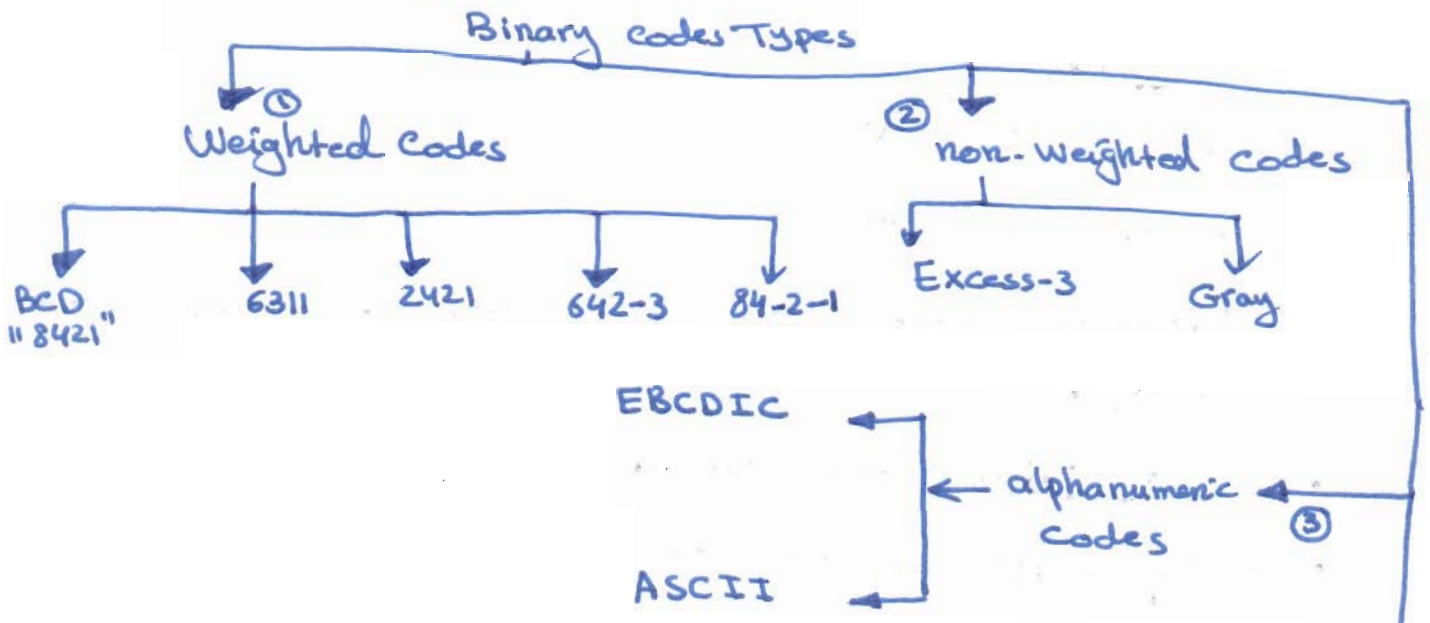
"Binary Codes"

objectives:

1. Binary Codes Types:
2. BCD code (8421 code).
3. Alphanumeric codes.
4. Excess-3 and Gray Code
5. Parity Method for error detection.

(1) Binary codes Types:



* Weighted codes and non-weighted codes are used to represent the decimal numbers.
* alphanumeric codes are used to represent the numeric and nonnumeric data (characters).
* Error detection codes are used to detect the errors during the data transmission.
* Weighted codes use 4 binary ~~digi~~ digit to represent (0-9) decimal numbers.

2. BCD code (8421) code:

Simplest form: each decimal digit is replaced by its binary equivalent.

Example: 937.25 is represented by

$\Rightarrow (937.25)_{10} = (1001\ 0011\ 0111.\ 0010\ 0101)_{BCD}$

This representation is referred to as "Binary-coded-decimal" : BCD or more explicitly as 8-4-2-1 (8421 code)

- Note : the result is quite different than that obtained by converting the number as a whole into binary.

example:2:

$854_{(10)}$ = 1000 0101 0100 (BCD)

- BCD is inefficient

e.g. To represent 999 and 999999 bits needed

- 10 and 20 in binary
- 12 and 24 for BCD

Decimal numbers	8421 (BCD)	6311	642-3
0	0000	0000	0000
1	0001	0001	0101
2	0010	0011	0010
3	0011	0100	1001
4	0100	0101	0100
5	0101	0111	1011
6	0110	1000	0110
7	0111	1001	1101
8	1000	1011	1010
9	1001	1100	1111

examples: Convert 01101000 00111001 (BCD) to its decimal equivalent.

solution: divide the BCD number into four-bit groups and convert each to decimal.

$$\underbrace{0110}_{6}\ \underbrace{1000}_{8}\ \underbrace{0011}_{3}\ \underbrace{1001}_{9}$$

3. Alpha numeric codes:

a complete alphanumeric code would include the 26 lowercase, 26 uppercase, 10 numeric digits, etc. There are many choices of codes sets to represent alphanumeric characters and several control characters.

Two well accepted code sets are used for information coding:

1. EBCDIC Code: Extended Binary coded decimal Interchange Code.
2. ASCII code: American Standard Code for Information Interchange:

The ASCII code is a seven-bit code, and so it has $2^7 = 128$ possible code groups.

Example:

	Binary	Hex		Binary	hex
A	100 0001	41	a	110 0001	61
F	100 0110	46	f	110 0110	66
Z	101 1010	5A	z	110 1111	6F
(	010 1000	28	)	010 1001	29
⋮			⋮		

Example:

write the ASCII code for the message

The email is

Answer:

T	h	e	e		
1010100	1101000	1100101	1100101		
m	a	i	l	i	s
1101101	1100001	1101001	1101100	1101001	1110011