Digital Electronics

Excercise:

1. convert the binary number 1101101001110101 to hex

solution:

$(1101101001110101)_2 = ?_{16}$

Step: Convert from base 2 to 10

1101101001110101

$= (1\times2^{15}) + (1\times2^{14}) + (0\times2^{13}) + (1\times2^{12}) + (1\times2^{2}) + (0\times2^{10}) + (1\times2^{9})$
$+ (0\times2^{8}) + (0\times2^{7}) + (1\times2^{6}) + (1\times2^{5}) + (1\times2^{4}) + (0\times2^{3}) + (1\times2^{2})$
$+ (0\times2^{1}) + (1\times2^{0})$

$= 32768 + 16384 + 0 + 4096 + 2048 + 0 + 512 + 0 + 0 + 64 + 32$
$+ 16 + 0 + 4 + 0 + 1$

$= 55925$

$= 55925_{10}$

Step2: convert 55925_{10} to base 16

		Reminder
16	55925	
16	3495 – 5	5
16	218 – 7	7
16	13 – 10(A)	10
	0 – 13(D)	13

Hence,

$55925_{10} = DA75$

So, $(1101101001110101)_2 = (55925)_{10} = (DA75)_1$

Thus, $1101101001110101_2 = DA75_{16}$

Ans:

2. convert the hex number D8C7 to binary.

Solution:

$(D8C7)_{16} = ?_2$

Here, Hexadeoimal digit

D = 13

C = 12

Step1:

convert from base 16 to 10

$(D8C7) = (13 \times 16^3) + (8 \times 16^2) + (12 \times 16^1) + (7 \times 16^1)$

$= 53248 + 2048 + 192 + 7$

$= 55495_{10}$

Step2:

convert from 55495_{10} to binary

		Reminder
2	55495	
2	27747-1	1
2	13873-1	1
2	6936-1	1
2	3468-0	0
2	1734-0	0
2	867-0	0
2	433-1	1
2	216-1	1
2	108-0	0
2	54-0	0
2	27-0	0
2	13-1	1
2	6-1	1
2	3-0	0
2	1-1	1
	0-1	

Hence,

$$55495_{10} = 1101\,1000\,1100\,0111_2$$

So,

$$(D8C7)_{16} = (55495)_{10} = (1101\,1000\,1100\,0111)$$

Ans:-

3. 10101101 in binary is equal to ____ in hexadecim and ____ in decimal.

Step1: convert from binary to hexadecimal

$$\frac{1010}{A} \quad \frac{1101}{D}$$

$$(10101101)_2 = (AD)_{16}$$

Step 2: convert from binary to decimal

$$10101101 = (1\times2^7)+(0\times2^6)+(1\times2^5)+(0\times2^4)+(1\times2^3)+(1\times2^2)+(0\times2^1)+(1\times2^0)$$

$$= 128+0+32+0+8+4+0+1$$

$$= 173_{10}$$

So, 10101101_2 in binary is equal to (AD) in hexadecimal and 173 in decimal

Ans.

4. 101 in octal is equal to ____ decimal and ____ in hexadecimal.

Step1: convert from octal to decimal

$101_8 = ?_{10}$

$101 = 1\times8^2 + 0\times8^1 + 1\times8^0$

$= 64 + 0 + 1$

$= 65_{10}$

Step2: convert from decimal to hexadecimal

$65_{10} = ?_{16}$

		Reminder
16	65	1
16	4	4
	0	

So, 101 in octal is equal to 65 decimal and 42 in hexadecimal.