**Alpha numeric codes :**

 It is an assignment of bit combinations to the letters of the alpha bet , the decimal digit (0-9) , punctuation marks , and several special character such as # .

 The most widely used of alpha numeric codes are :

1- EBCDIC (Extended Binary Coded Decimal Interchange Code ).

 2- ASCII (American Standard Code for Information Interchange ).

 The EBCDK code uses 8-bit to represent each symbols while the ASCII code use 7-bit code.

**Parity method for error detection :**

 **Even parity(ep) :** makes the total no. of 1΄s even

 **Odd parity (op):** makes the total no. of 1΄s odd

|  |  |  |
| --- | --- | --- |
| **odd P** | **even P** | **number** |
| 1 | 0 | 0000 |
| 0 | 1 | 0001 |
| 0 | 1 | 0010 |
| 1 | 0 | 0011 |
| 0 | 1 | 0100 |
| 1 | 0 | 0101 |
| 1 | 0 | 0110 |
| 0 | 1 | 0111 |
| 0 | 1 | 1000 |
| 1 | 0 | 1001 |
| 1 | 0 | 1010 |
| 0 | 1 | 1011 |
| 1 | 0 | 1100 |
| 0 | 1 | 1101 |
| 0 | 1 | 1110 |
| 1 | 0 | 1111 |

***EX***: Check an even parity(ep) and odd parity(op) for the following numbers:

 0101, 0001

 For 0101 ep=0, op=1

For 0001 ep=1, op=0

**Karnaugh map simplification ( k-map ) :**

 It is an important method to simplify or minimize a Boolean expression . It is composed of number of adjacent "cells" . Each cell corresponds to a T.T. row , therefore there must be 2n

Cells in the k-map ( where n=no. of input variables ) .

**For two input variables (A&B) :**

B

B

B

B

A

 0 1

A

10

00

11

01

A

 0

 n=2 22 =4 cell

A

 1

**For three input variables ( A,B,C ) :**

BC

A

BC

 B C BC BC BC

 00 01 11 10

A

|  |  |  |  |
| --- | --- | --- | --- |
| AA |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| N=3 8 cell |  |  |  |
|  |  |  |  |

0

1

**For four input variables ( A,B,C,D ) :**

CD

CD

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **N=4 16 ell** |  |  |  |
|  |  |  |  |
|  |  |  |  |

 C D CD CD CD

AB

 00 01 11 10

AB

A B

 AB

AB

AB

00

01

11

10

The first step in the minimization method is to implement the T.T. to the K-map.

1’s and 0’s in the output of the T.T. is placed in the cells corresponding to the input variables of the T.T.