## **1 Impact of ICT on individuals and communities in terms of social, economic, business, and professional development.**

Information technology has become an essential part of our life, and people are becoming dependent on it. ICT stands for Information and communications technology. Technology means the tools and machines we use to deal with problems or do things effectively. Information refers to facts about someone or something. Communication means sharing information with others. ICT is about using technology to input, store, process and produce information, and about communicating this information to others. Computers offer incredible benefits in education. They can help students to study, perform different tasks and improve their skills. The Internet is an invaluable resource for students of all ages. Computers are used to do research, make presentations and find information. ICT has increased the productivity of industries and reduced the time required to achieve the desired goal. The ICT system consists of the following components: Cloud Computing, Software, Hardware, Transactions, Communication Technologies, Data and the Internet.

## **2 Core characteristics of a modern computer.**

Computers have changed the way we study, work and play. That's why it is vital to have at least basic knowledge of computers. The core characteristis of a modern computer are as follows. First of all, computers are fast. They are capable of performing millions of tastks, calculationns or measurements per second. Secondly, computers are accurate. They perform various operations with precise results and no errors. Thirdly, computers are versatile. They can be used in almost every sphere — industry, business, education, entertainment, banking, tourism, etc.

Storage capacity is another relevant feature of a computer to condider. Today's computers can store large volumes of data. A piece of information once stored in a computet can never be gorgotten and can be retrieved almost instantaneously. Multitasking is also an essential characteristic of a computer. It enables to accomplish several tasks simultaneously such as downolading files, preparing office documents and participating in video conferences online — all at the same time!

## **3 Nature of ICT, its application and core attributes.**

Information and Communication Technology (ICT) refers to the use of digital technologies to access, process, and communicate information. ICT has become an integral part of our daily lives and has revolutionized the way we interact with the world around us. The core attributes of ICT include the ability to store, retrieve, manipulate, transmit, and receive information electronically in a digital form.

ICT has a wide range of applications across various fields such as education, healthcare, business, and entertainment. In education, ICT has been used to enhance the learning experience by providing students with access to digital resources, online courses, and interactive learning tools. In healthcare, ICT has been used to improve patient care by enabling remote consultations, telemedicine, and electronic health records. In business, ICT has been used to streamline operations, improve efficiency, and enhance customer experience. In entertainment, ICT has been used to create immersive experiences such as virtual reality and augmented reality.

In summary, ICT is a powerful tool that has transformed the way we live, work, and interact with the world around us. Its core attributes of storing, retrieving, manipulating, transmitting, and receiving information electronically in a digital form have enabled its wide range of applications across various fields.

## **4 Phases of digital revolution and the main features of each.**

1. Data processing. During this phase, computers were huge, complex, and expensive devices that stored data on reels of magnetic tape. They existed in limited numbers, primarily housed in big corporations and government agencies. Computers were operated by trained technicians and required specialised software.

2. Personal computing. This phase of the digital revolution is characterised by standalone computers powered by local software. Computers were used to enhance productivity. Computers were not connected to networks, so they were essentially self- contained units that allowed users to interact only with the installed software.

3. Network computing. During this phase, computers became networked, and the Internet was opened to public use. Though networks were mainly deployed to connect computers within a school or business, they were often unreliable. For the most part, these networks connected devices using cables; wireless networks were not available.

4. Cloud computing. This phase provided access to information, applications, communications, and storage over the Internet. Before this phase, most computers ran software based locally. Now you can use online applications and store your data in the cloud making it available on any of your digital devices that connect to the Internet.

5. Ubiquitous computing. This phase is characterised by a focus on manipulating real-world objects instead of data. Virtual reality, augmented reality, the Internet of Things, and automated vehicles are shaping a new digital era in which technologies bring computing beyond the screen and into the world of tangible objects.

## **5 Difference between data and information, data representation.**

Data - any raw facts or observations that describe a particular a phenomenon.

Information - simply data that has particular meaning within a specific context.

Data:

a) facts, statistics used for reference or analysis.

c) numbers, characters, symbols, images that can be processed by a computer.

e) it is a representation of information.

h) interpreted by a human or machine to derive the meaning.

Information:

b) knowledge derived from study, experience, or instructions.

d) interpreted data.

f) communication of intelligence.

g) kind of knowledge exchanged among people about things, facts, etc.

Data Representation

Data representation refers to the form in which data is stored, processed, and transmitted. Devices such as smartphones, tablets, iPods, and computers store data in digital formats that can be handled by electronic circuitry. Today, digital data representation has replaced the analog methods previously used for storing and transmitting photos, videos, and text. Digital data is text, numbers, graphics, sound and video that have been converted into discrete digits such as Os and 1s. In contrast, analog data is represented using an infinite scale of values.

