COMPUTER APPLICATIONS **CLASS IX**

CHAPTER – 1 HISTORY OF COMPUTERS

1. **Define computer.**

A computer is an electronic device which can store or process raw information or a set of data to produce useful information.

2. **State major areas of application of computer.**

Science, Education, Medicine and Health Care, Engineering, Entertainment, Communication, Business Application, Banking, Railways, Airlines etc.

Father of computer – Charles Babbage

Stored program concept given by Dr. John Von Neuman in 1945

First programmer in the world – Lady Ada Lovelace Augusta

Napier Bones invented by John Napier – 1617 AD

UNIVAC – Universal Automatic Computer – First commercial computer

ENIAC – Electronic numerical integrator and Calculator – first electronic computer

Analytical Engine – prototype of modern computer.

First mechanical device used for calculations - **ABACUS**

8. What is ENIAC? Write its full form.

Ans: ENIAC is the first electronic general purpose computer. Its full form is Electronic Numerical Integrator and Calculator.

9. Who was the first to give the idea of stored computer and when?

Ans: Dr. John Von Neuman in 1945

10. Who invented ENIAC and when?

Ans: Prof. J. Presper Eckert and John W. Mauchly in 1946

11. Who developed transistor?

Ans: John Bardeen, William Shockley and Walter Barttain

12. What is UNIVAC (UNIVersal Automatic Computer)?

Ans: It is the first commercial computer.

13. Types of IC:

Ans: SSIC (Small Scale IC)

MSIC(Medium Scale IC)

LSIC (Large Scale IC)

VLSI(Very Large Scale IC)

ULSI(Ultra Large Scale IC)

Q. 14. Who is known as the first programmer in the world?

Ans: Lady Ada Lovelace Augusta

Types of Computers (Class 10) – With Examples

1. Microcomputers / Personal Computers (PCs)

- These are small, low-cost computers used by individuals.

2. Minicomputers

- More powerful than microcomputers, used by small organisations for shared tasks.
- Can support multiple users at the same time.

3. Mainframe Computers

- Very powerful systems used by large organisations to process huge amounts of data.
- Support hundreds or thousands of users at once.

4. Supercomputers

- Fastest and most powerful computers in the world.
- Used for complex scientific calculations, weather forecasting, space research.

GENERATION OF COMPUTERS

Computers developed in **five generations**, each marked by major technological improvements:

1. **First Generation (1940–1956):**
   Used **vacuum tubes**, were very large and consumed a lot of electricity.
   Example: ENIAC, UNIVAC.
2. **Second Generation (1956–1963):**
   Used **transistors**, were smaller, faster, and more reliable than vacuum tubes.
3. **Third Generation (1964–1971):**
   Used **Integrated Circuits (ICs)**, which made computers more powerful and affordable.
4. **Fourth Generation (1971–Present):**
   Uses **microprocessors**; computers became smaller, cheaper, and widely used (PCs, laptops).
5. **Fifth Generation (Present & Future):**
   Based on **Artificial Intelligence**, robotics, quantum computing, and advanced parallel processing.

FEATURES OF THIRD GENERATION COMPUTERS:

1. Used Integrated Circuits (ICs), which made computers faster and more efficient.
2. Keyboards and monitors were introduced.
3. Produced less heat and consumed less power.

CHAPTER 2: THE BINARY CONCEPT

1. Conversion of decimal into binary, octal and hexadecimal
2. Conversion of binary, octal and hexadecimal to Decimal
3. Conversion from Octal to Binary and vice-versa
4. Conversion from hexadecimal to binary and vice-versa
5. addition and subtraction of binary, octal and hexadecimal numbers.
6. Finding 1's and 2's complement
7. subtraction using 1's and 2's complement.
8. Memory units

1. Define Number System.

Ans: A number system is defined a set of values or symbols used to represent quantities.

2. Define Base or Radix.

Ans: It is the number of symbols present in the number system.

