HIGHER SECONDARY FIRST YEAR
Unit – I Fundamentals of Computers :: Chapter – II Number Systems
Workshop Questions

1. Identify the number system for the following numbers

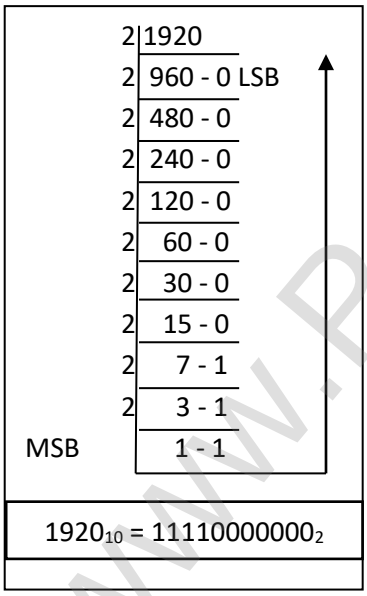
S.No	Number	Number System
1	(1010)10	here the base is 10 so Decimal Number System
2	(1010)2	here the base is 2 so Binary Number System
3	(989)16	here the base is 16 so Hexadecimal Number System
4	(750)8	here the base is 8 so Octal Number System
5	(926)10	Here the base is 10 so Decimal Number System

2. State whether the following numbers are valid or not. If invalid, give reason.

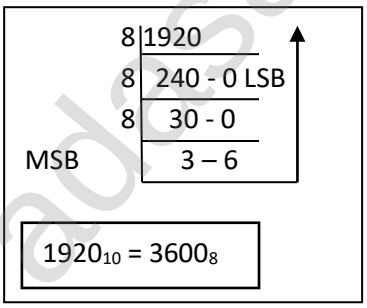
S.No	Statement	Yes / No	Reason (If invalid)
1.	786 is an Octal number	No	Octal Numbers 0 to 7 (base 8) here 2nd digit 8 not correct
2.	101 is a Binary number	Yes	Binary numbers 0 and 1 (base 2)
3.	Radix of Octal number is 7	No	Radix and Base same meaning. Octal number 0 to 7, so Radix 7 is not correct.

