Unit 3:- Number System

(Marks:-18)

Q.1. What is Number system? And explain the types of number system?

Ans.

Number system:-

In computer system data is store in specific format is called number system.

Base:-

Base is defined as number of symbol available in number system.

- There are **four** types of number system.

i. Binary Number System.
ii. Octal Number System.
iii. Decimal Number System.
iv. Hexa Decimal Number System.

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I. Binary Number System:-

A number system have in base is two is called binary number system.

Base: - 2.

Range:-0 to 1.

II. Octal Number System:-

A number system have in base is eight is called octal number system.

Base: - 8.

Range:-0 to 7.

III. Decimal Number System:-

A number system have in base is ten is called Decimal number system.

Base: - 10.

Range: - 0 to 9.

IV. Hexa Decimal Number System:-

A number system have in base is sixteen is called Hexa Decimal Number System.

Base:-16.

Range:- 0 to 15.

0 to 9 and A to F

A=10, C= 12 E=14.

B=11, D= 13, F=15.

1. Non positional Number System:-

A number system in which digits or value has not fix position is called Non-positional Number System.

2. Positional Number System:-

A number system in which digits or value has fix position is called Positional Number System.

Sum:-

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1. **Octal to binary:-**

~ $(7436.231)_8$====$(?)_2$

111 100 011 110. 010 011 001

Ans. $(7436.231)_8$ ==== (111 100 011 110. 010 011 001)$_2$

2. **Binary to octal:-**

~ $(110010101010.11010110)_2$====$(?)_8$

110 010 101 010 . 110 101 100

6 2 5 2 . 6 5 4

Ans. $(110010101010.11010110)_2$====$(6252.654)_8$

3. **Hexa Decimal to binary:-**

~ $(A896F.48E)_{16}$ ===== $(?)_2$

108915.4814

1010 1000 1001 0110 1111 .0100 1000 1110

Ans. $(A896F.48E)_{16}$ ===== (1010 1000 1001 0110 1111 .0100 1000 1110)$_2$

4. **Binary to hexa decimal:-**

~ $(1101011010100.1110101)_2$==== $(?)_{16}$

0001 1010 1101 0100. 1110 1010

1 A D 4 . E A

Ans. $(1101011010100.1110101)_2$==== (1AD4.EA) $_{16}$

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5. <u>Binary to decimal:-</u>

~ $(00101101001100011110000011000.110011100110)_2$ ==== $(?)_{10}$

0010 1101 0011 0001 1110 0001 1000.1100 1110 0110

2 D 3 1 E 1 8 C E 6

2D31E18CE6

Ans. $(00101101001100011110000011000.110011100110)_2$==== $(2D31E18CE6)_{10}$

6. <u>Decimal to binary:-</u>

~ $(744.58)_{10}$===== $(?)_2$

2	744		0.58*2=1.16	1
2	372	0	0.16*2=0.32	0
2	186	0	0.32*2=0.64	0
2	93	0	0.64*2=1.28	1
2	46	1	0.28*2=0.56	0
2	23	0		
2	11	1		
2	5	1		
2	2	1		
2	1	0		
	0	1		

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1 0 1 1 1 0 1 0 0 0

512 256 128 64 32 16 8 4 2 1

Ans. $(744.58)_{10}$=====$(1011101000.10010)_2$

7. <u>Decimal to octal</u>:-

~ $(376.44)_{10}$==== $(?)_8$

8	376		0.44*8=3.52	3
8	47	0	0.52*8=4.16	4
8	5	7	0.16*8=1.28	1
	0	5		

Ans. $(376.44)_{10}$====$(570.341)_8$

8. <u>Decimal to Hexa Decimal</u>:-

~ $(2348.30)_{10}$====$(?)_{16}$

16	2348	
16	146	12
16	9	2
	0	9

0.30*16= 4.80 4

0.80*16= 12.8 12

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0.80*16= 12.8 12

Ans. $(2348.30)_{10}$====$(92C.4CC)_{16}$

9. Hexa Decimal to Octal:-

~ $(B973.29C)_{16}$==== $(?)_8$

001 011 100 101 110 011.001 010 011 100

1 3 4 5 6 3 . 1 2 3 4

Ans. $(B973.29C)_{16}$====$(134563.1234)_8$

10. Octal to Hexa Decimal:-

~ $(732.351)_8$====$(?)_{16}$

0001 1101 1010.0111 0100 1000

1 D A . 7 4 8

Ans. $(732.351)_8$====$(1DA.748)_{16}$

11. Binary to Decimal:-

~ $(110010.0110)_2$==== $(?)_{10}$

- 5 4 3 2 1 0

  1 1 0 0 1 0

$= 2^5*1+2^4*1+2^3*0+2^2*0+2^1*1+2^0*0$

$= 32*1+16*1+8*0+4*0+2*1+1*0$

$= 50.$

- 1 2 3 4

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0 1 1 0

$= 2^{-1}*0+ 2^{-2}*1+2^{-3}*1+2^{-4}*0$

$= 0.5*0+0.25*1+0.125*1+0.0625*0$

$= 0+0.25+0.125+0$

$=0.375.$

Ans. $(110010.0110)_2$====$(50.375)_{10}$

11. <u>Octal to Decimal</u>:-

~ $(723.27)_8$====$(?)_{10}$

- <u>2 1 0</u>
  7 2 3

$= 8^2*7+8^1*1+8^0*3$

$=64*7+16*1+1*3$

$=448+16+3$

$=467$

- <u>1 2</u>
  2 7

$= 8^{-1}*2+8^{-2}*7$

$=0.125*2+ 0.0625*7$

$=0.250+0.4375$

$= 0.6875$

Ans. $(723.27)_8$====$(467.6875)_{10}$

12. <u>Hexa Decimal to Decimal</u>:-

~ $(B829.F2)_{16}$====$(?)_{10}$

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- 3 2 1 0
  B 8 2 9

$=16^3*11+16^2*8+16^1*2+16^0*9$

$= 4096*11+256*8+16*2+1*9$

$= 45056+2048+32+9$

$=47145$

- 1 2
  F 2

$=16^{-1}*1+16^{-2}*2$

$= 0.0625*1+0.0039*2$

$=0.0625+0.0078$

$=0.6328$

Ans. $(B829.F2)_{16}$====$(47145.6328)_{10}$

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❖ **Addition**:-

1. 63+20=(?)

```
   1 1
  0 1 1 0   0 0 1 1
  0 0 1 0   0 0 0 0
 ---------------------
  1 0 0 0   0 0 1 1
 ---------------------
    8           3
```

2. 843+521=(?)

```
      1000 0100 0011
      0101 0010 0001
 ----------------------
      1
      1101 0110 0100
      0110    6    4
 ----------------------
 0001 0011    6    4
 ----------------------
   1    3    6    4
```

3. 537+241=(?)

```
  0101 0011 0111
  0010 0100 0001
 ----------------------
  0111 0111 1000
 ----------------------
    7    7    8
```

Values	Sum	Carry
0+0	0	0
0+1	1	0
1+1	0	1
1+1+1	1	1

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❖ **Subtraction**:-

1. 54-32=(?)

0101 0100

0011 0010

0010 0010

2 2

3.111100-000101=(?)

111 100

000 101

111 011

7 3

2. 63-20=(?)

0110 0011

0010 0000

0100 0011

4 3

Value	Difference	Barrow
0-0	0	0
0-1	1	1
1-0	1	0
1-1	0	0

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