



**SNS COLLEGE OF ENGINEERING**

**(Autonomous)**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**



# UNIT-1

## DIGITAL

### FUNDAMENTALS

#### SOP & POS in

#### Karnaugh Map (K-Map)





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K-map can take two forms

1. Sum of Product (SOP) and
2. Product of Sum (POS)

according to the need of problem. K-map is table like representation but it gives more information than TRUTH TABLE.

We fill grid of K-map with 0's and 1's then solve it by making groups. Select K-map according to the number of variables.





## Canonical Form (Standard SOP and POS Form)

Any Boolean function that is expressed as a sum of minterms or as a product of max terms is said to be in its “canonical form”.

It mainly involves in two Boolean terms, “minterms” and “maxterms”.





## Steps to solve expression using K-map-

1. Select K-map according to the number of variables.
2. Identify minterms or maxterms as given in problem.
3. For SOP put 1's in blocks of K-map respective to the minterms (0's elsewhere).





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4. For POS put 0's in blocks of K-map respective to the maxterms(1's elsewhere).
5. Make rectangular groups containing total terms in power of two like 2,4,8 ..(except 1) and try to cover as many elements as you can in one group.
6. From the groups made in step 5 find the product terms and sum them up for SOP form.





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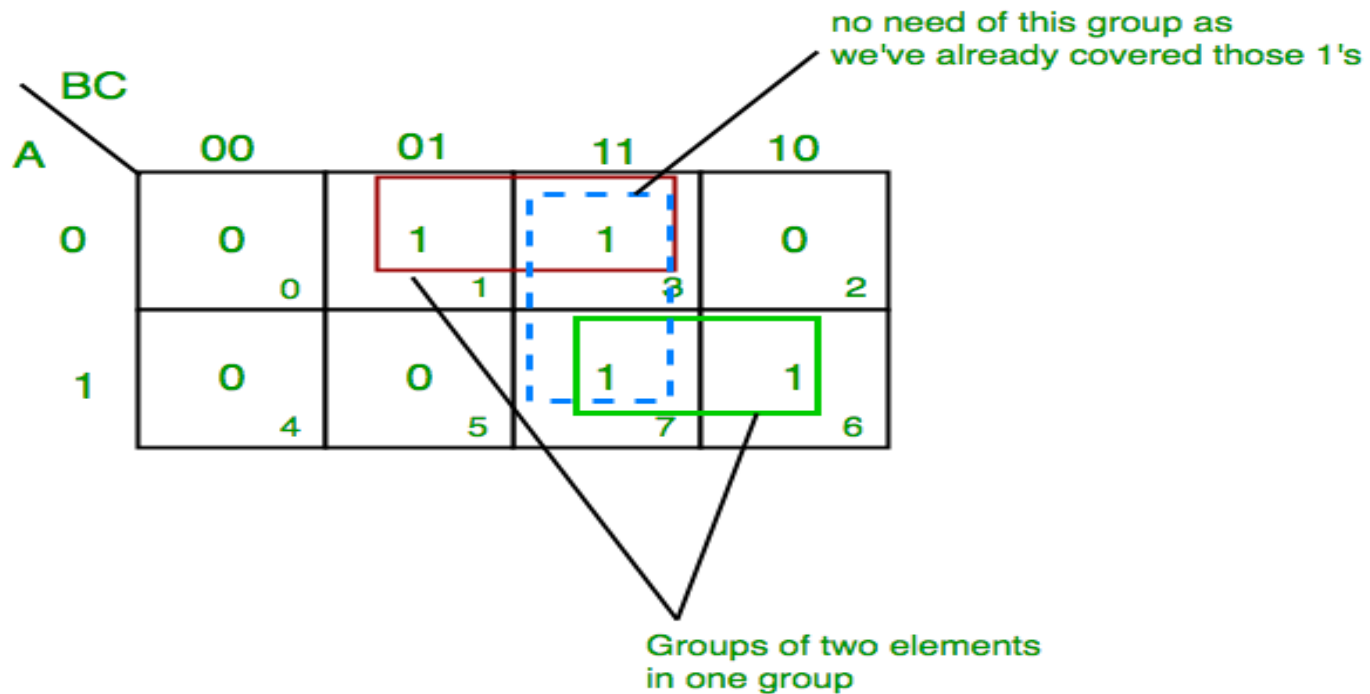
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## SOP FORM

