Unit 5 Number systems

5.0 Unit Objectives:

By the end of this Unit, learners should be able to:

- Understand need of different number systems.
- Convert a decimal number to binary number.
- Convert a binary number to decimal number.
- Add and subtract binary numbers.
- Convert a decimal number to octal number.
- Convert an octal number to decimal number.
- Convert a decimal number to hexadecimal number.
- Convert a hexadecimal number to decimal number

5.1 Unit Introduction:

While doing any calculations in our day to day life, generally we use the decimal number system. The number 10 is called the basis or radix of this number system. The different individual symbols used to write numbers in the decimal system are called digits. The numbers 0 to 9 are the digits used for decimal system.

There are other number systems which are mostly used in computer and telecommunication fields. In computer science data is converted into information and information is expressed in words. A computer word is a sequence of combinations of only two digits which are 0 and 1. These two digits are called binary digits or in short bits. The fundamental grouping of bits is called a byte rather than a word. This 2- digit number system is ideal for coding purpose for the computers because of the two state natures of the electronic components, which are used in computers. This number system is called as binary number system.

In this unit we are going to study how to convert numbers from any system to another system. While studying different number systems, the basis using which the number is written, is indicated as a subscript to the lower right side e.g. $(125)_{10}$ denotes the decimal number 125, while $(125)_8$ denotes the decimal number 125 and $(1100101)_2$ denotes a binary number.

5.2: The Binary number system

In decimal number system the base is equal to 10 because any position in a number can be occupied by one of the 10 digits which are 0, 1, 2, 3 **…,**9, while in binary number system the base is equal to 2 and the numbers are written using only 2 digits which are 0 and 1. This system has a carrying factor of 10 and each digit indicates a value which depends on the position it occupies.

For example, in the decimal number 23456 the digit 2 signifies 2×10000, the digit 3 signifies 3×1000, the digit 4 signifies 4×100, the digit 5 signifies 5×10 and the digit 6 signifies 6×1 or 6 .

5.2.1: Conversion of a decimal number to a binary number:

The procedure of converting a decimal number to its binary equivalent consists of dividing the decimal number by 2, until we get a quotient of zero. The remainders of these different divisions are written in the opposite order to to that in which they are obtained. The number written in this way is the binary representation of the decimal number.

Examples:

1. Conversion of $(25)_{10}$ into its binary equivalent number is performed as follows:

Number	Quotient when divided by 2	Remainder
25	12	1
12	6	0
6	3	0
3	1	1
1	0	1

We write the string of remainders from bottom to the top, it is the required binary equivalent. $\therefore (25)_{10} = (11001)_2$.

2. Conversion of $(142)_{10}$ into its binary equivalent number:

Number	Quotient when divided by 2	Remainder
142	71	0
71	35	1
35	17	1
17	8	1
8	4	0
4	2	0
2	1	0
1	0	1

We write the string of remainders from bottom to the top, it is the required binary equivalent. $\therefore (142)_{10} = (10001110)_2$.

3. Conversion of $(30)_{10}$ into its binary equivalent number is performed as follows:

Number	Quotient when divided by 2	Remainder
30	15	0
15	7	1
7	3	1
3	1	1
1	0	1

Write the string of remainders from bottom to the top, it is the required binary equivalent. $\therefore$ $(30)_{10} = (1111\ 0)_2$.

5.2.2: Conversion of a binary number to a decimal number:

For binary number system the basis is 2 and every number is written using the bits i.e. 0 and 1. To convert a number from binary number system to decimal number system following procedure is used. We multiply the rightmost bit by 2^0, then second right bit by 2^1, the third right bit by 2^2 and continue in this manner till we reach the first bit. These products are then added to find the required decimal equivalent.

