Electronics

MSc. Physics Semester 2

Paper - MPHY CC-7

Unit 4

Topic – Minterm and Maxterm

Dr. Surabhi Prasad

Prof.& Head

Department of Physics

Patna University

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Minterm and Maxterms

Minterms - A product terms which contain all variables in SOP form.

Maxterms - A sum term which contain all variable or Each individual term in Canonical POS form

Canonical SOP form.

$$Y = A\bar{B}C + \bar{A}BC + \bar{A}\bar{B}C$$

minterms

Canonical POS form.

$$Y = (A+B+C)(\bar{A}+\bar{B}+C)(\bar{A}+\bar{B}+\bar{C})$$

Maxterms

Three variables - A, B, C.

$$2^n = 2^3 = 8$$

SOP $\Rightarrow$ $A = 0 \Rightarrow \bar{A}$

$A = 1 \Rightarrow A$

$i = 0, 1, 2 \cdots 2^n - 1$

$= 0, 1, 2 \cdots 2^3 - 1$

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Dec No.	Variables A	B	C	SOP: Minterms m_i	POS: Maxterms M_i
				$A=0 \Rightarrow \bar{A}$, $A=1 \Rightarrow A$	$A=0 \Rightarrow A$, $A=1 \Rightarrow \bar{A}$
0	0	0	0	$\bar{A}\bar{B}\bar{C} = m_0$	$A+B+C = M_0$
1	0	0	1	$\bar{A}\bar{B}C = m_1$	$A+B+\bar{C} = M_1$
2	0	1	0	$\bar{A}B\bar{C} = m_2$	$A+\bar{B}+C = M_2$
3	0	1	1	$\bar{A}BC = m_3$	$A+\bar{B}+\bar{C} = M_3$
4	1	0	0	$A\bar{B}\bar{C} = m_4$	$\bar{A}+B+C = M_4$
5	1	0	1	$A\bar{B}C = m_5$	$\bar{A}+B+\bar{C} = M_5$
6	1	1	0	$AB\bar{C} = m_6$	$\bar{A}+\bar{B}+C = M_6$
7	1	1	1	$ABC = m_7$	$\bar{A}+\bar{B}+\bar{C} = M_7$

Dec No.	Variables A	B	C	O/p Y.
0	0	0	0	0
1	0	0	1	1
2	0	1	0	0
3	0	1	1	0
4	1	0	0	1
5	1	0	1	0
6	1	1	0	1
7	1	1	1	

SOP = high O/P '1'

(110) (111)

$Y = \bar{A}B\bar{C} + AB\bar{C} + ABC$

$Y = m_1 + m_4 + m_6 + m_7$

$Y = \sum m(1, 4, 6, 7)$

POS ⇒ low '0'

(010) (011) (101)

$Y = (A+B+C)(A+\bar{B}+C)(A+\bar{B}+\bar{C})(\bar{A}+B+\bar{C})$

Maxterm

$= M_0 + M_2 + M_3 + M_5$

$Y = \Pi M(0, 2, 3, 5)$