15/04/2015

Programmable Logic Array (PLA)

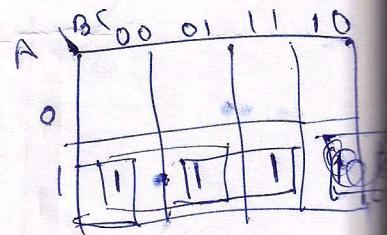
When the number of don't care conditions is excessive, it is economical to use PLA. In PLA, the decoder is replaced by a group of 'AND' GATES each of which can be programmed to generate a product term of the input variables.

Truth Table

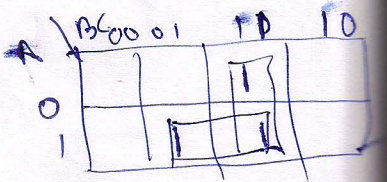
A	B	C	F_1	F_2
0	0	0	0	0
0	0	1	0	0
0	1	0	0	0
0	1	1	0	1
1	0	0	1	0
1	0	1	1	1
1	1	0	0	0
1	1	1	1	1

$F_1 = AB'C' + AB'C + ABC = AB' + ABC = AB' + AC$

$F_2 = A'BC + AB'C + ABC = A'BC + AC = AC + BC$



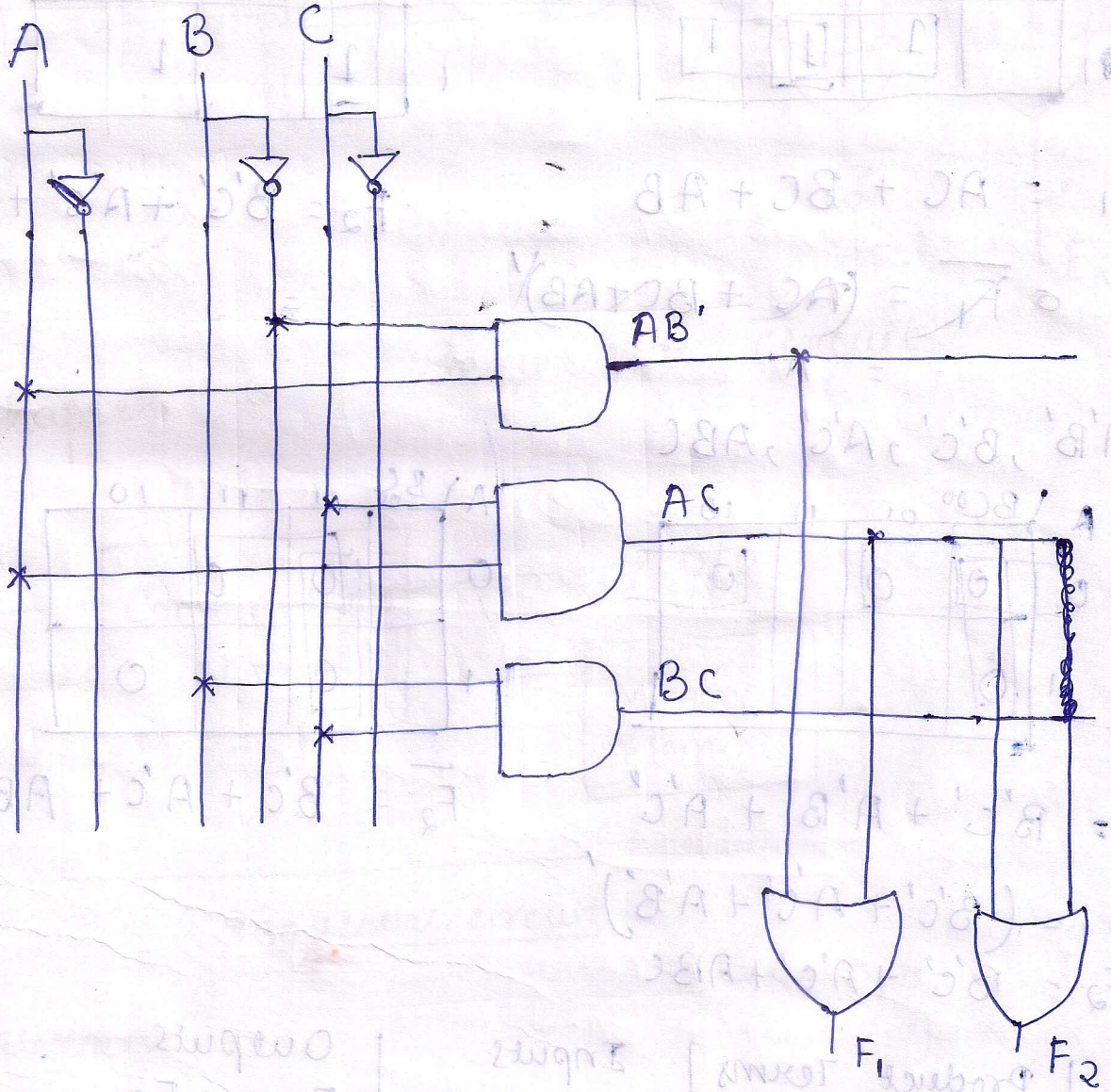
$= AB' + AC$



$= AC + BC$

PLA Program Table

	Product Terms	Inputs A	B	C	Outputs F_1	F_2
AB'	1	1	0	—	1	—
AC	2	1	—	1	1	1
BC	3	—	1	1	—	1

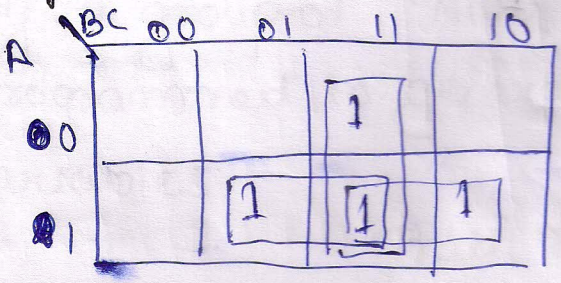


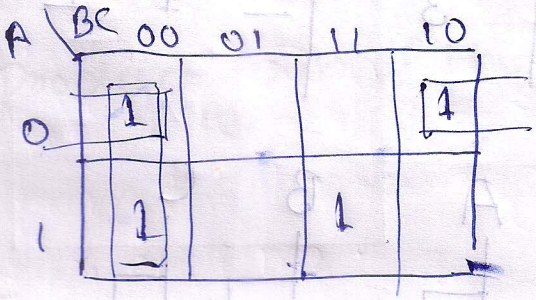
A combination circuit is defined by a function