Examples:

1. Conversion of $(11001)_2$ into decimal equivalent number is performed in following steps:

$$
\begin{aligned}
(11001)_2 &= (1 \times 2^4) + (1 \times 2^3) + (0 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) \\
&= (1 \times 16) + (1 \times 8) + 0 + 0 + (1 \times 1) \\
&= 16 + 8 + 1 \\
&= (25)_{10} .
\end{aligned}
$$

2. Conversion of $(10001110)_2$ into decimal equivalent number:

$$
\begin{aligned}
(10001110)_2 &= (1 \times 2^7)+(0\times 2^6)+(0\times 2^5)+(0\times 2^4)+(1\times 2^3)+(1\times 2^2)+(1 \times 2^1)+(0 \times 2^0) \\
&= (1 \times 128) + 0 + 0 + 0\ (1 \times 8) + (1 \times 4) + (1 \times 2) + (0 \times 1) \\
&= 128 + 8 + 4 + 2 \\
&= (142)_{10} .
\end{aligned}
$$

3. Conversion of $(11110)_2$ into decimal equivalent number:

$$
\begin{aligned}
(11110)_2 &= (1 \times 2^4) + (1 \times 2^3) + (1\times 2^2) + (1 \times 2^1) + (0 \times 2^0) \\
&= (1 \times 16) + (1 \times 8) + (1 \times 4) + (1 \times 2) + 0 \\
&= 16 + 8 + 4 + 2
\end{aligned}
$$

$= (30)_{10}$.

❖ ***<u>Self Test I</u>*: Select the correct alternative from the given alternatives.**

1. What is the basis for decimal number system ?
(a) 2 **(b)** 8 **(c)** 10 **(d)** 16.
2. What is the basis for binary number system?
(a) 2 **(b)** 8 **(c)** 10 **(d)** 16.
3. What is the significant value of the digit 4 in the decimal number 5436?
(a) 4×10 **(b)** 4×1 **(c)** 4×100 **(d)** 4×1000.
4. What is the binary equivalent of the decimal number 12?
(a) 1010 **(b)** 1100 **(c)** 1101 **(d)** 1110.
5. What is the binary equivalent of the decimal number 59?
(a) 111011 **(b)** 11100 **(c)** 11101 **(d)** 11110
6. What is the binary equivalent of the decimal number 184?
(a) 1010111 **(b)** 1111100 **(c)** 11101 **(d)** 10 111000.
7. What is the decimal equivalent of the binary number 1110?
(a) 12 **(b)** 13 **(c)** 14 **(d)** 15 .
8. What is the decimal equivalent of the binary number 11111?
(a) 21 **(b)** 31 **(c)** 41 **(d)** 55 .
9. What is the decimal equivalent of the binary number 101010?
(a) 42 **(b)** 43 **(c)** 44 **(d)** 45 .
10. What is the decimal equivalent of the binary number 1001000?
(a) 71 **(b)** 72 **(c)** 73 **(d)** 75 .

5.3: Addition and subtraction of binary numbers:

In machine language number are represented using binary number system. So when arithmetic operations such as addition and subtraction are performed, the result is also binary numbers. We can perform addition, subtraction, multiplication and division of binary numbers. Here we will study only the addition and subtraction of binary numbers.

5.3.1: Addition of binary numbers:

The addition of binary numbers is done in a similar way, to that for decimal numbers, except that a 1 is carried to the next left column when two 1s are added.

Following are the basic rules for binary addition:
0 + 0 = 0 i.e. when 0 is added to 0 the addition is 0.
1 + 0 = 1 i.e. when 1 is added to 0 the addition is 1.
0 + 1 = 1 i.e. when 0 is added to 1 the addition is 1.
1 + 1 = 10 i.e. when 1 is added to 1 the addition is 10, but it is written as 0 with a carry of 1.

