**2- BCD 8421 code :**

It is weighted code .

|  |  |
| --- | --- |
| **BCD 8421** | **Decimal** |
| 0000 | 0 |
| 0001 | 1 |
| 0010 | 2 |
| 0011 | 3 |
| 0100 | 4 |
| 0101 | 5 |
| 0110 | 6 |
| 0111 | 7 |
| 1000 | 8 |
| 1001 | 9 |
| 0001 0000 | 10 |
| 0001 0001 | 11 |

أكثر رقم نحتاجه هو 9

**3- Other 4-bit BCD codes :**

Many other 4-bit codes exists , such as 7421 , 6311 , 5421 ,5311 , 5211 , 2421 …..

All are weighted codes .

***EX***: (16)D  to 2421 code

1 6

0001 1100

(75)D  to 5421 code

1010 1000

(693)D to 6311 code

1000 1100 0100

|  |  |  |  |
| --- | --- | --- | --- |
| **7421** | **6311** | **2421** | **D** |
| 0000 | 0000 | 0000 | 0 |
| 0001 | 0001 | 0001 | 1 |
| 0010 | 0011 | 0010 | 2 |
| 0011 | 0100 | 0011 | 3 |
| 0100 | 0101 | 0100 | 4 |
| 0101 | 0111 | 1011 | 5 |
| 0110 | 1000 | 1100 | 6 |
| 1000 | 1001 | 1101 | 7 |
| 1001 | 1011 | 1110 | 8 |
| 1010 | 1100 | 1111 | 9 |

|  |  |  |
| --- | --- | --- |
| **5311** | **5421** | **Decimal** |
| 0000 | 0000 | 0 |
| 0001 | 0001 | 1 |
| 0011 | 0010 | 2 |
| 0100 | 0011 | 3 |
| 0101 | 0100 | 4 |
| 1000 | 1000 | 5 |
| 1001 | 1001 | 6 |
| 1011 | 1010 | 7 |
| 1100 | 1011 | 8 |
| 1101 | 1100 | 9 |

**Gray code :**

It is un weighted code the main characteristic of this code is that each gray number differs from the preceding number by single bit .

|  |  |  |
| --- | --- | --- |
| **Binary** | **Gray** | **Decimal** |
| 0000 | 0000 | 0 |
| 0001 | 0001 | 1 |
| 0010 | 0011 | 2 |
| 0011 | 0010 | 3 |
| 0100 | 0110 | 4 |
| 0101 | 0111 | 5 |
| 0110 | 0101 | 6 |
| 0111 | 0100 | 7 |
| 1000 | 1100 | 8 |
| 1001 | 1101 | 9 |
| 1010 | 1111 | 10 |
| 1011 | 1110 | 11 |
| 1100 | 1010 | 12 |
| 1101 | 1011 | 13 |
| 1110 | 1001 | 14 |
| 1111 | 1000 | 15 |
|  |  |  |

***EX***:

1 0 1 0 Gray 1 1 0 0 Binary

1 1 0 0 Binary 1 0 1 0 Gray