3. Convert the following Decimal numbers to its equivalent Binary, Octal, Hexadecimal.
A) 1920 B) 255 C)126

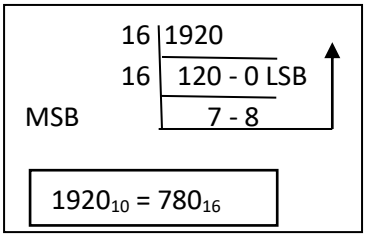
A) Decimal to Binary



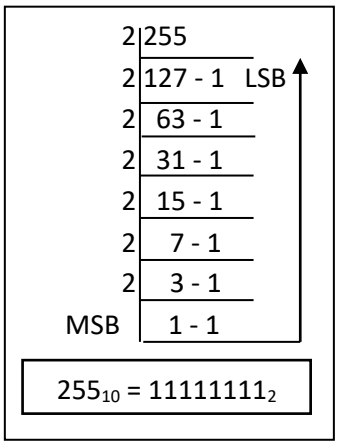
Decimal to Octal



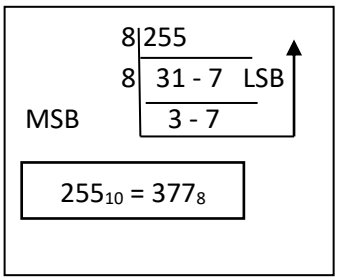
Decimal to Hexadecimal



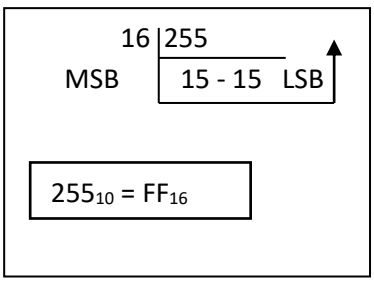
B) 255 Decimal to Binary



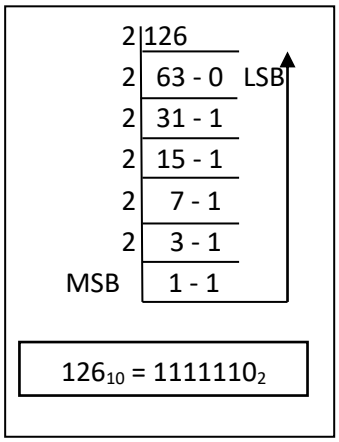
Decimal to Octal



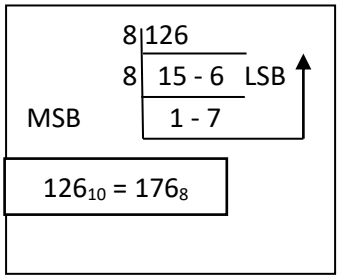
Decimal to Hexadecimal



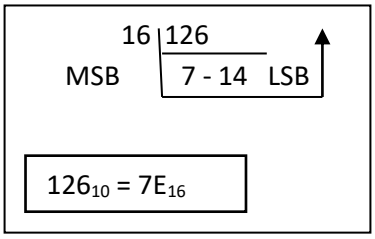
C) Decimal to Binary



Decimal to Octal



Decimal to Hexadecimal



***** Understand these tables for easy conversion**

Octal to Binary equivalent

Octal	Binary Equivalent
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Hexadecimal to Binary Equivalent

Hexadecimal	Binary Equivalent	Hexadecimal	Binary Equivalent
0	0000	8	1000
1	0001	9	1001
2	0010	A	1010
3	0011	B	1011
4	0100	C	1100
5	0101	D	1101
6	0110	E	1110
7	0111	F	1111

4. Convert the following Binary numbers to its equivalent Decimal, Octal, Hexadecimal.
   a) 101110101 b) 1011010 c)101011111

a) 101110101 **Binary to Decimal conversion**

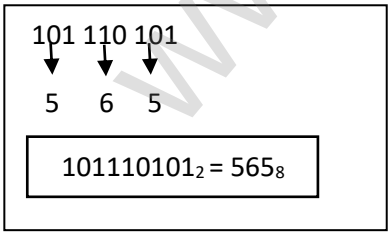
$= (1 \times 2^8) + (0 \times 2^7) + (1 \times 2^6) + (1 \times 2^5) + (1 \times 2^4) + (0 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0)$

$= 256 + 0 + 64 + 32 + 16 + 0 + 4 + 0 + 1$

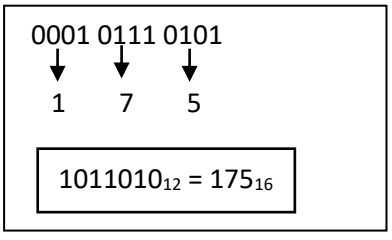
$= 373$

$101110101_2 = 373_{10}$

Binary to Octal Conversion



Binary to Hexadecimal conversion



b) 1011010 **Binary to Decimal conversion**

$= (1 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (1 \times 2^1) + (0 \times 2^0)$

$= 64 + 0 + 16 + 8 + 0 + 2 + 0$

$= 90$

$1011010_2 = 90_{10}$

Binary to Octal Conversion

001 011 010
1 3 2

$1011010_2 = 132_8$

Binary to Hexadecimal conversion

0101 1010
5 A

$1011010_2 = 5A_{16}$

c)101011111

Binary to Decimal conversion

$= (1 \times 2^8) + (0 \times 2^7) + (1 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0)$

$= 256 + 0 + 64 + 0 + 16 + 8 + 4 + 2 + 1$

$= 351$

$101011111_2 = 351_{10}$

Binary to Octal Conversion

101 011 111
5 3 7

$101011111_2 = 537_8$

Binary to Hexadecimal conversion

0001 0101 1111
1 5 F

$101011111_2 = 15F_{16}$

5. Convert the following Octal numbers into Binary numbers. (A) 472 (B) 145 (C) 347 (D) 6247 (E) 645

Use this table for easy conversion

Octal	Binary Equivalent
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

A) 472_8

4 7 2
100 111 010

$472_8 = 100111010_2$

B) 145_8

1 4 5
001 100 101

$145_8 = 001100101_2$

C) 347_8

3 4 7
011 100 111

$347_8 = 011100111_2$

D) 6247_8

6 2 4 7
110 010 100 111

$6247_8 = 110010100111_2$

E) 645_8

6 4 5
110 100 101

$645_8 = 110100101_2$

6. Convert the following Hexadecimal numbers to Binary numbers (A) A6 (B)BE (C)9BC8 (D) BC9

Hexadecimal to Binary Equivalent

Hexadecimal	Binary Equivalent	Hexadecimal	Binary Equivalent
0	**0000**	**8**	**1000**
1	**0001**	**9**	**1001**
2	**0010**	**A**	**1010**
3	**0011**	**B**	**1011**
4	**0100**	**C**	**1100**
5	**0101**	**D**	**1101**
6	**0110**	**E**	**1110**
7	**0111**	**F**	**1111**

(A) $A6_{16}$ (B) BE_{16} (C) $9BC8_{16}$ (D) $BC9_{16}$

A 6 → 1010 0110

B E → 1011 1110

9 B C 8 → 1001 1011 1100 1000

B C 9 → 1011 1100 1001

$A6_{16} = 10100110_2$ | $BE_{16} = 10111110_2$ | $9BC8_{16} = 1001101111001000_2$ | $BC9_{16} = 101111001001_2$

7. Write the 1's complement number and 2's complement number for the following decimal numbers: (A) 22 (B) -13 (C) -65 (D) -46

(A) 22

We cannot find 1's complement for $(22)_{10}$. Because it is a positive number. 1's complement apply only with negative number.

