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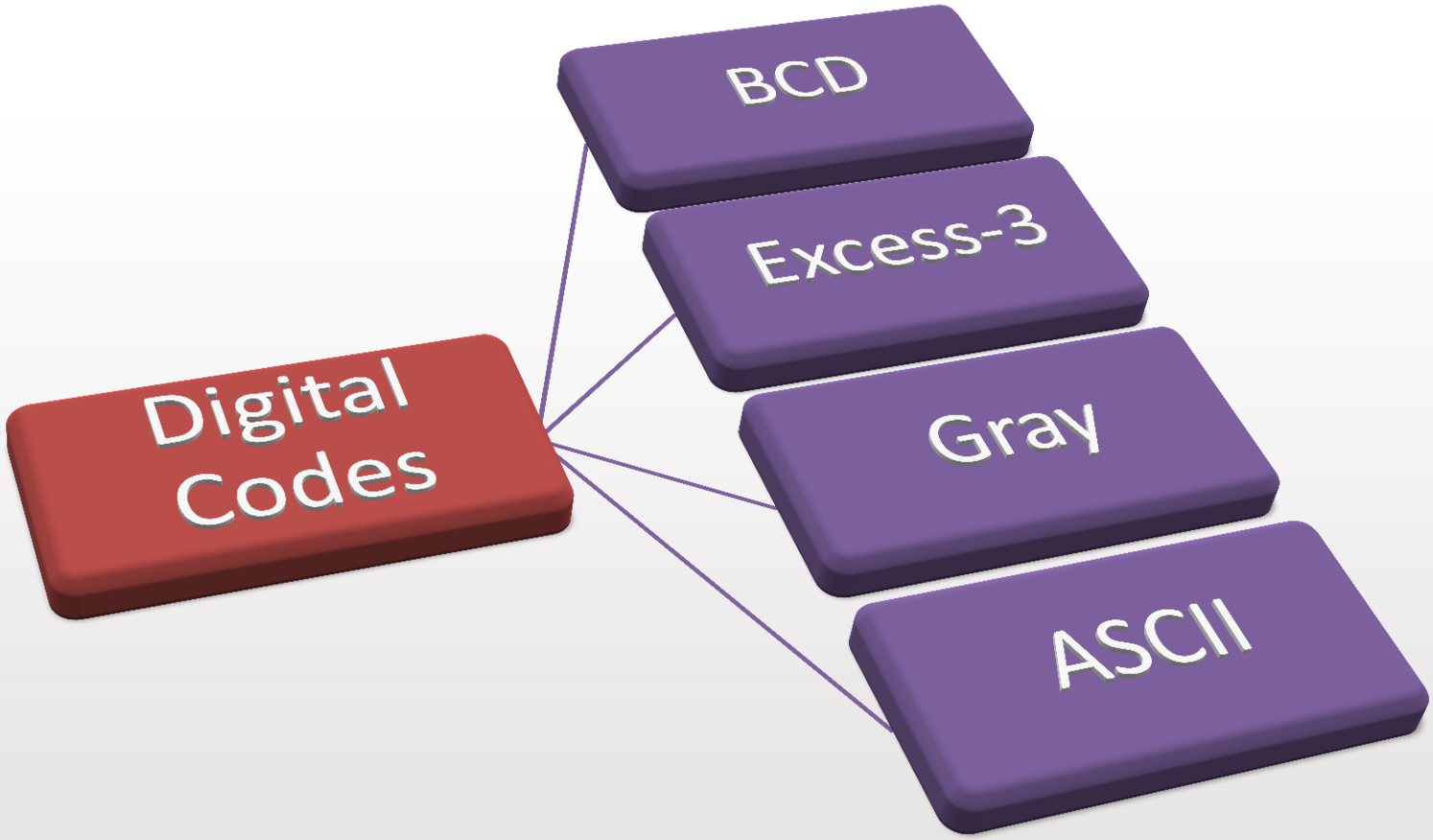
ONLINE LEARNING

Digital Electronics (SKEE1223)

Digital Codes

Muhammad Arif Abd Rahim
Muhammad Mun'ím Ahmad Zabidi
Ab Hadi Abd Rahman

Faculty of Electrical Engineering


Digital Codes
BCD
Excess-3
Gray
ASCII

BCD (Binary-Coded Decimal)

