Course: Uses of ICT in Science Education (6439)
Semester: Autumn, 2021

ASSIGNMENT No. 1

Q.1 Define Mother Board, RAM and ROM, Hardware & Software, ICT Literacy and E-learning.

A motherboard is one of the most essential parts of a computer system. It holds together many of the crucial components of a computer, including the central processing unit (CPU), memory and connectors for input and output devices. The base of a motherboard consists of a very firm sheet of non-conductive material, typically some sort of rigid plastic. Thin layers of copper or aluminum foil, referred to as traces, are printed onto this sheet. These traces are very narrow and form the circuits between the various components. In addition to circuits, a motherboard contains a number of sockets and slots to connect the other components.

If you were to open up your computer and take out the motherboard, you would probably get pretty confused about all the different parts. Depending on the make and model of your computer, it might look something like this.

To understand how computers work, you don't need to know every single part of the motherboard. However, it is good to know some of the more important parts and how the motherboard connects the various parts of a computer system together. Here are some of the typical parts:

- A CPU socket - the actual CPU is directly soldered onto the socket. Since high speed CPUs generate a lot of heat, there are heat sinks and mounting points for fans right next to the CPU socket.
- A power connector to distribute power to the CPU and other components.
- Slots for the system's main memory, typically in the form of DRAM chips.
- A chip forms an interface between the CPU, the main memory and other components. On many types of motherboards, this is referred to as the Northbridge. This chip also contains a large heat sink.
- A second chip controls the input and output (I/O) functions. It is not connected directly to the CPU but to the Northbridge. This I/O controller is referred to as the Southbridge. The Northbridge and Southbridge combined are referred to as the chipset.
- Several connectors, which provide the physical interface between input and output devices and the motherboard. The Southbridge handles these connections.
- Slots for one or more hard drives to store files. The most common types of connections are Integrated Drive Electronics (IDE) and Serial Advanced Technology Attachment (SATA).
- A read-only memory (ROM) chip, which contains the firmware, or startup instructions for the computer system. This is also called the BIOS.
- A slot for a video or graphics card. There are a number of different types of slots, including the Accelerated Graphics Port (AGP) and Peripheral Component Interconnect Express (PCIe).

RAM is volatile memory, which means that the information temporarily stored in the module is erased when you restart or shut down your computer. Because the information is stored electrically on transistors, when there is no electric current, the data disappears. Each time you request a file or information, it is retrieved either from the computer's storage disk or the internet. The data is stored in RAM, so each time you switch from one

program or page to another, the information is instantly available. When the computer is shut down, the memory is cleared until the process begins again. Volatile memory can be changed, upgraded, or expanded easily by users.

Hardware	Software
Hardware is a physical parts computer that cause processing of data.	Software is a set of instruction that tells a computer exactly what to do.
It is manufactured.	It is developed and engineered.
Hardware can not perform any task without software.	software can not be executed without hardware.
As Hardware are physical electronic devices, we can see and touch hardware.	We can see and also use the software but can't actually touch them.
It has four main categories: input device, output devices, storage, and internal components.	It is mainly divided into System software, Programming software and Application software.
Hardware is not affected by computer viruses.	Software is affected by computer viruses.
It can not be transferred from one place to another electrically through network.	But, it can be transferred.
If hardware is damaged, it is replaced with new one.	If software is damaged, its backup copy can be reinstalled.
Ex: Keyboard, Mouse, Monitor, Printer, CPU, Hard disk, RAM,	Ex: Ms Word, Excel, Power Point,

Hardware	Software
ROM etc.	Photoshop, MySQL etc.

ICT, or information and communications technology (or technologies), is the infrastructure and components that enable modern computing.

Although there is no single, universal definition of ICT, the term is generally accepted to mean all devices, networking components, applications and systems that combined allow people and organizations (i.e., businesses, nonprofit agencies, governments and criminal enterprises) to interact in the digital world. Components of an ICT system are:

ICT encompasses both the internet-enabled sphere as well as the mobile one powered by wireless networks. It also includes antiquated technologies, such as landline telephones, radio and television broadcast -- all of which are still widely used today alongside cutting-edge ICT pieces such as artificial intelligence and robotics.

ICT is sometimes used synonymously with IT (for information technology); however, ICT is generally used to represent a broader, more comprehensive list of all components related to computer and digital technologies than IT.

The list of ICT components is exhaustive, and it continues to grow. Some components, such as computers and telephones, have existed for decades. Others, such as smartphones, digital TVs and robots, are more recent entries.

ICT commonly means more than its list of components, though. It also encompasses the application of all those various components. It's here that the real potential, power and danger of ICT can be found. ICT is leveraged for economic, societal and interpersonal transactions and interactions. ICT has drastically changed how people work, communicate, learn and live. Moreover, ICT continues to revolutionize all parts of the human experience as first computers and now robots do many of the tasks once handled by humans. For example, computers once answered phones and directed calls to the appropriate individuals to respond; now robots not only can answer the calls, but they can often more quickly and efficiently handle callers' requests for services.

ICT's importance to economic development and business growth has been so monumental, in fact, that it's credited with ushering in what many have labeled the Fourth Industrial Revolution.

ICT also underpins broad shifts in society, as individuals en masse are moving from personal, face-to-face interactions to ones in the digital space. This new era is frequently termed the Digital Age.

Q.2 Write advantages and disadvantages of ICT in Science Education.

 **ICT in the classroom**

Computers may bring with them any number of technical problems, though most of these require only basic knowledge to sort out.

Software versions

Does the software item that you want to use actually run on the computers you have in your classroom?

Does the software item that you want to use actually run on the computer(s) you have in your classroom? Schools, of necessity, have machines of many different vintages. Software designed for the latest PC will often not run on older machines. Check the system requirements on the box carefully and then treat them with suspicion! While the package may install and run in a limited way on a minimum specification system, the experience may not be a good one. If a specification is referred to as 'preferred' this may actually be the effective minimum if you want to use all of the features of the software at a reasonable speed. Note also that by upgrading to the latest version of a well-loved package you may also require access to a higher specification computer.

Operating systems

Different versions of an operating system can be another headache for teachers. In many classes there may be two, or even three, versions of Microsoft® Windows; in others a mix of Acorn RISC OS, Windows or possibly an Apple Macintosh. The children often seem to cope admirably, but not so the poor teacher. Ideally, all computers in a classroom would have the same operating system but given the wide variations in age of computers this is not always possible. Unfortunately, you will need to learn sufficient of each system in order to use it.

Organising the pupils

Class management when using ICT may cause a few problems, especially if only one or two machines are available in the classroom. Even if the class is organised into the usual three or five groups, it may not be possible for all members of a group to use the computer at the same time. Non-computer-based activities are then required. To make these sessions successful requires careful planning and may involve the tasking of a classroom assistant or parent helper as well as the pupils. