MODULE 4. ICT
The plan

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1. Impact of ICT systems,computers, and other digital devices on our lives,global economy and business. 2. Nature of ICT, its application and core attributes.

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.

3. Difference between data and information.

Data - is a raw material(for instance, letters, characters, sound & etc).
Information - is a processed data(for instance, text,music,picture).

4. Core characteristics of a modern computer and how it works with data.

Digitisation - is a process of converting information.
Data Representation - is a form in which stores,processes,transmits data in 0s and 1s.
A bit is 0 or 1 used in the digital representation of data.The 0s represent the off state, the 1s indicate the on state. Digital devices are electronic, and so you can envision bits flowing within these devices as pulses of light. Numeric data consists of numbers that might be used in arithmetic operations. Computers represent numeric data using the binary number system,which has only two digits 0s and 1s. Character data is composed of letters,symbols,numerals that are

not used in arithmetic operations. A digital computer uses a series of bits to represent letters,characters and numerals. Analog data is represented using an infinite scale of values.

5. Phases of digital revolution and main features of each.

There are 5 phases of the digital revolution.
The first one is **Data processing**. During this phase computers were huge and expensive machines that stored data on magnetic tape. Computers were operated by trained technicians. Computers and data processing became crucial tools for effective business operations.
In the 80`s IBM decided to make the first PC. It's a second phase, which is called **Personal computing**. In this phase computers were not connected to the Internet and they allowed users to interact only with the installed software.
The next phase is **Network computing**. It takes place in the 90's. This phase of the digital revolution allowed us to share information between computers, which were connected with others by wire.
The fourth phase is **Cloud computing**. Thanks to this phase we don't need to use the capacity of our hard disk, because all data is stored on servers. We don't need our personal gadgets to get access to information we need.
And the last one is **Ubiquitous computing** which manipulates real objects using Virtual Reality(VR), Attended Reality(AR).

6. Definition and types of computers.

Computer - is a device, which inputs data,stores data, processes data and outputs information. The main task of computers is to transform data into information. Stored-program concept allows switching between tasks easily. Let's talk about types of computers.

1.**Workstation**. It's a type of computer used for engineering applications,software development and other types of applications that require a moderate amount of computing power.
2.**Supercomputer**. It is a powerful computer that can process large amounts of data and do a great amount of computation very quickly.
3.**Mainframe**. It is a high-performance computer used for large information processing jobs.(for instance in health care, stock brokerage firms)
4.**Desktop computer**.It is universally used for casual and commercial purposes and designed to stay at one location and fits under the desk. It has a separate monitor,keyboard,mouse and a system unit.
5.**Tablet.** It performs many of the functions of a personal computer and keeps users connected through messaging services,email,video????
6.**Laptop or notebook**. It’s a type of computer designed for portability and enables people to work on their projects from virtually anywhere.
7.**Smartphone**. It's a mobile device with touchscreen display and mobile operating system, rechargeable battery in a single thin, flat package.

7. Basic components of a computer.

8. Input/output devices.

Modem - is a device that establishes connection between you and your provider.

Router - is a device that distributes the signal to your devices.
Keyboard - is an input device, which inputs data through keys like a typewriter.
Mouse - is an input device that controls the cursor on the screen.
Monitor - is an output device that displays an output.

9. Processing devices.

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. Tell about clock speed?
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. Types of storage,secondary storage.

There are 6 types of storage in computers.
0. **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.
1.**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.
2.**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.
3.**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).
4.**Cache memory** is a volatile small but very fast part of RAM, which stores the data and instructions which the CPU uses more frequently.
5.**CMOS** contains all your BIOS settings such as time,date.It is a non-volatile type of storage, but we need a tiny battery to keep it charged.

11. Definition of e-waste; state of the e-waste issue today.

Electronic waste (or e-waste for short) - is a discarded electrical device hazardous to the environment. E-waste is a global problem. Ugly e-waste dumps defile the landscape and have yet unknown health effects. Every country generates e-waste, but the bulk of it comes from prosperous, technology-forward countries such as the US,China,the UK,Japan,Germany etc.

Some illegal e-waste originates in legitimate recycling centres, where consumers assume electronic components will be handled in environmentally friendly ways.

12. Threats of e-waste.

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 e-waste problem.

1.Should I upgrade or repair?
First question to ask yourself "Do I really need that new device?" Repairing old electronics or upgrading certain components instead of buying a whole new machine is the easiest way to cut down e-waste.
2.How do I find less toxic products?
Certain electronics tend to be more harmful than others.||??
3.How can I safely donate my old electronics for reuse?
Donating your old computer can help low-income families,schools and people who can't afford it.
4.How can I recycle my old electronics?
Many manufacturers will allow you to return old products for recycling(maybe tell about trade-in). Some companies offer it for free, while some require customers to pay,but it depends on the type of product.
5.What if my only option is to throw my computer into the trash?
Not only does trashing your old electronics mean that they will rot in a landfill and leach toxins,but it's also illegal in many countries.You should contact your local government office for alternative solutions.

14. Solutions of the e-waste issue.

1.Designing better products. In order to reduce e-waste, manufacturers need to design electronics that are safer,more durable,repairable and recyclable. This means using less toxic materials.
2.Extended Producer Responsibility. Extended Producer Responsibility requires companies that make products to be responsible for the management and disposal of them at the end of their lives. The idea is to turn waste materials into a resource for producing new products.
3.Better recycling. To reduce health and environmental hazards while maintaining the informal recycling system that supports so many people,some countries are looking ways to integrate the informal and formal recycling systems. One strategy would give informal recycles financial incentives to divert e-waste to formal collection or recycling centres.