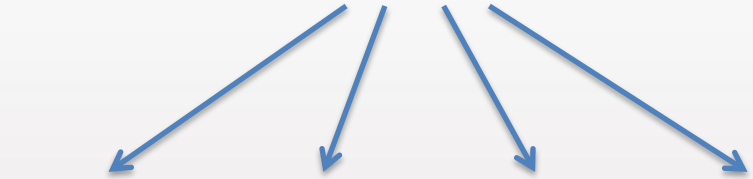
- Four-bit code that represents one of the ten decimal digits from 0 to 9.
- BCD code requires more bits than straight binary code.
- Suitable for input and output operations in digital systems.
- Two kinds, based on weighting: 8421 and 2421
- BCD 2421 is self-complementing code, means inverting all bits in a coded number yields 9's complement of the number itself.

BCD Code

Decimal	BCD (8421)	BCD (2421)
0	0000	0000
1	0001	0001
2	0010	0010
3	0011	0011
4	0100	0100
5	0101	1011
6	0110	1100
7	0111	1101
8	1000	1110
9	1001	1111

BCD Code

Decimal number 5103



BCD Code 0101 0001 0000 0011

Excess-3 (XS3) Code

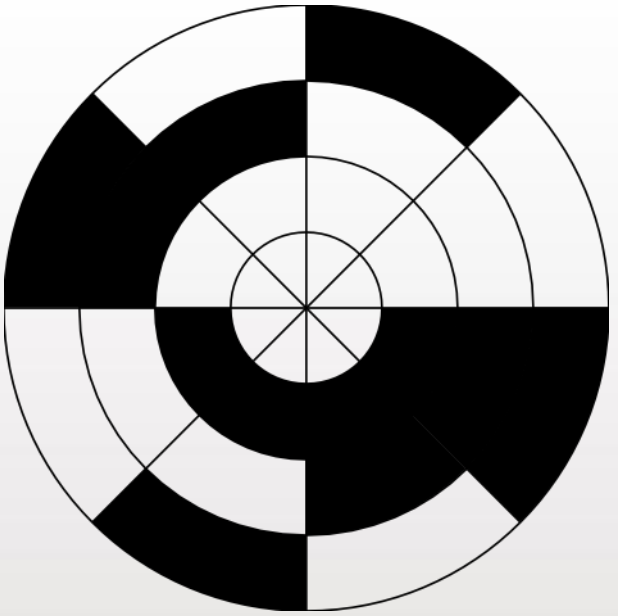
- Obtained by adding binary 0011 to the natural BCD code of the digit.
- It is not weighted code.
- Its self-complementing code, means inverting all bits in a coded number yields 9's complement of the number itself.
- Used in systems performing subtraction operations.

Excess-3 Code

Decimal	Excess-3
0	0011
1	0100
2	0101
3	0110
4	0111
5	1000
6	1001
7	1010
8	1011
9	1100