$F_1(A,B,C) = \Sigma(3,5,6,7)$

$F_2(A,B,C) = \Sigma(0,2,4,7)$

Implement this circuit with a PLA having 3 input, 4 product terms and 2 outputs



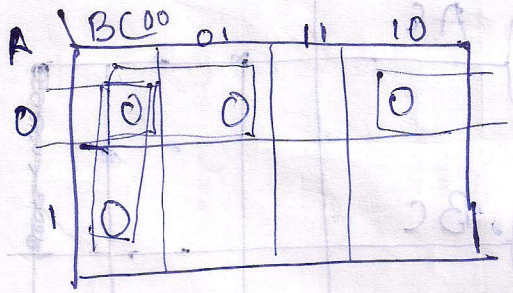


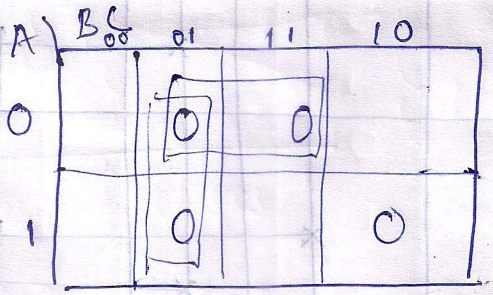
$F_1 = AC + BC + AB$

$\overline{F_1} = (AC + BC + AB)'$

$= A$

$A'B', B'C', A'C', ABC$





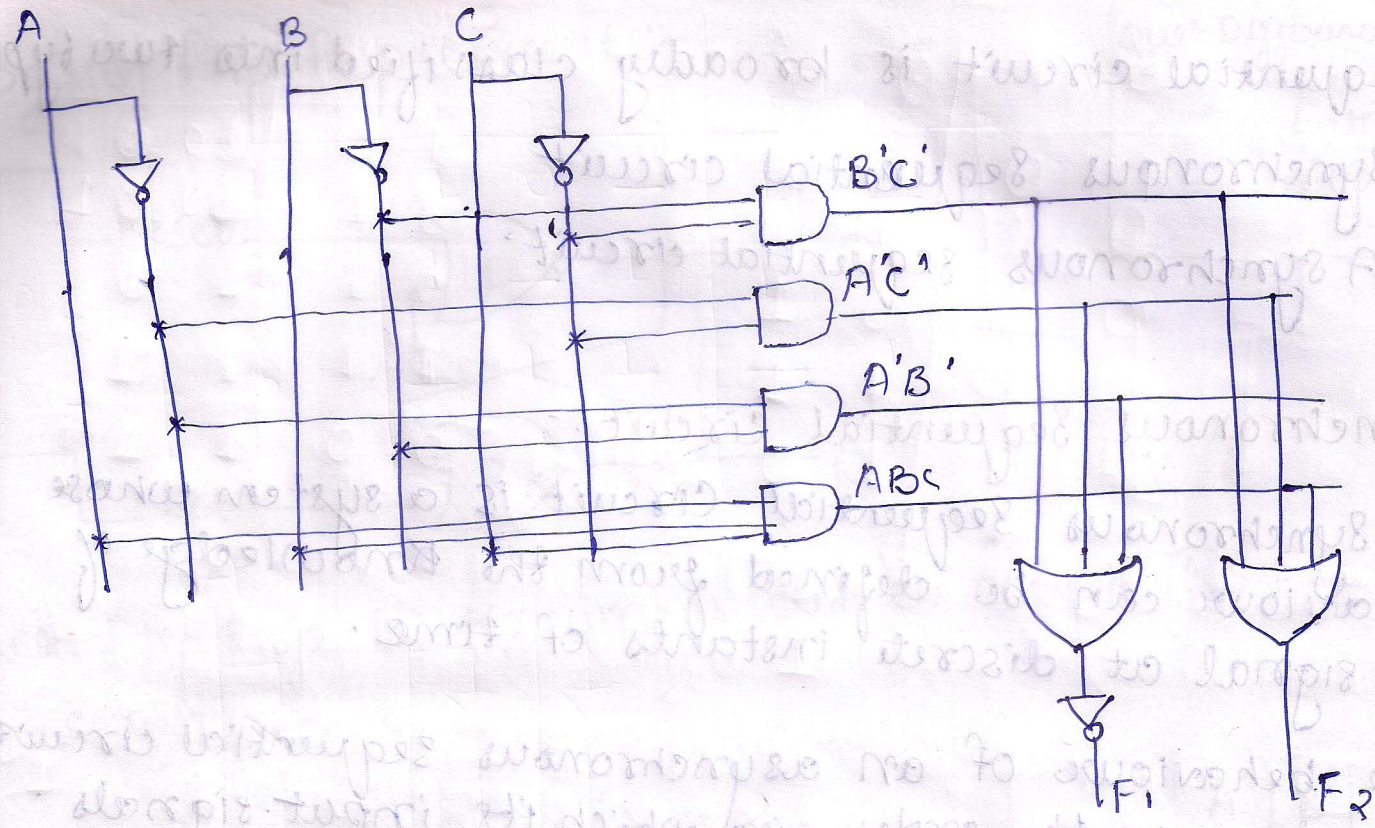
$\overline{F_1} = B'C' + A'B' + A'C'$

$\therefore F_1 = (B'C' + A'C' + A'B')'$

$F_2 = B'C' + A'C' + ABC$

$\overline{F_2} = B'C + A'C + ABC'$

	Product Terms	Inputs A	B	C	Outputs F_1	F_2