Examples:

1. Let us find $(1\ 1)_2 + (0\ 1)_2$.

$$\begin{array}{rrrl} {\scriptstyle 1} & {\scriptstyle 1} & & {\scriptstyle \text{carry}} \\ & 1 & 1 & \\ + & 0 & 1 & \\ \hline 1 & 0 & 0 & \end{array}$$

While doing this addition, in the rightmost column we get 1 +1 = 1 0 . So 0 is written with a carry 1 to the 2nd column from right side.
In the 2nd column from the right side the carry 1 is added to 1 + 0 i.e. value for this column is 1+(1 + 0) = 1+ 1 = 1 0.
∴ In the 2nd column from the right side addition is 0 with carry 1 to the next column.
∴ In the addition in left most column the carry 1 is written.
So $(1\ 1)_2 + (0\ 1)_2 = (1\ 0\ 0)_2$.

2. We will find $(1\ 1)_2 + (1\ 1\ 1)_2$.

$$\begin{array}{rrrrl} & {\scriptstyle 1} & {\scriptstyle 1} & & {\scriptstyle \text{carry}} \\ & & 1 & 1 & \\ + & 1 & 1 & 1 & \\ \hline 1 & 0 & 1 & 0 & \end{array}$$

While doing this addition, in the rightmost column we get 1 +1 = 1 0 .
So 0 is written in the rightmost column, with a carry 1 to the 2nd column from right side.
In the 2nd column from the right side the carry 1 is added to 1 + 1 i.e. value for this column is 1+(1 + 1) = 1+ 10 = 1 1.
∴ In the 2nd column from the right side addition is 1 with carry 1 to the next column.
In the 3rd column from the right side the carry 1 is added to 1 + 1 i.e. value for this column is 1+(0 + 1) = 1+ 1 = 1 0.

∴ In the 3rd column from the right side addition is 0, with carry 1 to the next column.

∴ In the addition, left most column entry is the carry 1.

So $(1\ 1)_2 + (1\ 1\ 1)_2 = (1\ 0\ 1\ 0)_2$.

3. Consider the addition $(1\ 1\ 1\ 0\ 0)_2 + (1\ 0\ 0\ 1\ 1)_2$.

$$\begin{array}{cccccc} 1 & & & & & \text{carry} \\ & 1 & 1 & 1 & 0 & 0 \\ + & 1 & 0 & 0 & 1 & 1 \\ \hline 1 & 0 & 1 & 1 & 1 & 1 \end{array}$$

While doing this addition, in the rightmost column we get 0 +1 = 1.
In the 2nd column from the right side the addition is 0 +1 = 1.
In the 3rd column from the right side the addition is 1 + 0 = 1.
In the 4th column from the right side the addition is 1 + 0 = 1.
In the 5th column from the right side the addition is 1 + 1 = 1 0. So 0 is written in the In the 5th column from the right side, with carry 1 to the next column.

∴ In the addition, left most column entry is the carry 1.

So $(1\ 1\ 1\ 0\ 0)_2 + (1\ 0\ 0\ 1\ 1)_2 = (1\ 0\ 1\ 1\ 1\ 1)_2$.

5.3.2: Subtraction of binary numbers:

The subtraction of binary numbers is also done in a similar way , to that for decimal numbers. Following are the basic rules for binary addition:0 3

0 – 0 = 0 i.e. when 0 is subtracted from 0 the subtraction is 0.
1 – 0 = 1 i.e. when 0 is subtracted from 1 the subtraction is 1.
1 – 1 = 0 i.e. when 1 is subtracted from 1 the subtraction is 0.
10 – 1 = 1 i.e. when 1 is subtracted from 1 0 the subtraction is 1.

Examples:

1. Subtract $(0\ 1)_2$ from $(1\ 1)_2$.

$$\begin{array}{ccc} & 1 & 1 \\ - & 0 & 1 \\ \hline & 1 & 0 \end{array}$$

While doing this subtraction, in the rightmost column we get 1 –1 = 0. In the 2nd column from the right side we get 1 – 0 = 1.

So $(1\ 1)_2 - (1\ 0)_2 = (1\ 0)_2$.

