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1. Understanding Computers and Basics

Definition of a Computer :A computer is an electronic device that receives data, processes it according to given instructions, and transforms it into valuable information. This information can be stored, displayed, or transferred.

Components of a Computer: A computer consists of hardware and software.

- **Hardware:**

The tangible, physical components of the computer, such as:

- Central Processing Unit (CPU): Known as the 'brain' of the computer, it processes data and executes commands.

- Memory: Stores data temporarily during processing.

- Peripheral Devices: Such as the keyboard, mouse, and monitor.

- **Software:**

The set of instructions and programs that direct the computer to perform specific tasks, categorized into:

- System Software: Such as operating systems (Windows, Linux), which provide an environment for application software to operate.
- Application Software: Programs designed for end users, such as word processors (Word) and engineering design tools (AutoCAD).

2. The Concept of Computing
Definition of Computing:

Computing is the process of using computers to perform data processing and storage. Computing serves several objectives, including:
- Data Analysis: Extracting valuable insights from data.
- Process Automation: Automating industrial and engineering operations.
- Modeling and Simulation: Creating predictions and studying possibilities.
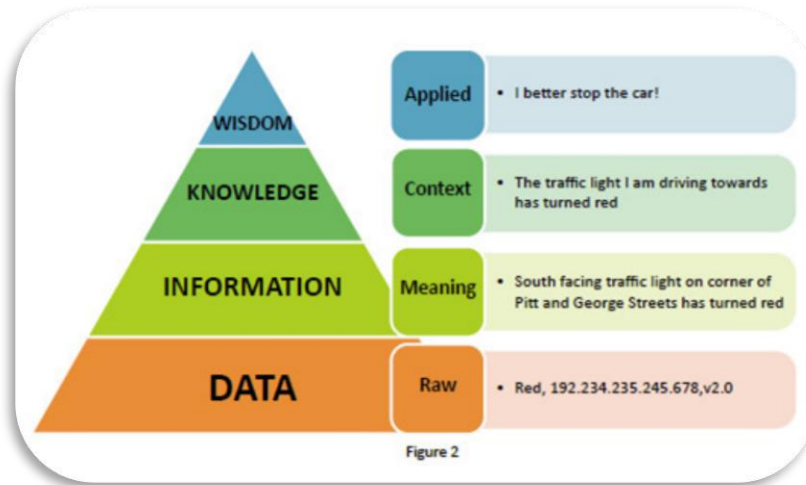
3. Data and Information
Concept of Data:

Data refers to raw input that has not yet been processed, which could be in the form of numbers, text, or images.

Concept of Information:

Information is the output of processed data, where raw data is transformed into useful insights

Figure 2

4. Applications of Information, Electronics, and Communication Technology (IECT)

IECT Applications:

Advances in Information, Electronics, and Communication Technology have transformed various fields, including:
- Healthcare: Devices connected to networks to monitor patients.
- Education: E-learning and use of computers and tablets in classrooms.
- Engineering: 3D modeling software for building and factory design.

5. Connecting Peripheral Devices to the CPU

Peripheral Devices:

Peripheral devices connected to the CPU include:
- Input Devices: Such as keyboards and scanners, which help enter data into the computer.
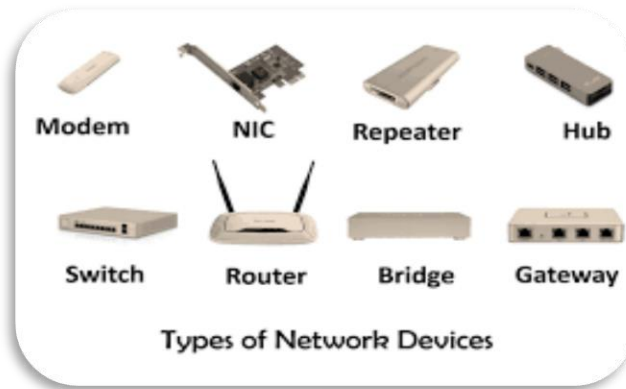- Output Devices: Such as monitors
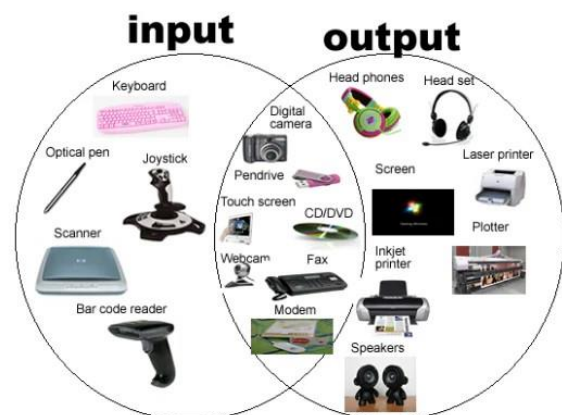
and printers, which display the results.

