```
***look_ahead***
.lib "/home/LEE/t109360142/Desktop/icfb/CDL_OUT/cic018.l" TT
.SUBCKT nand A B vout vdd gnd
Mp1 vout A vdd vdd P_18 L=180.00n W=1.88u
Mp2 vout B vdd vdd P_18 L=180.00n W=1.88u
Mn1 vout A w1  gnd N_18 L=180.00n W=500.0n
Mn2 w1 B gnd gnd N_18 L=180.00n W=500.0n
.ENDS

.SUBCKT nor A B vout vdd gnd
Mp1 w1 A vdd vdd P_18 L=180.00n W=1.88u
Mp2 vout B w1 vdd P_18 L=180.00n W=1.88u
Mn1 vout A gnd  gnd N_18 L=180.00n W=500.0n
Mn2 vout B gnd gnd N_18 L=180.00n W=500.0n
.ENDS

.SUBCKT inv vin vout vdd gnd
mp1 vout vin vdd vdd P_18 L=180.00n W=1.88u m=1
mn1 vout vin gnd gnd N_18 L=180.00n W=500.0n m=1
.ENDS

.SUBCKT or A B Y vdd gnd
xnor A B vout vdd gnd nor
xinv vout Y vdd gnd inv
.ENDS

.SUBCKT and A B Y vdd gnd
xnand A B vout vdd gnd nand
xinv vout Y vdd gnd inv
.ENDS

.SUBCKT xor A B Y vdd gnd
xnand1 A B n1 vdd gnd nand
xnand2 A n1 n2 vdd gnd nand
xnand3 B n1 n3 vdd gnd nand
xnand4 n2 n3 Y vdd gnd nand
.ENDS

.SUBCKT look_ahead A0 A1 A2 A3 B0 B1 B2 B3 Cin S0 S1 S2 S3 Cout vdd gnd
xxor1 A0 B0  w1 vdd gnd xor
xxor2 w1 Cin S0 vdd gnd xor
xxor3 A1 B1  w2 vdd gnd xor
xxor4 w2 C1  S1 vdd gnd xor
xxor5 A2 B2  w3 vdd gnd xor
xxor6 w3 C2  S2 vdd gnd xor
xxor7 A3 B3  w4 vdd gnd xor
xxor8 w4 C3  S3 vdd gnd xor

xand1 A0 B0  g0 vdd gnd and
xor1  A0 B0  p0 vdd gnd or
xand2 p0 Cin pg0 vdd gnd and
xor2  pg0 G0 C1 vdd gnd or

xand3 A1 B1 g1 vdd gnd and
xor3  A1 B1 p1 vdd gnd or
xand4 p1 C1 pg1 vdd gnd and
xor4  pg1 G1 C2 vdd gnd or

xand5 A2 B2 g2 vdd gnd and
xor5  A2 B2 p2 vdd gnd or
xand6 p2 C2 pg2 vdd gnd and
xor6  pg2 G2 C3 vdd gnd or
```

```
xand7 A3 B3 g3    vdd gnd and
xor7  A3 B3 p3    vdd gnd or
xand8 p3 C3 pg3   vdd gnd and
xor8  pg3 G3 Cout vdd gnd or

.ENDS

vdd vdd 0 1.8
vgnd gnd 0 0
vA0 A0 gnd pulse(0 1.8 0 0.1n 0.1n 12.5n 25n)
vA1 A1 gnd pulse(0 1.8 0 0.1n 0.1n 25n 50n)
vA2 A2 gnd pulse(0 1.8 0 0.1n 0.1n 50n 100n)
vA3 A3 gnd pulse(0 1.8 0 0.1n 0.1n 100n 200n)
vB0 B0 gnd pulse(0 1.8 0 0.1n 0.1n 8n 16n )
vB1 B1 gnd pulse(0 1.8 0 0.1n 0.1n 16n 32n)
vB2 B2 gnd pulse(0 1.8 0 0.1n 0.1n 32n 64n)
vB3 B3 gnd pulse(0 1.8 0 0.1n 0.1n 64n 128n)

vCin Cin gnd pulse(0 1.8 0 0.1n 0.1n 200n 400n)

xlook A0 A1 A2 A3 B0 B1 B2 B3 Cin S0 S1 S2 S3 Cout vdd gnd look_ahead

.op
.options post
.tran 0.01n 800n
.end
```