2. Find $(1\,0\,0\,1)_2 - (1\,1\,0)_2$.

$$\begin{array}{rcccc} & & \scriptstyle 1 & & \scriptstyle \text{carry} \\ & 1 & 0 & 0 & 1 \\ - & & 1 & 1 & 0 \\ \hline & 0 & 0 & 1 & 1 \end{array}$$

While doing this subtraction, in the rightmost column we get 1 – 0 = 1.
In the 2nd column from the right side 1 cannot be subtracted from 0, so we borrow 1 from the 3rd column from the right side. Then in the 2nd column we obtain the value 10 – 1 = 1.

In the 3rd column from the right side we want 0 – (1+1), because the borrowed 1 is to be subtracted. So we borrow 1 from the 4th column from the right side. Then in these two columns we obtain the value
10 – (1 +1) = 10 – 10 = 00 .

$\therefore\ (1\ 0\ 0\ 1)_2 - (1\ 1\ 0)_2 = (0\ 1\ 1)_2$.

3. Consider the subtraction $(1\,1\,1\,0\,0)_2 - (1\,0\,0\,1\,1)_2$.

$$\begin{array}{rccccc} & 1 & 1 & 1 & 0 & 0 \\ - & 1 & 0 & 0 & 1 & 1 \\ \hline & 0 & 1 & 0 & 0 & 1 \end{array}$$

While doing this subtraction, in the rightmost column 1 cannot be subtracted from 0, so we borrow 1 from the 2nd column from the right side and obtain the value 10 – 1 = 1.
In the 2nd column from the right side 1 + borrowed 1 = 1+1 = 10 cannot be subtracted from 0, so we borrow 1 from the 3rd column from the right side and obtain the value 10 – 10 = 0.
In the 3rd column from the right side the subtraction is 1 – 0 = 1.
In the 4th column from the right side the subtraction is 1 – 0 = 1.
In the 5th column from the right side the subtraction is 1 – 1 = 0.

$\therefore\ (1\,1\,1\,0\,0)_2 - (1\,0\,0\,1\,1)_2 = (1\,0\,0\,1)_2$.

❖ ***Self Test II*****: Select the correct alternative from the given alternatives.**

1. What is the value of 1 + 1, in binary number system?
(a) 0 **(b)** 1 **(c)** 10 **(d)** 11.
2. What is the value of 11 + 11, in binary number system?
(a) 110 **(b)** 111 **(c)** 101 **(d)** 011.
3. What is the value of 1010 +1111, in binary number system?
(a) 10001 **(b)** 11001 **(c)** 1001 **(d)** 1101.
4. What is the value of 11001 + 10101, in binary number system?
(a) 1011110 **(b)** 11111 **(c)** 101110 **(d)** 101011.
5. What is the value of 1110 + 110111, in binary number system?
(a) 111110 **(b)** 111000 **(c)** 101010 **(d)** 1000101.
6. What is the value of 1 0 – 1, in binary number system?
(a) 0 **(b)** 1 **(c)** 10 **(d)** 11.
7. What is the value of 111 – 10, in binary number system?
(a) 110 **(b)** 111 **(c)** 101 **(d)** 011.
8. What is the value of 10100 – 11 11, in binary number system?
(a) 101 **(b)** 1001 **(c)** 1010 **(d)** 110.
9. What is the value of 11001 – 10101, in binary number system?
(a) 101 **(b)** 111 **(c)** 100 **(d)** 1010.
10. What is the value of 111001 – 110111, in binary number system?
(a) 11110 **(b)** 1110 **(c)** 110 **(d)** 10.

5.4: The Octal number system:

In octal number system the base is equal to 8. The numbers are written using 8 different symbols which are the digits from 0 to 9. We call these digits by their usual decimal names i.e. zero, one, two etc. Each digit indicates a value which depends on the position it occupies.

5.4.1: Conversion of a decimal number to a octal number:

The procedure of converting a decimal number to its octal equivalent is similar to the procedure of converting a decimal number to its binary equivalent. This procedure consists of dividing the decimal number by 8, until we get a quotient of zero. The remainders of these different divisions are written in the opposite order to that, in which they are obtained. The number written in this way is the octal representation of the decimal number.

