

FYBCA SEM – I
Subject 103 – Introduction to Computer (IC)
UNIT – 3

3.1 Introduction of Number System

There are four types of number system:

1. Binary Number System (2)
2. Octal Number System (8)
3. Decimal Number System (10)
4. Hexadecimal Number System (16)

1. Binary Number System:

- Base of Binary number system is: 2.
- It contains total two numbers: 0, 1.

Examples:

$(101)_2$, $(1101)_2$, $(1001)_2$.

2. Octal Number System:

- Base of Octal number system is : 8.
- It contains total eight number numbers: 0 - 7.

Examples:

$(125)_8$, $(471)_8$, $(365)_8$.

3. Decimal Number System:

- Base of Decimal number system is: 10.
- It contains total ten numbers: 0 - 9.

Examples:

$(185)_{10}$, $(78)_{10}$, $(365)_{10}$.

4. Hexadecimal Number System:

- Base of Hexadecimal number system is: 16.
- It contains total sixteen numbers where 0 to 9 is taken as numbers and 10 to 15 are taken as alphabets where,
10 – A, 11 – B, 12 – C, 13 – D, 14 – E, 15 – F.

Examples: $(A5)_{16}$, $(79)_{16}$, $(FB5)_{16}$.


3.2 Conversion from Decimal to Binary and Binary To Decimal

3.2.1 Decimal to Binary Conversion

1) $(24)_{10} = (?)_2$

Ans.

2	24	0
2	12	0
2	6	0
2	3	1
	1	




-> $(24)_{10} = (11000)_2$

2) $(85)_{10} = (?)_2$

Ans.

2	85	1
2	42	0
2	21	1
2	10	0
2	5	1
2	2	0
	1	



-> $(85)_{10} = (1010101)_2$

3.2.2 Binary to Decimal Conversion

1. $(101)_2 = (?)_{10}$

$\rightarrow 2^0 \times 1 + 2^1 \times 0 + 2^2 \times 1$

$\rightarrow 1 + 0 + 4$

$\rightarrow 5$

$\rightarrow (101)_2 = (5)_{10}$

2. $(1011)_2 = (?)_{10}$

$\rightarrow 2^0 \times 1 + 2^1 \times 1 + 2^2 \times 0 + 2^3 \times 1$

$\rightarrow 1 + 2 + 0 + 8$

$\rightarrow 11$

$\rightarrow (1011)_2 = (11)_{10}$

3. $(10010)_2 = (?)_{10}$

$\rightarrow 2^0 \times 0 + 2^1 \times 1 + 2^2 \times 0 + 2^3 \times 0 + 2^4 \times 1$

$\rightarrow 0 + 2 + 0 + 0 + 16$

$\rightarrow 18$

$\rightarrow (10010)_2 = (18)_{10}$

4. $(1101)_2 = (?)_{10}$

$\rightarrow 2^0 \times 1 + 2^1 \times 0 + 2^2 \times 1 + 2^3 \times 1$

$\rightarrow 1 + 0 + 4 + 8$

$\rightarrow 13$

$\rightarrow (1101)_2 = (13)_{10}$

3.3 Binary Addition and Subtraction

Binary Addition:

$$0 + 0 = 0$$

$$0 + 1 = 1$$

$$1 + 0 = 1$$

$$1 + 1 = 2 \text{ (10)}$$

$$1+1+1 = 3 \text{ (11)}$$

$$1) (110)_2 + (101)_2 = (?)_2$$

$$\begin{array}{r} 110 \\ + 101 \\ \hline 1011 \end{array}$$

$$2) (101)_2 + (11)_2 = (?)_2$$

$$\begin{array}{r} 101 \\ + 11 \\ \hline 1000 \end{array}$$

$$3) (11101)_2 + (1110)_2 = (?)_2$$

$$\begin{array}{r} 11101 \\ + 1110 \\ \hline 101011 \end{array}$$

Binary subtraction:-

1) $(101)_2 - (11)_2 = (?)_2$

$$\begin{array}{r} 10 \\ \cancel{1} 0 1 \\ - \quad 1 1 \\ \hline 1 0 \end{array}$$

2) $(1101)_2 - (110)_2 = (?)_2$

$$\begin{array}{r} 10 10 \\ \cancel{1} \cancel{1} 0 1 \\ - \quad 1 1 0 \\ \hline 1 1 1 \end{array}$$

3) $(10011)_2 - (1110)_2 = (?)_2$

$$\begin{array}{r} 1 \\ \cancel{10} 10 \\ \cancel{1} 0 0 1 1 \\ - \quad 1 1 1 0 \\ \hline 1 0 1 \end{array}$$

4) $(11001)_2 - (1111)_2 = (?)_2$

$$\begin{array}{r} 1 \\ 10 \cancel{10} 10 \\ \cancel{1} \cancel{1} 0 0 1 \\ - \quad 1 1 1 1 \\ \hline 1 0 1 0 \end{array}$$

3.3 ASCII and ANSI Character Code

ASCII Code:

ASCII stands for American Standard Code for Information Interchange. It is a 7-bit character set that contains characters from 0 to 127. It represents text in computers, telecommunications equipment, and other devices.

