Computers:

- Computers are sophisticated devices that process information, perform tasks, and store data using a combination of hardware (physical components) and software (programs and instructions).

Computer Evolution:

- **Generations:**

- **First Generation (1940s-1950s):** Used vacuum

tubes for processing.

- **Second Generation (1950s-1960s):** Transistors replaced vacuum tubes, reducing size and heating issues.

- **Third Generation (1960s-1970s):** Integrated circuits brought further miniaturization and increased efficiency.

- **Fourth Generation (1970s-present):** Microprocessors led to the creation of personal computers and mobile

devices.

Data Processing:

- **Definition:** Involves collecting, manipulating, and organizing data into meaningful information.

- **Components:** Data processing involves input (receiving data), processing (manipulating data), output (presenting the results), and storage (keeping the information).

Memory Hierarchy:

- **Overview:** Computers use various types of memory, each with different capacities, speeds, and purposes.

- **Hierarchy:** Includes registers (fastest), cache, RAM (Random Access Memory), virtual memory, and storage (Hard Drives, SSDs).

Input/Output & VDU:

- **Input Devices:** Examples include keyboards, mice, scanners, and touchscreens

that allow users to enter data.

- **Output Devices:** Such as monitors, printers, speakers, and projectors used to display or output information.

- **VDU (Visual Display Unit):** Another term for a computer monitor or screen.

BIOS:

- **Basic Input Output System (BIOS):** A firmware embedded in the computer's motherboard that initializes

hardware components during the boot process and provides low-level system control.

Data Representation:

- **Number Systems:** Binary (base-2), Decimal (base-10), Octal (base-8), and Hexadecimal (base-16) are used for data representation.

- **Conversions:** Methods exist to convert between these systems, each with its own rules and processes.

1's and 2's Complement:

- **Negative Binary Numbers:**
- **1's Complement:** Involves flipping all the bits.
- **2's Complement:** Flipping bits and adding 1 to represent negative numbers in binary.

Basic Computer Structure:

- **Components:**
- CPU (Central Processing

Unit): Processes instructions and performs calculations.

- **Memory:** Stores data and instructions temporarily for the CPU to access.

- **Input/Output Devices:** Facilitate interaction between the user and the computer.

- **Storage:** Holds data permanently, like hard drives and solid-state drives.

Computer Operations:

- **Cycle:** The CPU fetches instructions from memory, decodes them, executes the operations, and stores or outputs the results. This cycle repeats continuously during operation.

- ## Working of a Basic Computer:

- **Fetch:** The CPU fetches instructions from memory.

- **Decode:** Instructions are decoded to understand their purpose.

- **Execute:** The CPU performs the specified operations.

- **Store/Output:** Results are stored back in memory or sent to output devices.

- **Repeat:** This cycle continues, fetching, decoding, executing, and storing/outputting instructions and data continuously during operation.