Examples:

1. Conversion of $(25)_{10}$ into its octal equivalent number is performed as follows:

Number Quotient when divided by 8 Remainder

25	3	1
3	0	3

We write the remainders from bottom to the top, it is the required octal equivalent. $\therefore$ $(25)_{10} = (31)_8$.

2. Conversion of $(111)_{10}$ into its octal equivalent number:

Number	Quotient when divided by 8	Remainder
111	13	7
13	1	5
1	0	1

We write the remainders from bottom to the top, it is the required octal equivalent. $\therefore$ $(111)_{10} = (157)_8$.

3. Conversion of $(845)_{10}$ into its octal equivalent number:

Number	Quotient when divided by 8	Remainder
845	105	5
105	13	1
13	1	5
1	0	1

Write the f remainders from bottom to the top, it is the required octal equivalent. $\therefore$ $(845)_{10} = (1515)_8$.

4. Conversion of $(2088)_{10}$ into its octal equivalent number:

Number	Quotient when divided by 8	Remainder
2088	261	0
261	32	5
32	4	0
4	0	4

Write the f remainders from bottom to the top, it is the required octal equivalent. $\therefore$ $(2088)_{10} = (4050)_8$.

5.4.2: Conversion of an octal number to a decimal number:

To convert a number from octal number system to decimal number system following procedure is used. We multiply the rightmost bit by 8^0, then second right bit by 8^1, the third right bit by 8^2 and continue in this manner till we reach the leftmost bit. These multiplications are then added to find the required decimal equivalent.

Examples:

1. Conversion of $(31)_8$ into decimal equivalent number is performed in following steps:

$$\begin{aligned}(31)_8 &= (3 \times 8^1) + (1 \times 8^0) \\ &= (3 \times 8) + (1 \times 1) \\ &= 24 + 1 \\ &= (25)_{10}.\end{aligned}$$

2. Conversion of $(157)_8$ into decimal equivalent number:

$$\begin{aligned}(157)_8 &= (1\times 8^2) + (5 \times 8^1) + (7 \times 8^0) \\ &= (1\times 64) + (5 \times 8) + (7 \times 1) \\ &= 64 + 40 + 7 \\ &= (111)_{10}.\end{aligned}$$

3. Conversion of $(1515)_8$ into decimal equivalent number:

$$\begin{aligned}(1515)_8 &= (1 \times 8^3) + (5 \times 8^2) + (1 \times 8^1) + (5 \times 8^0) \\ &= (1 \times 512) + (5 \times 64) + (1 \times 8) + (5 \times 1) \\ &= 512 + 320 + 8 + 5 \\ &= (845)_{10}.\end{aligned}$$

4. Conversion of $(4050)_8$ into decimal equivalent number:

$$\begin{aligned}(4050)_8 &= (4 \times 8^3) + (0 \times 8^2) + (5\times 8^1) + (0 \times 8^0) \\ &= (4 \times 512) + 0 + (5 \times 8) + 0 \\ &= 2048 + 40 \\ &= (2088)_{10}.\end{aligned}$$

❖ ***<u>Self Test III</u>*: Select the correct alternative from the given alternatives.**

1. What is the basis for octal number system?

(a) 2 **(b)** 8 **(c)** 10 **(d)** 16.

2. Which of the following is not a valid octal number ?

(a) 2467 **(b)** 3489 **(c)** 1000 **(d)** 1756.

