## SHEET 7

7.1)  $\varphi(A, B, C, D, E) = m_0 + m_2 + m_4 + m_6 + m_9$ +  $m_{10} + m_{13} + m_{14} + m_{15} + m_{16} + m_{17} + m_{21} + m_{26}$ +  $m_{28} + m_{30} + m_{31}$ 

a) Prime implicants of 4

· Numbers into binary representation

m,5 -> 01111 mo -> 00000 my -> 10000 m2->00010 m17 -> 10001 my -> 00100 m2 -> 10101 m => 00110 m26 -> 11010 mg -> 01001 m28 -> 11100 m,0 -> 01010 m30 -> 11110 m13 > 01101  $m_3 \rightarrow 11111$ m14 -> 01110

· Classify the minterms

No.				
	Group	Minterm	Pattern	
	0 1's	m.	00000	
	* i.m. + .m.	m <sub>2</sub>	00010	
	1 1 1	m4	00100	
willy		m 16	10000	
7		m <sub>6</sub>	00110	
	2 1'5	mg	01001	
		mio	01010	
	atobresias	mir	10001	
		m 13	01101	F
	3 1's	mil	01110	
	00015	mzi	10101	
	00015	m <sub>26</sub>	11010	
	LOSLO FIX-	mze	11100	
	4115	mis	01111	
		m <sub>30</sub>	11110	
	9.5 1's	m <sub>31</sub>	11111	
	Mirror !	00	and to de m	
		0 1's  1 1  2 1's	0 1's mo  mz  1 1 my  mr6  m6  2 1's mg  m10  m17  m13  3 1's m14  m26  m28  4 1's m30	0 1's mo 00000  m2 00010  1 1 my 00100  m6 10000  m6 00110  2 1's mg 01001  m10 01010  m17 10001  m13 01101  m21 10101  m26 11100  m28 11100  4 1's m30 1111  m30 11110

Minterm	Pattern	Used	Minterm	Pattern	Used	Minterms	Patterns
mo	00000		mo, z	0-000	<b>V</b>	m 0,2,4,6	50-00
		314	mo,4	0.0-00	-		00-0
		1715	mo,16	-0000	-	11 4	
m <sub>2</sub>	00010	V	m 2, 6	00_10	- V	m2, 6,10,14	010)
my	00100	1/	m2,10	0_010	1	m2,10,15,14	010
mie	10000	1	m4,6	001-0	V	1100-	
16			m16, 17	1000-	-	11000	
me	00110	V	m6,14	0_110	-	m 10,14,25,30	(01-1-
mg	01001	V	mg, 13	01-01	FLOR	m 10, 26, 14,30	-1-10
mio	01010	V	m10, 14	01-10	V	15 3000	
miz	10001	V	m10,26	-1010	1	1014	
			m <sub>17, 21</sub>	10_01	-		
m,3	01101	V	m 13, 15	011-1	-	m <sub>14</sub> , 15, 30,31	-111-7
miy	01110	V	m14,15	0111-	1	m14, 30,15,31	_111_
mai	10101	V	m 14,30	_1110	<b>V</b>		
m 26	11010	V	m <sub>26</sub> , 30	11-10	1	1	
m 28	11100	V	m 28,30	111-0	-	1-14	
mis	01111	V	m15,31	_1111	1	The same	
m 30	11110	1	m30,31	1111-	V		
m 31	11111	/					7

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No more combinations can be done

There are 10 prime implicants:

b) The essential prime implicants

			-1																16						1
	me	I	m	2	my	m <sub>6</sub>	mg	m	0	mıs	m	14	mis	mi	n	17	mz	n	726	m	28	mzo	m	1	Comment
mo, 16	J	1												V				,			1			-	
m16, 17		1		1										V	1	/								1	-
mg, 13		1		1	0		V	-	N. A.	V					1									1	Essential
m17, 21		1						-				-	3		1	/	J				-			1	Essential
m <sub>13,15</sub>		1	I					1	2 4	1		-	/		T										
m28,30	4	1					2	1							I						1	1			Essential
m 0, 2,4,6	V	1	1	1	J	V	6.0	1			T	The second second						1						9	Essential
m 2,6,10,14	8	+	1	A	8	1		1	201	P	1	1		Total Control	1		-	1			1				
10,14,26,30		1	1		9.0			1	1	199	1	1			1			1	1			1			Essential
m 14, 15, 30,31		1		2				1	7		1	,	1		1			1	1			/	1	3/5	Essential
	5		1	1	V	V	J	1	/	V	1	1	1	9	1.	1	J		1	1	1	1	1		Coverage
								The state of the s							-										of essention

## The essential prime implicants:

mg, 13

m, 2, 21

m 28, 30

mo, 2, 4,6

m 10,14,26,30

m14, 15, 30, 31

Either mois or mis, 17

Minimal boolean expressions

· 9' (A,B,C,D,E) = ('A N B N T D N E) V (A N 'B N 'D N E) V (A N B N C N 'E) V ('A N 'B N 'E) V (B N D N T E) V (B N C N D) V (A N 'B N 'C N T D)