PRODUCT OF SUM AND MAX-TERM REPRESENTATION

ANALOG & DIGITAL ELECTRONICS

ESC-301

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COMPUTER SCIENCE AND ENGINEERING

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- DEFINITION
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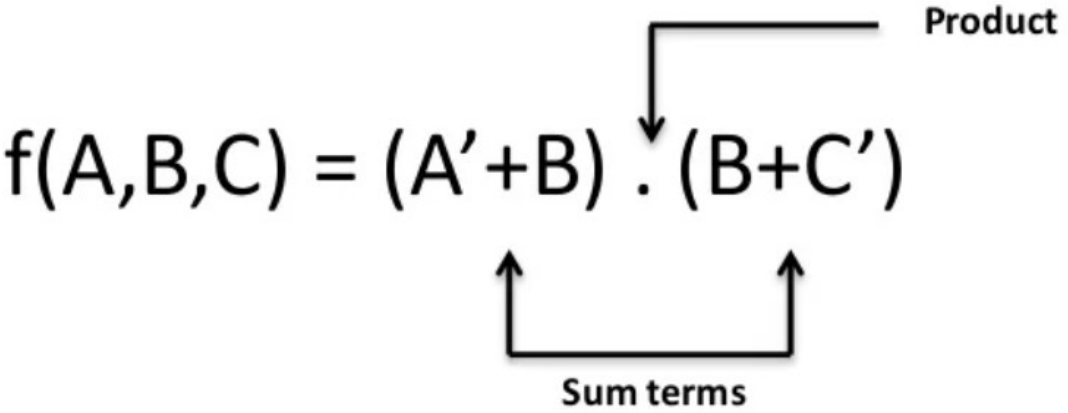
PRODUCT OF SUM

- When two or more sum terms are multiplied together

- **EXAMPLE:**



CANONICAL OR STANDARD POS FORM

◉ In POS form all the terms do not involve all the literals

◉ For example:

The expression A.(B+C)

-the first term does not contain B and C whereas the second term does not contain A

◉ If each term of POS contain all the literals then it is known as **STANDARD POS FORM**

Lets take an example and convert it to Standard POS form

STEP-WISE CONVERSION TO STANDARD POS FORM

- Find the missing literals in each sum term.

$$f(A,B,C) = (A + B) \cdot (B + C) \cdot (A + C)$$

Literal B is missing

Literal A is missing

Literal C is missing

- OR t … ement.

$$f(A,B,C) = (A + B)+(C.C') + (B + C)+(A.A') + (A + C)+(B.B')$$

Missing literals and their complements

- Expand t … the repeated

$$f(A,B,C)=(A+B+C).(A+B+C').(A+B+C).(A'+B+C).(A+B+C).(A+B'+C)$$

$$f(A,B,C)=(A+B+C).(A+B+C').(A'+B+C).(A+B'+C)$$

MAX-TERMS

- Maxterms are OR terms with every variable in true or complemented form.
- Given that each binary variable may appear normal (e.g., x) or complemented (e.g. x'), there are 2^n maxterms for n variables.
- Example: Two variables (X and Y) produce 2x2=4 combinations:

  X+Y(both normal)

  X+Y'(x normal, y complemented)

  X'+Y(x complemented, y normal)

  X'+Y'(both complemented)

TRUTH TABLE REPRESENTATION OF MAX TERMS

A	B	C	Maxterms
0	0	0	$A+B+C = M_0$
0	0	1	$A+B+C' = M_1$
0	1	0	$A+B'+C = M_2$
0	1	1	$A+B'+C' = M_3$
1	0	0	$A'+B+C = M_4$
1	0	1	$A'+B+C' = M_5$
1	1	0	$A'+B'+C = M_6$
1	1	1	$A'+B'+C' = M_7$

MAX-TERMS EXAMPLES

1. $f(A,B,C) = (A+B+C).(A+B'+C).(A+B'+C')+(A'+B'+C')$

   $= M_0 + M_2 + M_3 + M_7$

   $= \Pi M(0,2,3,7)$

2. $f(A,B,C)= (A+B+C').(A+B'+C').(A+B'+C').(A'+B'+C')$

   $= M_1 + M_3 + M_5 + M_7$

   $= \Pi M\ (1,3,5,7)$

3. $f(A,B,C)= (A+B+C).(A+B'+C).(A+B'+C').(A'+B'+C)$

   $= M_0 + M_2 + M_3 + M_6$

   $= \Pi M\ (0,2,3,6)$

THANK YOU