3. What is the octal equivalent of the decimal number 12?
(a) 14 **(b)** 11 **(c)** 101 **(d)** 10.
4. What is the octal equivalent of the decimal number 59?
(a) 71 **(b)** 72 **(c)** 73 **(d)** 74.
5. What is the octal equivalent of the decimal number 184?
(a) 275 **(b)** 267 **(c)** 270 **(d)** 184.
6. What is the octal equivalent of the decimal number 1882?
(a) 3532 **(b)** 3235 **(c)** 3625 **(d)** 1000.
7. What is the decimal equivalent of the octal number 110?
(a) 72 **(b)** 73 **(c)** 74 **(d)** 75 .
8. What is the decimal equivalent of the octal number 1111?
(a) 558 **(b)** 855 **(c)** 585 **(d)** 888.
9. What is the decimal equivalent of the octal number 1631?
(a) 12 9 **(b)** 913 **(c)** 921 **(d)** 219 .
10. What is the decimal equivalent of the octal number 7714?
(a) 4404 **(b)** 4440 **(c)** 4440 **(d)** 4044.

5.5: The Hexadecimal number system:

For the hexadecimal number system the base is equal to 16. In this system the numbers are written using 16 different symbols. The symbols used are the digits from 0 to 9 and the letters A, B, C, D, E, and F. Therefore in the hexadecimal number system the letter “A” has the value “10”, “B” has the value “11”, “C” has the value “12”, “D” has the value “13”, “E” has the value “14”, and “F” has the value “15”. We call these symbols by their common names.

5.5.1: Conversion of a decimal number to a hexadecimal number:

The procedure of converting a decimal number to its hexadecimal equivalent is similar to the procedure of converting a decimal number to its octal equivalent. This procedure consists of dividing the decimal number by 16, until we get a quotient of zero. The remainders of these different divisions are written in the opposite order to that, in which they are obtained. The number written in this way is the hexadecimal representation of the decimal number.

Examples:

1. Conversion of $(25)_{10}$ into its hexadecimal equivalent number is performed as follows:

Number	Quotient when	Remainder	Symbol for

	divided by 16	in decimal digits	Remainder
25	1	9	9
1	0	1	1

We write the remainders from bottom to the top, it is the required hexadecimal equivalent of 25. $\therefore$ $(25)_{10} = (19)_{16}$.

2. Conversion of $(22850)_{10}$ into its hexadecimal equivalent number:

Number	Quotient when divided by 16	Remainder in decimal digits	Symbol for Remainder
22850	1428	2	2
1428	89	4	4
89	5	9	9
5	0	5	5

We write the remainders from bottom to the top, it is the required hexadecimal equivalent. $\therefore$ $(22850)_{10} = (5942)_{16}$.

3. Conversion of $(43981)_{10}$ into its hexadecimal equivalent number:

Number	Quotient when divided by 16	Remainder in decimal digits	Symbol for Remainder
43981	2784	13	D
2784	174	12	C
174	10	11	B
10	0	10	A

Write the remainders from bottom to the top, it is the required hexadecimal equivalent. $\therefore$ $(43981)_{10} = (\text{A B C D})_{16}$.

4. Conversion of $(10895)_{10}$ into its hexadecimal equivalent number:

Number	Quotient when divided by 16	Remainder in decimal digits	Symbol for Remainder
10895	680	15	F
680	42	8	8
42	2	10	A
2	0	2	2

Write the f remainders from bottom to the top, it is the required hexadecimal equivalent. $\therefore$ $(10895)_{10} = (2\,A\,8\,F\,)_{16}$.

5.5.2: Conversion of an hexadecimal number to a decimal number:

To convert a number from hexadecimal number system to decimal number system following procedure is used. We multiply the rightmost bit by 16^0, then second right bit by 16^1, the third right bit by 16^2 and continue in this manner till we reach the leftmost bit. These multiplications are then added to find the required decimal equivalent.