4. Types of positional number system:

Number System	**Base or Radix (R)**	**Set of symbols**	**Example**
Decimal	R = 10	0,1,2,3,4,5,6,7,8 and 9	$(25)_{10}$
Binary	R = 2	0 and 1	$(11001)_{10}$
Octal	R = 8	0,1,2,3,4,5,6 and 7	$(31)_{10}$
Hexadecimal	R = 16	0,1,2,3,4,5,6,7,8,9,A,B,C, D,E and F	$(19)_{10}$

7. Conversion:

Decimal to Binary/Octal/Hexadecimal

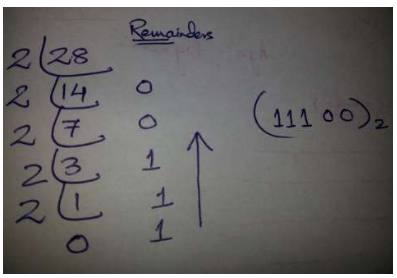
Steps to be followed:

1. Divide the number by 2 / 8 / 16 and note down the remainder.

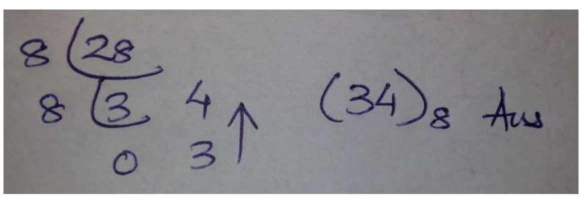
2. Repeat step1 until the quotient becomes 0.

3. Collect the remainders in the reverse order.

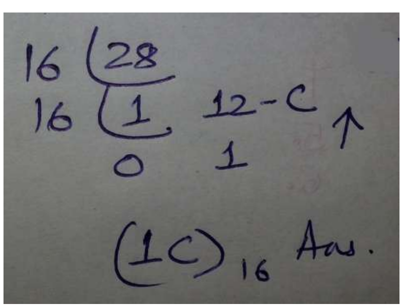
Ex: Convert 28_{10} *into binary*



Ex: Convert 28_{10} *into Octal*



Ex: Convert 28_{10} *into Hexadecimal*



Binary/Octal/Hexadecimal to Decimal

1. Convert $(1101)_2$ into decimal

$\overset{3}{1}\overset{2}{1}\overset{1}{0}\overset{0}{1}$ Base = 2

[illegible]

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

$= 1 \times 8 + 1 \times 4 + 0 + 1 \times 1$

$= 8 + 4 + 1$

$= 13$ $\therefore (13)_{10}$ Ans.

2. Convert $(34)_8$ into decimal

$\overset{1}{3}\overset{0}{4}$ Base = 8

$= 3 \times 8^1 + 4 \times 8^0$

$= 3 \times 8 + 4 \times 1$ $\therefore (28)_8$ Ans.

$= 24 + 4$

$= 28$

3. Convert $(1A2)_{16}$ into decimal

$\overset{2}{1}\overset{1}{A}\overset{0}{2}$ Base = 16

$= 1 \times 16^2 + A \times 16^1 + 2 \times 16^0$

$= 1 \times 256 + 10 \times 16 + 2 \times 1$

$= 256 + 160 + 2 = 418$ $\therefore (418)_{10}$ Ans.

Binary to octal		Binary	Hexadecimal
Binary	Octal	0000	0
000	0	0001	1
001	1	0010	2
010	2	0011	3
011	3	0100	4
100	4	0101	5
101	5	0110	6
110	6	0111	7
111	7	1000	8
		1001	9
		1010	A
		1011	B
		1100	C
		1101	D
		1110	E
		1111	F

Binary to Octal

An octal digit is represented by 3 binary digits. Therefore, make a group of 3 bits from Right hand side and write the octal equivalent of each groups. (using the above table)

Ex - Convert $(1101100110)_2$ *into Octal*

001 101 100 110 i.e. 1546 in Octal (refer to the table shown above)

Octal to Binary

Write the 3 digits binary equivalent of each octal digit (using the above table)

Ex - Convert $(4017)_8$ *into Binary*

4017 i.e. *100 000 001 111 i.e. 100000001111 in Binary(refer to the table shown above)*

Binary to Hexadecimal

An hexadecimal digit is represented by 4 binary digits. Therefore, make a group of 4 bits from Right hand side and write the Hexadecimal equivalent of each groups. (using the above table)

