Classification of Codes

Group of Symbols ← Codes (Number or letters in specific symbols)

- Weighted Codes
  - 1) Binary Code
  - 2) 8421
  - 3) 2421
  - Each position specific weight
  - $q_3\ q_2\ q_1\ q_0$
  - 8 4 2 1 → weight of position
  - $b_3\ b_2\ b_1\ b_0$
  - 2 4 2 1
- Non-Weighted Codes
  - Ex Excess-3 code
  - Gray Code
  - No positional weight
- Reflective code (self complementing)
  - Ex:- 2421
  - Excess-3
  - 9 → complements of 0
  - 8 → Complement of 1
  - 7 → Complement of 2
- Sequential Codes
  - Ex:- 8421
  - Excess-3
- Alpha numeri
  - ASCII
- Error Correcting & detecting
  - For noise or error correcting & detecting
  - Ex:- Hamming Code.

ASCII :- American Standard Code for Information Interchange

2421 Code

Decimal	2421 Code
0	0000
1	0001
2	0010
3	0011
4	0100
5	1011
6	1100
7	1101
8	1110
9	1111

9 is Complement of 0.

8 is 1110 → 0001

7 1101 → 0010

BCD Code

Binary Coded Decimal

→ In this Code each decimal digit is represented by a 4-bit binary number.

→ $r = 10$

$(0, 1, \ldots r-1) = (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)$

↳ decimal digit.

→ 143 → decimal number

111

decimal digit.

→ positional weights are 8-4-2-1

→ BCD Code is ~~Som~~ called 8-4-2-1

Decimal digits	BCD Code.
0	0000
1	0001 → 8-4-2-1
2	0010 → 8-4-2-0
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001

BCD code for decimal digits.

Valid BCD codes

$2^4 = 16$

only 10 are dealt

Invalid BCD codes

10 ⟶ 15 (decimal numbers)

10 ⟶ 1 & 0 (decimal digits.

10	x x x x
11	x x x x
12	x x x x
13	x x x x
14	x x x x
15	x x x x

} donot Care.

2) Conversion of Decimal Nos to BCD

i) $(17)_{10} \rightarrow (0001\ 0111)$
1 7

2) $(10)_{10} \rightarrow (0001\ 0000)$
1 0

Complete BCD representation till 15

3) $(156)_{10} \rightarrow (0001\ 0101\ 0110)$
1 5 6

3) BCD to decimal

i) $(10100)_{BCD}$

0001 0100

↓ ↓

$(1\ 4)_{10}$

ii) $(01001001)_{BCD}$

↓ ↓

$(4\ 9)_{10}$

Packed BCD nos.

BCD nos greater than 9 are packed BCD.

Ex:- (138) , (156)

Binary Compared with BCD

	binary	BCD
$(10)_{10} \rightarrow$	1010	0001 0000
$(12)_{10} \rightarrow$	1100	0001 0010

Binary has 4 bits & BCD uses more bits

BCD is less efficient than binary.

Difficult to operate Arithemthic Opns.

H.W

1) 37
2) 186
3) 3489

} Convert to BCD

4) 100110
5) 0011001 1000
6) 1110 1100

} Convert to decimal