UNIT 1 : LOGIC SIMPLIFICATION AND COMBINATIONAL LOGIC DESIGN

Today's Target

- Tabulation Method
- Numerical Practice
- DPP
- University Questions

Tabulation Method

STEP 1:

- Convert Minterm List to Prime Implicant List

STEP 2:

- Choose All Essential Prime Implicants
- If all minterms are covered, stop

STEP 3:

- Formulate the Reduced Cover Table

EXAMPLE: $f^{on} = \{m_0, m_1, m_2, m_3, m_5, m_8, m_{10}, m_{11}, m_{13}, m_{15}\}$
$= \sum (0, 1, 2, 3, 5, 8, 10, 11, 13, 15)$

	A	B	C	D
m_0	0	0	0	0
m_1	0	0	0	1
m_2	0	0	1	0
m_3	0	0	1	1
m_5	0	1	0	1
m_8	1	0	0	0
m_{10}	1	0	1	0
m_{11}	1	0	1	1
m_{13}	1	1	0	1
m_{15}	1	1	1	1

G_1	m_0	0 0 0 0	✓
G_2	m_1	0 0 0 1	✓
	m_2	0 0 1 0	✓
	m_8	1 0 0 0	✓
G_3	m_3	0 0 1 1	✓
	m_5	0 1 0 1	✓
	m_{10}	1 0 1 0	✓
G_4	m_{11}	1 0 1 1	✓
	m_{13}	1 1 0 1	✓
G_5	m_{15}	1 1 1 1	✓

0,1	0 0 0 –	✓
0,2	0 0 – 0	✓
0,8	– 0 0 0	✓
1,3	0 0 – 1	✓
1,5	0 – 0 1	(PI)
2,3	0 0 1 –	✓
2,10	– 0 1 0	✓
8,10	1 0 – 0	✓
3,11	– 0 1 1	✓
5,13	– 1 0 1	(PI)
10,11	1 0 1 –	✓
11,15	1 – 1 1	(PI)
13,15	1 1 – 1	(PI)

0,1,2,3	0 0 – –	(EPI)
0,2,8,10	– 0 – 0	(EPI)
2,3,10,11	– 0 1 –	(EPI)

	0	1	2	3	5	8	10	11	13	15
$\bar{A}\bar{B}$	X	X	X	X						
$\bar{B}\bar{D}$	X		X			X	X			
$\bar{B}C$			X	X			X	X		
$\bar{A}\bar{C}D$		X			X					
$B\bar{C}D$					X				X	
ACD								X		X
$A\bar{B}D$									X	X
	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

$$f = \bar{B}\bar{D} + \bar{A}\bar{B} + B\bar{C}D + ACD$$

Simplify the following expression using Tabulation Method

$$F(A,B,C,D) = \sum m(0,4,8,10,12,13,15) + d(1,2)$$

	A	B	C	D
m_0	0	0	0	0
m_4	0	1	0	0
m_8	1	0	0	0
m_{10}	1	0	1	0
m_{12}	1	1	0	0
m_{13}	1	1	0	1
m_{15}	1	1	1	1
d_1	0	0	0	1
d_2	0	0	1	0

G_1	m_0	0000 ✓	0,4	0 _ 0 0 ✓
			0,8	_ 0 0 0 ✓
G_2	m_4	0100 ✓	0,1	0 0 0 _ (PI)
	m_8	1000 ✓	0,2	0 0 _ 0 ✓
	d_1	0001 ✓		
	d_2	0010 ✓	4,12	_ 1 0 0 ✓
			8,10	1 0 _ 0 ✓
G_3	m_{10}	1010 ✓	8,12	1 _ 0 0 ✓
	m_{12}	1100 ✓	2,10	_ 0 1 0 ✓
G_4	m_{13}	1101 ✓	12,13	1 1 0 _ (PI)
G_5	m_{15}	1111	13,15	1 1 _ 1 (PI)

0,4,8,12	_	_	0	0 (EPI)
0,8,2,10	_	0	_	0 (EPI)

	m							d	
	0	4	8	10	12	13	15	1	2
$\bar{C}\bar{D}$	X	(X)	X		X				
$\bar{B}\bar{D}$	X		X	(X)					X
$\bar{A}\bar{B}\bar{C}$	X							X	
$AB\bar{C}$					X	X			
$A\bar{B}D$						X	(X)		
	✓	✓	✓	✓	✓	✓	✓		✓

$$F = \bar{C}\bar{D} + \bar{B}\bar{D} + A\bar{B}D$$

$F = \Sigma m(0, 8, 12, 15, 21, 26, 30, 31)$

	16	8	4	2	1
	A	B	C	D	E
m_0	0	0	0	0	0
m_8	0	1	0	0	0
m_{12}	0	1	1	0	0
m_{15}	0	1	1	1	1
m_{21}	1	0	1	0	1
m_{26}	1	1	0	1	0
m_{30}	1	1	1	1	0
m_{31}	1	1	1	1	1

DPP

a) Minimize the following Boolean function using Tabulation Method:

$F(A,B,C,D) = \sum m(0,1,2,3,4,6,7,11,12,15)$

b) Simplify the expression $F(A,B,C,D,E) = \sum m(8,9,10,11,13,15,16,18, 21,24, 25,26,27,30,31)$

c) Simplify the logic function using Quine Mc Cluskey method

$F(A,B,C,D) = \Sigma m(0,1,2,3,11,12,14,15)$

UNIVERSITY QUESTIONS

YEAR	QUESTION	MARKS	ANSWER
22-23	Minimize y = Σm(0,1,2,3,5,6,7,8,14,15) + d(4,11,13) using tabular method.	10 marks	Y= A' +BC + B'C'D'
19-20	Minimize the logic function using Quine-McCluskey Method $F(A, B,C,D,E)$= Σm(8,9,10,11,13,15, 16, 18,21,24,25,26,27,30,31)	10 marks	F=BC'+ABD+ AC'E' + A'BE + AB'CD'E
18-19	Minimize the following using Quine-McCluskey meth0d: F(A,B, C, D)= Σm(0,1, 9,15, 24, 29, 30) + d(8,11, 31)	10 marks	F= A'B'C'D' + A'BDE + A'BC'E + BC'D'E' + ABCE + ABCD

GATEWAY CLASSES

GATEWAY CLASSES

AKTU Full Courses (Paid)

Download Gateway Classes Application

From Google Play store

All Subjects

Link in Description

Thank You