WEEK 2 – Introduction to Computing and Basic Concepts

I. Definition of Computer and Computing

- Is an electronic machine or device that manipulates or control data / information according to a list of instructions.
- Is a device capable of performing computations and making logical decisions at speed millions and even billions of times faster than human beings can.

II. Advantages and disadvantages of computers

Advantages of Computers

Multitasking – Multitasking is one among the main advantage of computer. Person can do multiple task, multiple operation at a same time, calculate numerical problems within few seconds. Computer can perform millions or trillions of work in one second.

Speed – Now computer isn't just a calculating device. Now a day's computer has vital role in human life. One of the most advantages of computer is its incredible speed, which helps human to finish their task in few seconds.

Storage – The pc has an in-built memory where it can store an outsized amount of knowledge . You can also store data in auxiliary storage devices.

Accuracy – One among the basis advantage of computer is which will perform not only calculations but also with accuracy.

Data Security – Protecting digital data is understood as data security.

Task completer – Completes tasks that might be impossible for humans to complete.

Productivity – The level of productivity gets automatically doubled as the computer can done the work at very fast.

Reduces workload – Information are often accessed by more than one person with the necessity for work to be duplicated.

Reliability – Computers can perform same sort of work repeatedly without throwing up errors thanks to tiredness or boredom, which are quite common among humans.

Disadvantages of Computers

Virus and hacking attacks – Virus may be a worm and hacking is just an unauthorized access over computer for a few illicit purpose. Virus can go to other system from email attachment, viewing an infected website advertisement, through removable device like USB etc.

Online Cyber Crimes – Online cyber-crime means computer and network may have utilized in order to commit crime. Cyberstalking and fraud are the points which comes under online cyber-crimes.

Reduction employed opportunity – Mainly past generation wasn't used of the pc or they need the knowledge of computer they faced an enormous problem when computer came in field.

High cost – Computers are expensive. Even the foremost affordable computers are still very expensive for the typical person in South Africa. Since computers empower people.

Distractions/disruptions – If you've got ever spent hours browsing the web or watching videos on YouTube, then you recognize how distracting computers can be! Because of their high entertainment value.

Increases waste and impacts the environment – With the speed that computers and other electronics get replaced, all of the old devices that get thrown away have a big impact on the environment.

Health Problems: – Prolonged use of computers can lead to various health Hazards. Too much sitting near the screen results in eye strain and drying up of the eyes. Also, prolonged sitting leads to neck and back problems.

III. History & Generations of Computers

Early Computing Devices

The history of computers began long before modern machines existed. Early civilizations used simple tools to perform calculations.

- **Abacus (c. 2400 BC):**
  The Abacus is considered the first known calculating device. It was used in ancient China and other parts of Asia to perform arithmetic operations like addition, subtraction, multiplication, and division.
- **Pascaline (1642):**
  Invented by Blaise Pascal, this mechanical calculator could add and subtract directly and multiply or divide through repeated addition or subtraction.
- **Analytical Engine (1837):**
  Designed by Charles Babbage, this is considered the first concept of a programmable mechanical computer. It had basic components found in modern computers, such as memory and a central processing unit.
- **Punched Card System (1890):**
  Herman Hollerith developed a punched card system used for the 1890 U.S. Census. This technology laid the foundation for early data processing machines and led to the formation of IBM (International Business Machines).

Evolution Toward Modern Computing

- **ENIAC (1946):**
  The Electronic Numerical Integrator and Computer (ENIAC) was the first general-purpose electronic computer. It used vacuum tubes and could perform thousands of calculations per second, marking a major leap from mechanical to electronic computing.
- **UNIVAC (1951):**
  The Universal Automatic Computer was the first commercial computer produced in the United States, capable of handling both numerical and textual information.

Generations of Computers

Computers evolved through five main generations, each marked by a significant technological development.

1. **First Generation (1940–1956) – Vacuum Tubes**

- Used vacuum tubes as the main electronic component.
- Very large, consumed a lot of electricity, and produced heat.
  Example: ENIAC, UNIVAC.

2. **Second Generation (1956–1963) – Transistors**

- Transistors replaced vacuum tubes, making computers smaller, faster, and more reliable.
  Example: IBM 1401, IBM 7090.

3. **Third Generation (1964–1971) – Integrated Circuits (ICs)**

- Integrated circuits allowed multiple transistors on a single chip, improving speed and efficiency.
  Example: IBM System/360.

4. **Fourth Generation (1971–Present) – Microprocessors**

- Introduction of the microprocessor, where the entire CPU was placed on a single chip.
- Personal computers (PCs) were developed.

Example: Intel 4004, Apple II, IBM PC.

5. **Fifth Generation (Present and Beyond) – Artificial Intelligence (AI)**

- Focused on AI, machine learning, and advanced computing.
- Modern systems use cloud computing, quantum processors, and neural networks to simulate human intelligence.

IV. *Computing Milestones*

Throughout the history of computing, several key milestones have transformed how humans use technology. These breakthroughs laid the foundation for today's digital society.

1. The Microprocessor (1971)

The invention of the **microprocessor** by Intel in 1971 marked a major turning point in computer history.

- It integrated the **entire central processing unit (CPU)** on a single silicon chip.
- This made computers smaller, faster, and more affordable.
- The microprocessor led to the rise of **personal computers (PCs)** in the 1970s and 1980s.

2. The Internet (1960s–1990s)

The **Internet** began as a research project called **ARPANET** in the late 1960s, connecting computers across universities.

- In 1989, **Tim Berners-Lee** invented the **World Wide Web**, introducing web pages and browsers.
- The Internet revolutionized global communication, enabling email, e-commerce, and social networking.

3. The Mobile Revolution (2000s–Present)

The development of **mobile computing** brought the power of computers into portable devices.

- Early smartphones combined telephony with computing power.
- The introduction of **Apple's iPhone (2007)** and **Android systems** sparked the era of app-based computing.
- Today, mobile devices allow constant connectivity, enabling online learning, mobile banking, and real-time collaboration.

V. Computer Usage & Application in Society

EDUCATION - Computers are used in education sector through online classes, online examinations, referring e-books, online tutoring, etc. They help in increased use of audio-visual aids in the education field.

BUSINESS - Nowadays, computers are totally integrated into business. The main objective of business is transaction processing, which involves transactions with suppliers, employees or customers. Computers can make these transactions easy and accurate. People can analyze investments, sales, expenses, markets and other aspects of business using computers.

MEDICAL FIELD - Computers are used in hospitals to maintain a database of patients' history, diagnosis, X-rays, live monitoring of patients, etc. Surgeons nowadays use robotic surgical devices to perform delicate operations, and conduct surgeries remotely. Virtual reality technologies are also used for training purposes. It also helps to monitor the fetus inside the mother's womb.

GOVERNMENT - In government sectors, computers are used in data processing, maintaining a database of citizens and supporting a paperless environment. The country's defense organizations have greatly benefitted from computers in their use for missile development, satellites, rocket launches, etc.

ENTERTAINMENT - Computers help to watch movies online, play games online; act as a virtual entertainer in playing games, listening to music, etc. MIDI instruments greatly help people in the entertainment industry in recording music with artificial instruments. Videos can be fed from computers to full screen televisions. Photo editors are available with fabulous features.