The process of converting information, such as text, numbers, photos, or music, into digital data that can be manipulated by electronic devices is called digitisation. Imagine that you want to send a message by flashing a light. Your light switch offers two states: on and off. You can use sequences of "ons" and "offs" to represent various letters of the alphabet. To write down the representation for each letter, you can use Os and 1s. The Os represent the off state of your light switch; the 1s indicate the on state.

The Os and 1s used to represent digital data are referred to as binary digits. It is from this term that we get the word "bit". A bit is a 0 or 1 used in the digital representation of data. Bits are grouped into eight-digit codes that typically represent characters. Eight bits together are called a byte.

## **6 Definition and types of computers.**

1.Workstation. It is used for engineering applications (CAD/CAM), desktop publishing, software development, and other types of applications that require a moderate amount of computing power and relatively high-quality graphics capabilities.

2. Supercomputer. It is a high-performance computer used for large information processing jobs. Primarily used in institutions, academics, health care, stock brokerage firms and large businesses.

3. Mainframe computer. A powerful computer that can process large amounts of data and do a great amount of computation very quickly.

4. Desktop computer. It is used for casual and commercial purposes and designed to stay at one location and fits on or under a desk. It typically has a separate monitor, keyboard, mouse, and a system unit.

5. Tablet. It is a mobile device, typically with a mobile operating system and a touchscreen display, a processing circuitry, and a rechargeable battery in a single thin, flat package.

6. Laptop computer or notebook. It is designed for portability and enables people to work on their projects from virtually anywhere.

7. Smartphone. It performs many of the functions of a personal computer and keeps users connected through messaging services, email, video calls and social networking apps, in addition to standard text messaging and phone calls.

## **7 Basic components of a computer.**

A computer system is a complex arrangement of various components working in harmony to enable the execution of tasks and processes. Understanding the fundamental building blocks of a computer is essential for anyone seeking insight into the intricacies of computing.

1. Central Processing Unit (CPU):

*Definition:* The CPU, often likened to the brain of the computer, is the primary component responsible for executing instructions and performing arithmetic and logical operations.

1. Memory (RAM):

*Definition:* Random Access Memory (RAM) serves as temporary storage that the CPU uses for quick access to data during active tasks.

1. Storage Devices:

*Definition:* Storage devices, such as Hard Disk Drives (HDDs) and Solid State Drives (SSDs), provide non-volatile storage for the long-term retention of data, applications, and the operating system.

1. Motherboard:

*Definition:* The motherboard is the central circuit board connecting various components, including the CPU, memory, and peripheral devices, facilitating communication between them.

1. Input Devices:

*Definition:* Input devices, such as keyboards and mice, allow users to provide commands and interact with the computer.

*Examples:* keyboard, scanner, webcamera, microphone, mouse

1. Output Devices:

*Definition:* Output devices, including monitors and printers, display the results of computations and make information perceptible to users.

*Examples:* printer, monitor, multimedia projector

1. Graphics Processing Unit (GPU):

*Definition:* The GPU is specialized in rendering graphics and is crucial for tasks such as gaming, video editing, and graphical computations.

Understanding how these components interact and contribute to the overall functionality of a computer system is fundamental for both users and aspiring computer professionals.

## **8 Input and output devices.**

Input Devices:

*Definition:* Input devices, such as keyboards and mice, allow users to provide commands and interact with the computer.

*Examples:* keyboard, scanner, web camera, microphone, mouse

Output Devices:

*Definition:* Output devices, including monitors and printers, display the results of computations and make information perceptible to users.

*Examples:* printer, monitor, multimedia projector

## **9 Processing device (CPU).**

The nerve centre of a PC is the Central Processing Unit or CPU for short - is the electronic circuit that executes program instructions and coordinates the activities that take place within a computer system. The processor consists of three main parts: Control Unit or CU, Arithmetic Logic Unit or ALU and registers. ALU is responsible for processing data (arithmetic and logical operations), CU is responsible for fetching the data and instructions and clearing registers when the data is processed. The registers are high speed units of memory used to store and control data.

The power and performance of a computer is partly determined by the speed of its processor. A system clock sends out signals at fixed intervals to measure and synchronise the flow of data. Clock speed is measured in gigahertz (GHz).

Random Access Memory (or RAM) - is a volatile type of storage which means data disappears when the power is lost. RAM contains OS and all programmes that you use, when your computer is on. Motherboard - is the main circuit board inside your computer, which contains processor, memory chips, expansion slots and controllers for peripherals connected by buses, electrical channels which allow devices inside the computer to communicate with each other.

