

8W1

4) Carry Lookahead Adder

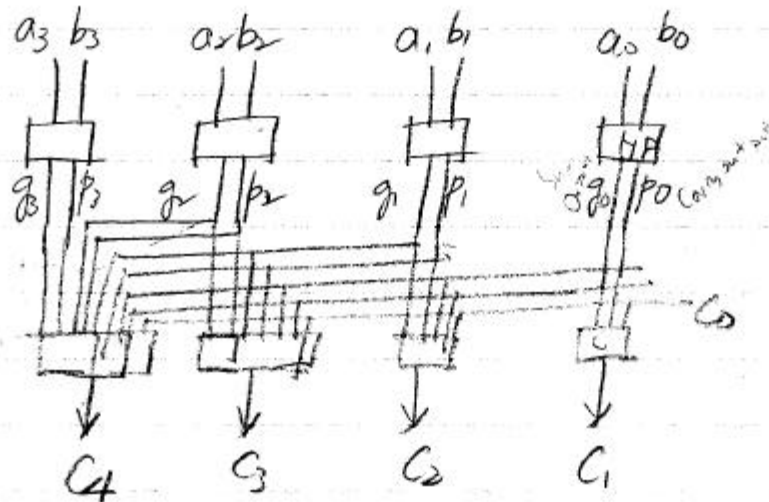
$$C_1 = a_0 b_0 + (a_0 + b_0) C_0 = g_0 + p_0 C_0$$

$$C_2 = a_1 b_1 + (a_1 + b_1) C_1 = g_1 + p_1 C_1 = g_1 + p_1 g_0 + p_1 p_0 C_0$$

$$C_3 = a_2 b_2 + (a_2 + b_2) C_2 = g_2 + p_2 C_2 = g_2 + p_2 g_1 + p_2 p_1 g_0 + p_2 p_1 p_0 C_0$$

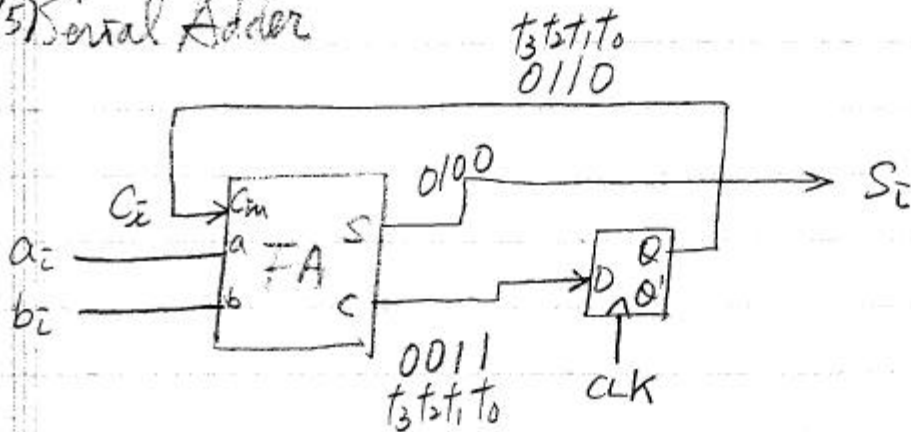
$$C_4 = a_3 b_3 + (a_3 + b_3) C_3 = g_3 + p_3 C_3 = g_3 + p_3 g_2 + p_3 p_2 g_1 + p_3 p_2 p_1 g_0 + p_3 p_2 p_1 p_0 C_0$$

$$g_i = a_i b_i, \quad p_i = a_i + b_i$$



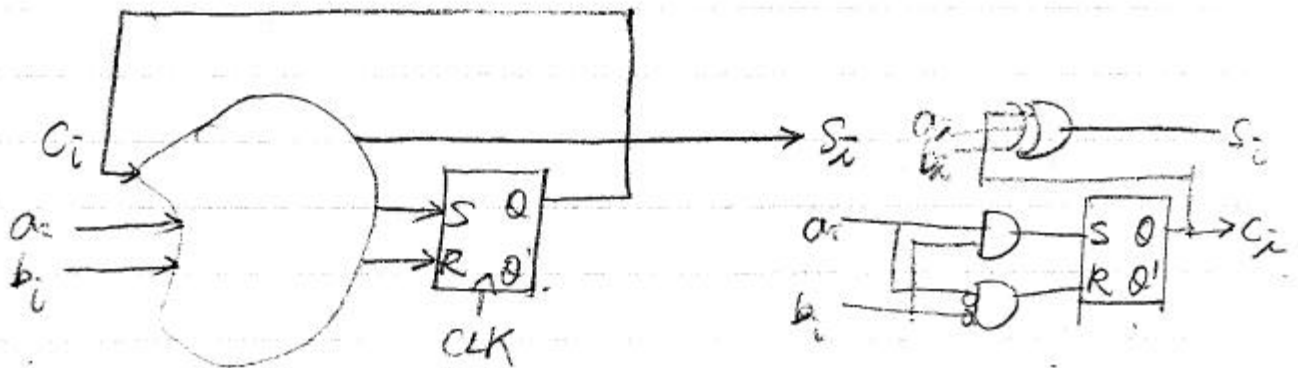
(5) Serial Adder

$t_3 \ t_2 \ t_1 \ t_0$
0 0 1 1
0 0 0 1



0 0 1 1 Carry
0 0 1 1
0 0 0 1
0 1 0 0

Design a serial adder with a SR FF.



i	a _i	b _i	C _i	C _{i+1}	S _i	R	S
0	0	0	0	0	0	-	0
1	0	0	1	0	0	1	0
2	0	1	0	0	0	-	0
3	0	1	1	1	-	0	0
4	1	0	0	0	0	-	0
5	1	0	1	1	-	0	0
6	1	1	0	1	1	0	0
7	1	1	1	1	-	0	0

$$S = a_i b_i$$

$$R = a_i' b_i'$$

State Table

SR	00	01	10	11
Q(t)	0	0	1	-
Q(t+1)	1	1	0	1
PS	0	1	0	1
Q(t)	0	0	1	0
Q(t+1)	1	0	1	0

Q(t) Q(t+1)

8W2

62. Multiplication

$$\begin{array}{r}
 a_2 a_1 a_0 \\
 \times b_2 b_1 b_0 \\
 \hline
 a_2 b_0 \ a_1 b_0 \ a_0 b_0 \\
 a_2 b_1 \ a_1 b_1 \ a_0 b_1 \\
 + a_2 b_2 \ a_1 b_2 \ a_0 b_2 \\
 \hline
 \end{array}$$

