***EX***: Prove that :

F= ABC + ABC + ABC = A(B+C)

= AC(B+B) + ABC

= AC + ABC

= A(C+BC)

= A(C+B)

***EX***: Simplify :

X = AB + ABC + AB + ABC

= AB(1+C) + AB + ABC

= AB + AB + ABC

= B + ABC

= B + BAC

= B + AC

***EX***: In a 3-input cct. The output is (1) if the majority of input is (1) , and otherwise , it is zero. White the T.T. for this cct. :

ABC Z

000 0

001 0

010 0

011 1

100 0

101 1

110 1

111 1

**Sum -of- product representation of logic function :**

A SP expression is a product term or several product terms, logically added together e.g:

F= A.B + ABC + BD + …….

product

(AND)

**Derivation of sp :**

1-construct the T.T.

2-construct a multiplication column of product of all inputs.

3-the desired expression is the sum of the product of all terms in which the output is 1 .

***EX***: For the following T.T. , write the logic function using sp method :

P terms AB Z

00 1 AB

01 0 AB Z = AB + AB

10 0 AB

11 1 AB

***EX***: For the following T.T. , write the logic function using sp method , then simplify it :

ABC Z P terms min terms

000 0 ABC m0

ABC m1 001 0

m2 ABC 010 0

011 1 ABC m3

100 0 ABC m4

101 1 ABC m5

110 1 ABC m6

111 1 ABC m7

Z = m3 + m5 + m6 + m7

= ABC + ABC +ABC + ABC

= BC(A + A) + ABC + ABC

= BC + ABC + ABC

= C(B+BA) +ABC = C(B+A) +ABC

= CB + CA + ABC = CB + A(C+BC)

= CB + A(C+B)

= CB + AC +AB