Connecting Devices:

Peripheral devices connect to the CPU through ports like USB and HDMI. The connection is managed by driver software that enables the device to communicate with the computer and handle data correctly.

Types of Network Devices

7. Units of Data Measurement
. Data Measurement Units Table with Practical Examples

The following table provides data measurement units along with practical applications in day-to-day computing:

Unit	Size	Example Usage
Bit	1 Bit	Smallest storage unit
Byte	8 Bits	Single text character
Kilobyte (KB)	1024 Bytes	Short text or small image
Megabyte (MB)	1024 KB	High-quality image or audio file
Gigabyte (GB)	1024 MB	Movie or video game
Terabyte (TB)	1024 GB	Large file collection or video library

8. Types of Software by Field

Application software can be categorized based on the industries they serve:

- Engineering Design Software: Tools like AutoCAD and SolidWorks for creating engineering models.
- Data Analysis Software: Programs such as Excel and SPSS used for statistical data analysis.
- Industrial Control Software: Used to operate and manage equipment in factories and labs.
- Image Processing Software: Tools like Photoshop and GIMP for editing and processing images.

9. Basic Concept of Networks and Communication

Computers today are interconnected via networks, allowing them to share information and resources:

- Local Area Network (LAN): Connects devices within a small area, like a school or office.
- Wide Area Network (WAN): Links multiple LANs over a larger area, such as the internet connecting devices worldwide.

10. Importance of Computing in Chemical Engineering

In chemical engineering, computers play a crucial role in several areas:

- Design and Simulation: Software is used to model chemical reactions and develop new products.
- Data Management: Computers help store and analyze lab and experimental data.
- Industrial Process Analysis: Computers aid in analyzing chemical processes to improve efficiency.
- Process Control: Automated control software monitors and regulates reactions and processes in manufacturing.

11. Computing Ethics and Information Security

As we rely more on computers, understanding ethical responsibilities and information security becomes vital:

- Computing Ethics: Includes respecting privacy and refraining from unethical use of systems.
- Information Security: Involves protecting data from external threats using antivirus software and security protocols.

Examples of Computing Applications in Chemical Engineering

Examples of how computing enhances processes and efficiency in chemical engineering:

- **Design and Simulation:** Software like ASPEN Plus is used for fluid flow analysis and chemical reaction modeling.
- **Data Management:** Computers store experimental data, such as pressure and temperature measurements, to monitor chemical reactions.
- **Process Control:** Industrial control software adjusts system parameters like temperature and pressure to maximize efficiency.

Practice problems (HW):

1. **What is a computer?** Describe its main components, explaining the roles of hardware (such as the CPU and memory) and software (system and application) in operating the computer.

2. **Explain the difference between data and information,** providing an example that demonstrates how raw data is transformed into useful information in fields like healthcare or education.

3. **Discuss the evolution of computer generations,** from the first generation to the current one, highlighting how these advancements have impacted the size, performance, and storage capacity of computers.

4. **Explain the importance of computing and networks in modern work,** mentioning the difference between a Local Area Network (LAN) and a Wide Area Network (WAN) and how each facilitates information sharing.

5. **What are computing ethics and information security?** List 3 main principles, and discuss how to protect personal data in your daily use of computers and networks.