 0 & 1 & (A3 \ A2 \ A1 \ A0) \\
 + & 1 & 0 & 1 & 1 & (B3 \ B2 \ B1 \ B0) \\
 \hline
 1 & 1 & 0 & 0 & 0 & (CARRY \ S3 \ S2 \ S1 \ S0)
 \end{array}
 \end{array}$$





**Result** → Here, in this task we designed a full adder in static CMOS design with proper sizing of transistors and created symbol for the same and verified it with inputs and outputs. Also, we designed a four-bit ripple carry adder using symbol using the full adders and verified with inputs and outputs. At page 6 I took an example of addition of 2 numbers and the same output can be seen at the graph here.

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