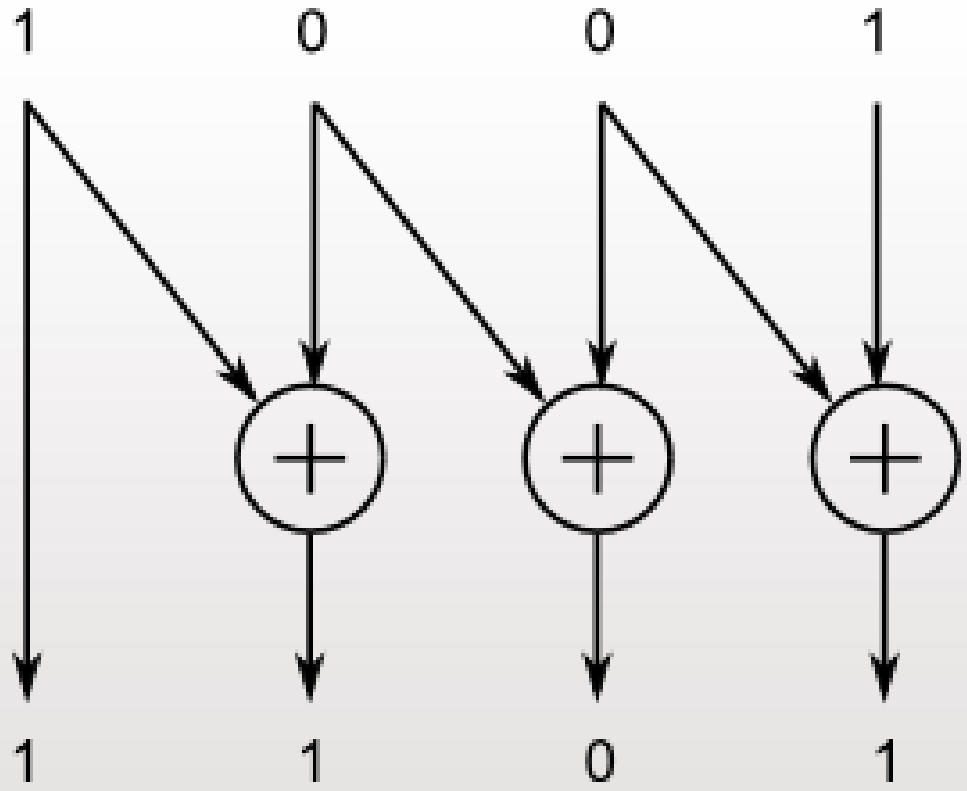
Gray Code

- Differs from leading and following number by a single bit.
- No weights are assigned to the bit positions.
- Extensively used in shaft encoders.

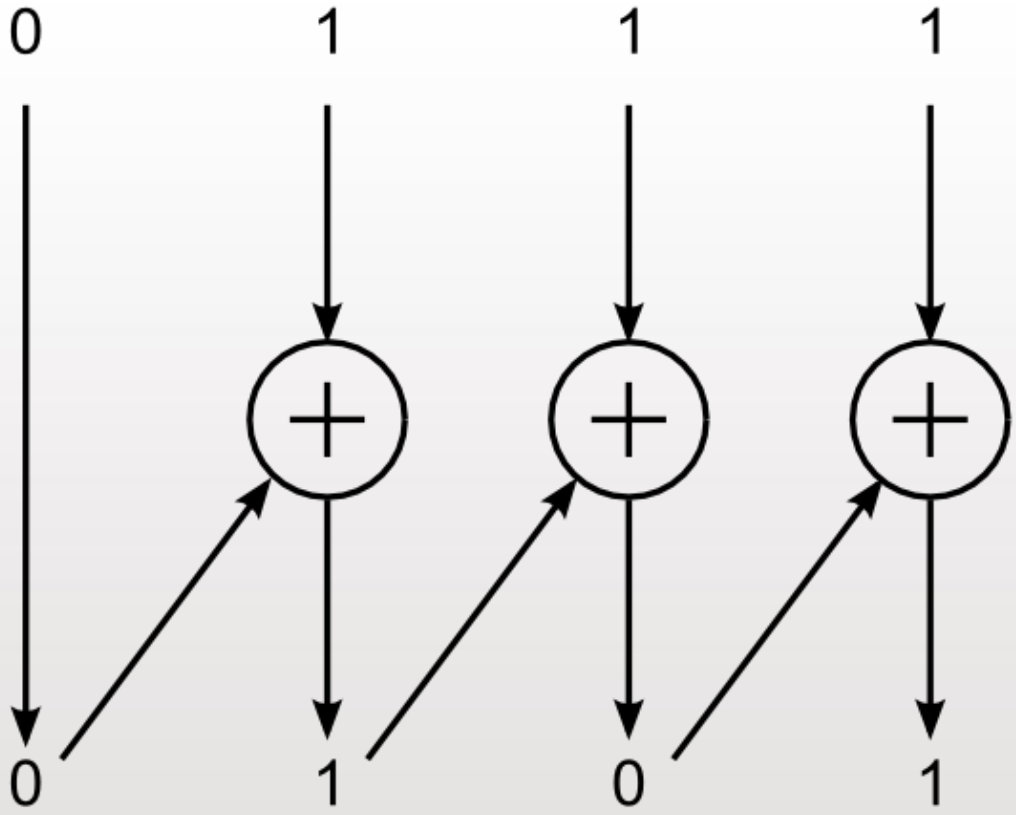


A shaft encoder.

Binary to Gray



Gray to Binary



ASCII Code

- Stands for American Standard Code Information Interchange
- Standard ASCII is a 7-bit code supporting 127 characters.
- Standard ASCII series starts from 00 to 7F, where 00-1F are used as control characters and 20-7F as printable symbols.
- Many other codes derived from ASCII to support non-English languages e.g. Extended ASCII, Unicode

ASCII Code Chart

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2		!	"	#	$	%	&	'	(	)	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{	|	}	~	DEL