(B) -13

Binary equivalent of 13	1101
8 bit format	00001101
1's Complement	11110010
Add 1 to LSB	1
2's Complement	11110011

(C) -65

Binary equivalent of 65	1000001
8 bit format	01000001
1's Complement	10111110
Add 1 to LSB	1
2's Complement	10111111

(D) -46

Binary equivalent of 46	101110
8 bit format	00101110
1's Complement	11010001
Add 1 to LSB	1
2's Complement	11010010

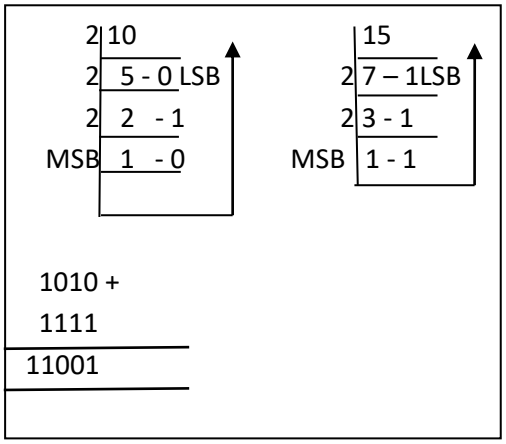
8. Perform the following binary computations: (A) $10_{10} + 15_{10}$ (B) $-12_{10} + 5_{10}$ (C) $14_{10} - 12_{10}$

(A) $10_{10} + 15_{10}$

Binary equivalent of 10 = 1010

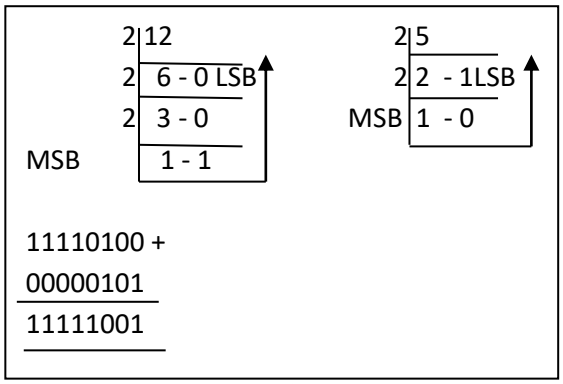
Binary equivalent of 15 = 1111

Binary addition of 10_{10} and $15_{10} = 11001_2$



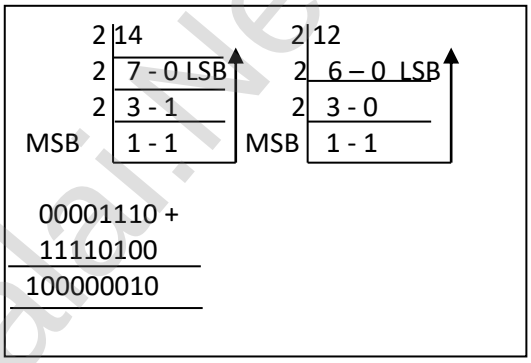
(B) $-12_{10} + 5_{10}$

Binary equivalent of 12	1100
8 bit format	00001100
1's Complement	11110011
Add 1 to LSB	1
2's Complement	**11110100**
Binary equivalent of 5	101
8 bit format	**0000 0101**
Binary addition of $-12_{10} + 5_{10}$	11111001_2



(C) $14_{10} - 12_{10}$

Binary equivalent of 14	1110
8 bit format	**00001110**
Binary equivalent of -12	1100
8 bit format	00001100
1's Complement	11110011
Add 1 to LSB	1
2's Complement	**11110100**
Binary addition of 14_{10} and -12_{10}	**100000010_2**



(D) $(-2_{10}) - (-6_{10})$

Binary equivalent of 2	10
8 bit format	00000010
1's complement	11111101
Add 1 to LSB	1
2's Complement	**11111110**
Binary equivalent of 6	110
8 bit format	00000110
1's complement	11111001
Add 1 to LSB	1
2's Complement of -2	**11111010**
Binary subtraction of -2_{10} and -6_{10}	00000100