$B'C'$	1	–	0	0	1	1
$A'C'$	2	0	–	0	1	1
$A'B'$	3	0	0	–	1	0
ABC	4	1	1	1	–	1



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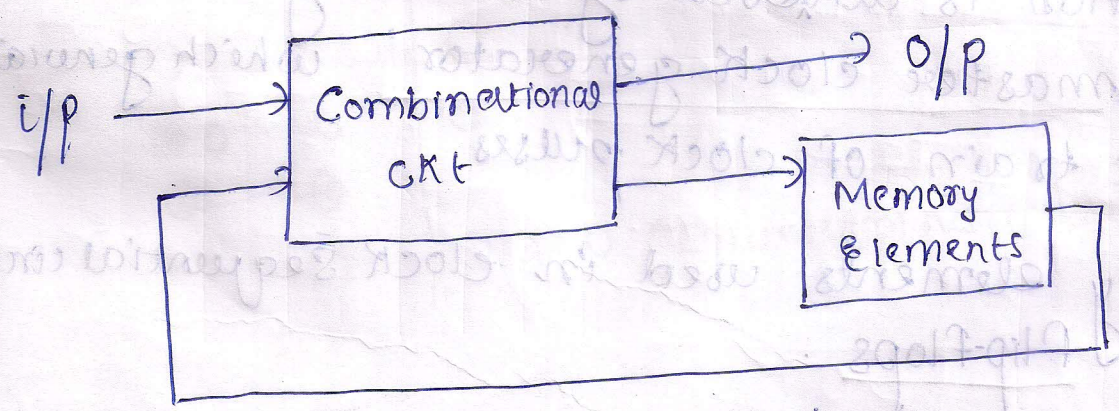
Chapter - 6

Sequential Circuit



Sequential circuit

~~Memory elements~~

A sequential circuit consist of a combinational circuit to which memory elements are connected to form a feedback path. The memory elements are devices capable of storing binary information within them. The binary information stored in the memory elements at any given time defines the state of the sequential circuit.