

Sum of Product (SOP form)

$$\bar{A} = 0$$

$$A = 1$$

m - minterm

	A	B	C	F
m ₀	0	0	0	0
m ₁	0	0	1	0
m ₂	0	1	0	1
m ₃	0	1	1	0
m ₄	1	0	0	1
m ₅	1	0	1	1
m ₆	1	1	0	1
m ₇	1	1	1	1

SOP form is written when function (F) is high

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

written directly from truth table

then it is called standard or

canonical SOP form. Standard SOP

will contain ~~each and every~~ ^{every} variable in each and every term.

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

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

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

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

$$= \bar{A} \frac{BC}{x} + A$$

$$\bar{A}x + A$$

$$(\bar{A} + A)(x + A)$$

$$\bar{B}\bar{C} + A$$

minimised SOP form.
(minimal SOP)

Q) Simplify the expression for

$$Y(A, B) = \sum m(0, 2, 3) = m_0 + m_2 + m_3$$

	A	B	Y
m_0	0	0	1
m_1	0	1	0
m_2	1	0	1
m_3	1	1	1

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

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

$$= \bar{A}\bar{B} + A$$

$$= (\bar{A} + A) \cdot (\bar{B} + A)$$

$$= \bar{B} + A \text{ (Ans)}$$

(Minimal)

POS form :- It is written when function F is ~~low~~ low

	A	B	C	F
M_0	0	0	0	0
M_1	0	0	1	0
M_2	0	1	0	1
M_3	0	1	1	0
M_4	1	0	0	1
M_5	1	0	1	1
M_6	1	1	0	1
M_7	1	1	1	1

written directly from truth table then it is called canonical POS form

$$\bar{B} \quad \bar{A} = 1$$

$$A = 0$$

~~$$F = A + B + C$$~~

~~$$M_0 \cdot M_1 \cdot M_3$$~~

$$F = M_0 \cdot M_1 \cdot M_3$$

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

$$A + BA + A(\bar{B} + \bar{C})$$

$$+ B(\bar{B} + \bar{C})$$

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

$$= A(1 + B) + A\bar{B} + A\bar{C} + B\bar{C}$$

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

$$= A(1 + \bar{B}) + A\bar{C} + B\bar{C}$$

$$= A + A\bar{C} + B\bar{C} = A(1 + \bar{C}) + B\bar{C}$$

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

$$F = (x + c)(x + \bar{c})(A + \bar{B} + \bar{c})$$

$$= (x + xc + x\bar{c} + 0)(A + \bar{B} + \bar{c})$$

$$= (x + x(c + \bar{c}))(A + \bar{B} + \bar{c})$$

$$= (x + x)(A + \bar{B} + \bar{c})$$

$$= x(A + \bar{B} + \bar{c})$$

$$= (A + B)(A + (\bar{B} + \bar{c}))$$

$$A(1+\bar{C}) + A(B+\bar{B}) + B\bar{C}$$

$$A + A + B\bar{C}$$

$$A + B\bar{C}$$

$$(A+B) \cdot (A+\bar{C})$$

minimal pos form