1.K-map of 3 variables-

$$Z = \sum A, B, C(1, 3, 6, 7)$$





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From red group we get product term—

$A'C$

From green group we get product term—

$AB$

Summing these product terms we get-  
Final expression ( $A'C+AB$ )





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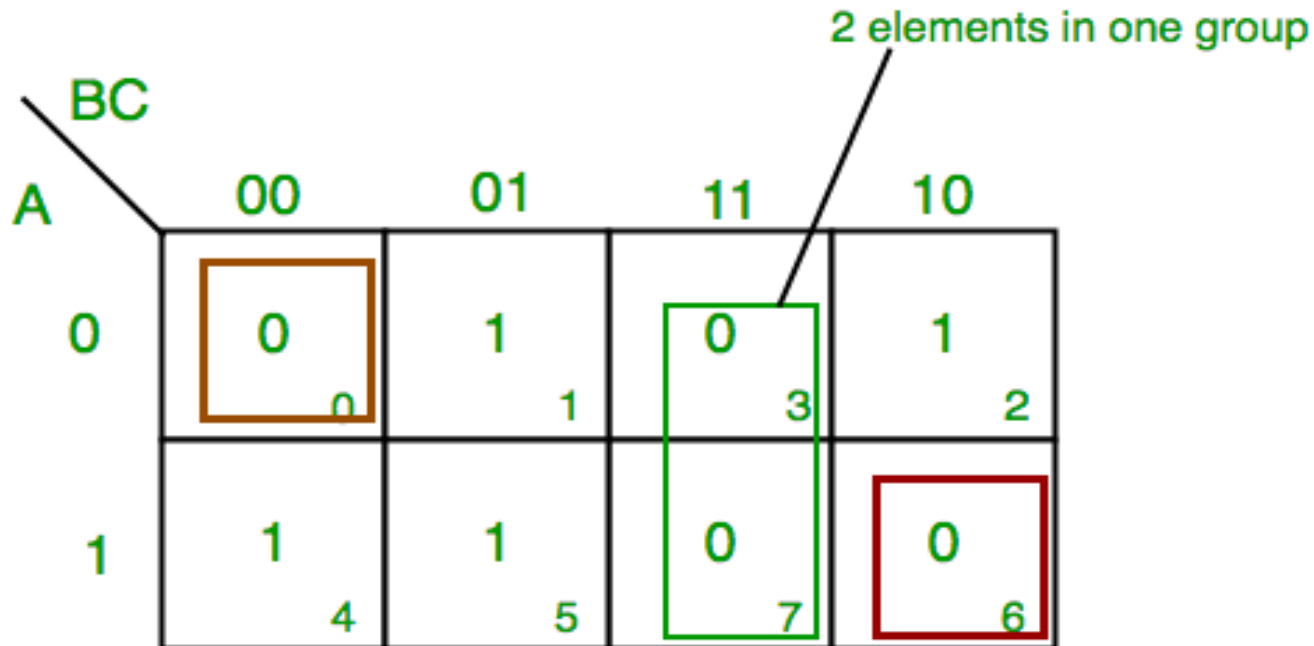
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## POS FORM

1.K-map of 3 variables-

$$F(A,B,C)=\pi(0,3,6,7)$$







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From red group we find terms

$A \quad B \quad C'$

Taking complement of these two

$A' \quad B' \quad C$

Now sum up them

$(A' + B' + C)$

From green group we find terms

$B \quad C$

Taking complement of these two terms

$B' \quad C'$

Now sum up them

$(B' + C')$

From brown group we find terms

$A' \quad B' \quad C'$

Taking complement of these two

$A \quad B \quad C$

Now sum up them

$(A + B + C)$

We will take product of these three terms :Final expression  $(A' + B' + C) (B' + C') (A + B + C)$





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# THANK YOU