Ex - Convert $(1101100110)_2$ *into Hexadecimal*

0011 0110 0110 *i.e. 366 in Hexadecimal (refer to the table given above)*

Hexadecimal to Binary

Write the 4 digits binary equivalent of each hexadecimal digit (using the above table)

Ex - Convert $(A9F)_{16}$ *into Binary*

4017 i.e. 0100 0000 0001 0111 *i.e. 0100000000010111 in Binary(refer to the table given above)*

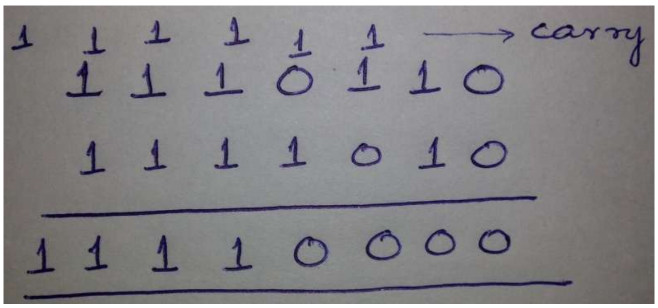
8. Binary Arithmetic

(i) **Binary Addition**: Use the following rules to add two binary numbers.

A	B	Carry	Sum
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

Note: when u add three 1s , then sum and carry will be 1.

Ex: Add 1110110 with 1111010



Learn Octal addition and hexadecimal addition.

11. Complement

Complement is a method which can be used to make the subtraction easier for machines. Generally, it is used to represent negative numbers.

(a) To find 1's complement: change 0 into 1 and 1 into 0.

(b) To find 2's complement: result of 1's complement + 1

Ex: Find 1's and 2's complement of 110010100_2

(a) 1's complement = 001101011

(b) 2's complement = 001101011 + 1 = 001101100

A. **Binary subtraction using 1's complement.**

Steps: 1.First check whether the number of digits of the given binary numbers are equal, if not, then balance it by adding 0s to the leftmost side.

2. Find 1's complement of the negative number.

3. Add it with the positive number

4. Observe the result.

a. If carry occurs in the result, then remove it and add 1 to the result to get the answer.

b. If carry does not occur in the result, then find its 1's complement and place a negative sign (-) at the front to get the answer.

Ex**. 1. Subtract 110 from 1011 using 1's complement.**

Given, 1011 - 110

Step 1: Since the no. of digits of these binary numbers are not equal, so we are adding 0s to make them equal.

Now, 1011 - 0110

Step 2: We need to find 1's complement of the negative number(i.e. 0110) .

1's complement of 0110 = 1001

Step 3: Adding the result 1001 with the positive number (i.e.1011)

```
  1011
  1001
 ------
 10100
```

Step 4: Since carry occurred in the result, we remove the carry (i.e. 0100) and add 1 to it(i.e. 0100 + 1 = 0101)

The required answer is 0101.

B. **Binary subtraction using 2's complement.**

Steps: 1. First check whether the number of digits of the given binary numbers are equal, if not, then balance it by adding 0s to the leftmost side.

2. Find 2's complement of the negative number.

3. Add it with the positive number

4. Observe the result.

a. If carry occurs in the result, then remove it and write the remaining as the answer.

b. If carry does not occur in the result, then find its 2's complement and place a negative sign (-) at the front to get the answer.

Ex**. Subtract 110 from 1011 using 2's complement.**

Given, 1011 - 110

Step 1: Since the no. of digits of these binary numbers are not equal, so we are adding 0s to make them equal.

Now, 1011 - 0110

Step 2: We need to find 2's complement of the negative number(i.e. 0110) .

1's complement of 0110 = 1001

2's complement of 0110 = 1001 + 1 = 1010

Step 3: Adding the result 1010 with the positive number (i.e.1011)

1011

1010

10101

Step 4: Since carry occurred in the result, we remove the carry (i.e. 0101).

The required answer is 0101.

MEMORY UNITS

A single binary digit – 1 bit

Group of bits carry information – 1 word

1 Nibble = 4 bits

1 Byte (B) = 8 Bits

1 Kilobyte (KB) = 1024 Bytes

1 Megabyte (MB) = 1024 KB

1 Gigabyte (GB) = 1024 MB

1 Terabyte (TB) = 1024 GB

1 Petabyte (PB) = 1024 TB