Examples:

1. Conversion of $(\,19\,)_{16}$ into decimal equivalent number is performed in following steps:

$$(\,19\,)_{16} = (1 \times 16^1\,) + (9 \times 16^0\,) = 16 + 9 = (\,25\,)_{10}\,.$$

2. Conversion of $(\,5942\,)_{16}$ into decimal equivalent number:

$$\begin{aligned}(\,5942\,)_{16} &= (5 \times 16^3\,) + (9 \times 16^2) + (4 \times 16^1) + (2 \times 16^0\,)\\ &= (5 \times 4096\,) + (9 \times 256\,) + (4 \times 16) + (2 \times 1)\\ &= 20480 + 2304 + 64 + 2\\ &= (\,22850\,)_{10}\,.\end{aligned}$$

3. Conversion of $(\,A\,B\,C\,D\,)_{16}$ into decimal equivalent number:

$$(A\,B\,C\,D\,)_{16} = (A \times 16^3\,) + (B \times 16^2\,) + (C \times 16^1\,) + (D \times 16^0\,)$$

Now, we know that in decimal system "A" has the value "10", "B" has the value "11", "C" has the value "12", "D" has the value "13".

$$\begin{aligned}\therefore\quad (A\,B\,C\,D\,)_{16} &= (10 \times 16^3\,) + (11 \times 16^2\,) + (12 \times 16^1\,) + (13 \times 16^0\,)\\ &= (10 \times 4096\,) + (\,11 \times 256\,) + (12 \times 16) + (13 \times 1)\\ &= 40960 + 2816 + 192 + 13\\ &= (\,43981\,)_{10}\,.\end{aligned}$$

4. Conversion of $(\,2\,A\,8\,F\,)_{16}$ into decimal equivalent number:

$$(2\,A\,8\,F)_{16} = (2 \times 16^3\,) + (A \times 16^2\,) + (8 \times 16^1\,) + (F \times 16^0\,)$$

Now, we know that in decimal system "A" has the value "10", "F" has the value "15'.

$$\begin{aligned}\therefore\quad (2\,A\,8\,F\,)_{16} &= (2 \times 16^3\,) + (A \times 16^2\,) + (8 \times 16^1\,) + (F \times 16^0\,)\\ &= (2 \times 4096\,) + (\,10 \times 256\,) + (8 \times 16) + (15 \times 1)\\ &= 8192 + 2560 + 128 + 15\\ &= (\,10895\,)_{10}\,.\end{aligned}$$

❖ ***Self Test IV***: **Select the correct alternative from the given alternatives.**

1. What is the basis for hexadecimal number system?
(a) 2 **(b)** 8 **(c)** 10 **(d)** 16.
2. Which of the following is not a valid hexadecimal number ?
(a) 2D67 **(b)** H3A8C **(c)** 1CEFD **(d)** 1756.
3. What is the hexadecimal equivalent of the decimal number 12?
(a) 14 **(b)** B **(c)** 12 **(d)** C.
4. What is the hexadecimal equivalent of the decimal number 59?
(a) 3B **(b)** 4B **(c)** 3A **(d)** 3C.
5. What is the hexadecimal equivalent of the decimal number 184?
(a) A8 **(b)** B8 **(c)** C8 **(d)** B7.
6. What is the hexadecimal equivalent of the decimal number 6699?
(a) 1A2B **(b)** A1B2 **(c)** AB12 **(d)** 12BA.
7. What is the decimal equivalent of the hexadecimal number 8E?
(a) 144 **(b)** 140 **(c)** 142 **(d)** 442.
8. What is the decimal equivalent of the hexadecimal number 6DCE?
(a) 28172 **(b)** 28731 **(c)** 28110 **(d)** 28175 .
9. What is the decimal equivalent of the hexadecimal number F1AB?
(a) 55867 **(b)** 61867 **(c)** 61585 **(d)** 67861.
10. What is the decimal equivalent of the hexadecimal number BCA?
(a) 302 9 **(b)** 3913 **(c)** 3018 **(d)** 3219 .

5.6: Summary for Unit 5

In this unit learners studied the following topics in details:

1. What is the Binary number system?
2. How to convert a decimal number to its binary equivalent.
3. How to convert a binary number to its decimal equivalent.
4. Addition and subtraction of binary numbers.
5. The Octal number system, Conversion of a decimal number to a octal number and vice versa.
6. The Hexadecimal number system, Conversion of a decimal number to a hexadecimal number and vice versa.