## **10 Definition and types of storage.**

There are 6 types of storage in computers.

1. Solid State Drive (SSD) or Hard Disk Drive (HDD). It contains all programs and OS when your computer is off. It's non-volatile. Data in HDD is represented as magnetised particles with positive and negative direction. HDD contains one or more platters and their associated read-write heads. In SDD data is represented as charged and discharged capacitors.

2. Random Access Memory (or RAM). When your computer is on, RAM contains OS and all programmes that you use. It is a volatile type of storage.

3. Read Only Memory (or ROM) contains only one programme - basic startup routine or BIOS. BIOS is a programme which self-checks in order to see all devices are working, find access to HDD, find OS and load OS into RAM.

4.Virtual memory used by a computer when it doesn't have enough space in RAM. (It extends the capacity of the main memory to execute large programs using the hard disk).

5. Cache memory is a volatile small but very fast part of RAM, which stores the data and instructions which the CPU uses more frequently.

## **11 Definition of sustainability IT, its core elements.**

The quality of causing little or no damage to the environment.

Sustainable IT is a term used to describe the manufacture, management, use, and disposal of information technology in a way that minimizes damage to the environment. It is a process of using technology in a more sustainable way that can reduce corporate energy bills and keep toxins out of landfills . Sustainable IT can also help companies manage raw materials more efficiently and increase revenue.

## **12 Threats of e-waste.**

E-waste is a growing environmental concern that poses several threats to the environment and human health. E-waste contains hazardous materials such as lead, mercury, cadmium, and brominated flame retardants that can pollute the environment and harm human health. When e-waste is not disposed of properly, it can contaminate soil and water resources, leading to environmental degradation and health problems. The improper disposal of e-waste can also contribute to climate change by releasing greenhouse gasses into the atmosphere.

Computers and electronics contain toxic substances such as lead, cadmium and mercury.

1. It Worsens Air Pollution, because when discarded electronics are burned, electronic components can emit toxic dioxin into the atmosphere.

2. It Contaminates Soil and Water. When discarded equipment is buried in landfills, these substances can leach into groundwater and streams.

3. It Can Harm Wildlife. Soil contamination often leads to water contamination, which is detrimental to wildlife health. After heavy metals and other toxins reach streams, rivers, and lakes, clean drinking water can be extremely difficult to find. Because land and marine animals need clean water sources to survive, they suffer if their water becomes contaminated.

4. It’s Dangerous to Human Health. Breathing in heavy metal particles or drinking contaminated water is incredibly dangerous to human health. In fact, exposure to e-waste toxins can cause issues within the brain, heart, etc.

## **13 Obstacles for tackling the problem of e-waste.**

1.  [**Lack of awareness**: Many people are not aware of the environmental and health hazards associated with e-waste, which makes it difficult to encourage proper disposal and recycling](https://bing.com/search?q=Obstacles+for+tackling+the+problem+of+e-waste).

2.  [**Lack of infrastructure**: E-waste recycling requires specialized infrastructure and equipment, which is not always available in many parts of the world](https://bing.com/search?q=Obstacles+for+tackling+the+problem+of+e-waste).

3.  [**Lack of regulations**: Many countries lack proper regulations for e-waste disposal and recycling, which makes it difficult to enforce proper disposal practices](https://bing.com/search?q=Obstacles+for+tackling+the+problem+of+e-waste).

4.  **Costs**: E-waste recycling can be expensive, which makes it difficult for some organizations to invest in proper disposal practices.

5.  **Complexity**: E-waste contains a wide range of materials, which makes it difficult to recycle and dispose of properly.

## **14 Solutions to implement sustainability in IT.**

Electronic waste, or e-waste, presents a pressing environmental challenge. However, several strategies can mitigate its impact:

1. Recycling Initiatives: Establishing comprehensive e-waste recycling programs encourages proper disposal and reutilization of electronic components.
2. Extended Producer Responsibility (EPR): Holding manufacturers accountable for the entire life cycle of their products, including responsible disposal, incentivizes sustainable design and recycling.
3. Reuse and Refurbishment: Promoting the reuse and refurbishment of electronics extends their lifespan, reducing the need for constant replacements.
4. Education and Awareness: Educating consumers about responsible disposal methods and the environmental impact of e-waste fosters better habits and choices.
5. Legislation and Policy Implementation: Governments can enact strict regulations and policies that enforce responsible e-waste management, ensuring compliance across industries.
6. Innovation in Design: Designing electronics with recyclability in mind, using easily separable components and eco-friendly materials, contributes to a more sustainable manufacturing process.

E-waste poses a multifaceted challenge, but with a combination of these strategies, we can work towards minimizing its detrimental effects on the environment.