ASCII Character Table:

ASCII control characters			ASCII printable characters								
DEC	HEX	Simbolo ASCII	DEC	HEX	Simbolo	DEC	HEX	Simbolo	DEC	HEX	Simbolo
00	00h	NULL (carácter nulo)	32	20h	espacio	64	40h	@	96	60h	`
01	01h	SOH (inicio encabezado)	33	21h	!	65	41h	A	97	61h	a
02	02h	STX (inicio texto)	34	22h	"	66	42h	B	98	62h	b
03	03h	ETX (fin de texto)	35	23h	#	67	43h	C	99	63h	c
04	04h	EOT (fin transmisión)	36	24h	\$	68	44h	D	100	64h	d
05	05h	ENQ (enquiry)	37	25h	%	69	45h	E	101	65h	e
06	06h	ACK (acknowledgement)	38	26h	&	70	46h	F	102	66h	f
07	07h	BEL (timbre)	39	27h	'	71	47h	G	103	67h	g
08	08h	BS (retroceso)	40	28h	(	72	48h	H	104	68h	h
09	09h	HT (tab horizontal)	41	29h	)	73	49h	I	105	69h	i
10	0Ah	LF (salto de línea)	42	2Ah	*	74	4Ah	J	106	6Ah	j
11	0Bh	VT (tab vertical)	43	2Bh	+	75	4Bh	K	107	6Bh	k
12	0Ch	FF (form feed)	44	2Ch	,	76	4Ch	L	108	6Ch	l
13	0Dh	CR (retorno de carro)	45	2Dh	-	77	4Dh	M	109	6Dh	m
14	0Eh	SO (shift Out)	46	2Eh	.	78	4Eh	N	110	6Eh	n
15	0Fh	SI (shift In)	47	2Fh	/	79	4Fh	O	111	6Fh	o
16	10h	DLE (data link escape)	48	30h	0	80	50h	P	112	70h	p
17	11h	DC1 (device control 1)	49	31h	1	81	51h	Q	113	71h	q
18	12h	DC2 (device control 2)	50	32h	2	82	52h	R	114	72h	r
19	13h	DC3 (device control 3)	51	33h	3	83	53h	S	115	73h	s
20	14h	DC4 (device control 4)	52	34h	4	84	54h	T	116	74h	t
21	15h	NAK (negative acknowle.)	53	35h	5	85	55h	U	117	75h	u
22	16h	SYN (synchronous idle)	54	36h	6	86	56h	V	118	76h	v
23	17h	ETB (end of trans. block)	55	37h	7	87	57h	W	119	77h	w
24	18h	CAN (cancel)	56	38h	8	88	58h	X	120	78h	x
25	19h	EM (end of medium)	57	39h	9	89	59h	Y	121	79h	y
26	1Ah	SUB (substitute)	58	3Ah	:	90	5Ah	Z	122	7Ah	z
27	1Bh	ESC (escape)	59	3Bh	;	91	5Bh	[	123	7Bh	{
28	1Ch	FS (file separator)	60	3Ch	<	92	5Ch	\	124	7Ch	|
29	1Dh	GS (group separator)	61	3Dh	=	93	5Dh	]	125	7Dh	}
30	1Eh	RS (record separator)	62	3Eh	>	94	5Eh	^	126	7Eh	~
31	1Fh	US (unit separator)	63	3Fh	?	95	5Fh	_			
127	20h	DEL (delete)									

ANSI Code:

ANSI stands for American National Standards Institute. It is used for 8-bit character sets which contains further characters from 128 to 255. It is also known as Extended ASCII characters.

ANSI Character Table:

TABLE 2			
ANSI CHARACTER SET USED IN MICROSOFT WINDOWS			
0128 €	0160	0192 À	0224 à
0129	0161 ¡	0193 Á	0225 á
0130 ,	0162 ¢	0194 Â	0226 â
0131 f	0163 £	0195 Ã	0227 ã
0132 „	0164 ¤	0196 Ä	0228 ä
0133 ...	0165 ¥	0197 Å	0229 å
0134 †	0166 ¦	0198 Æ	0230 æ
0135 ‡	0167 §	0199 Ç	0231 ç
0136 ^	0168 ¨	0200 È	0232 è
0137 ‰	0169 ©	0201 É	0233 é
0138 Š	0170 ª	0202 Ê	0234 ê
0139 <	0171 «	0203 Ë	0235 ë
0140 Œ	0172 ¬	0204 Ì	0236 ì
0141	0173 -	0205 Í	0237 í
0142	0174 ®	0206 Î	0238 î
0143	0175 ¯	0207 Ï	0239 ï
0144	0176 °	0208 Ð	0240 ð
0145 ‘	0177 ±	0209 Ñ	0241 ñ
0146 ’	0178 ²	0210 Ò	0242 ò
0147 “	0179 ³	0211 Ó	0243 ó
0148 ”	0180 ´	0212 Ô	0244 ô
0149	0181 µ	0213 Õ	0245 õ
0150 —	0182 ¶	0214 Ö	0246 ö
0151 —	0183 ·	0215 ×	0247 ÷
0152 ~	0184 ¸	0216 Ø	0248 ø
0153 ™	0185 ¹	0217 Ù	0249 ù
0154 š	0186 º	0218 Ú	0250 ú
0155 ›	0187 »	0219 Û	0251 û
0156 œ	0188 ¼	0220 Ü	0252 ü
0157	0189 ½	0221 Ý	0253 ý
0158	0190 ¾	0222 Þ	0254 þ
0159 Ÿ	0191 ¿	0223 ß	0255 ÿ

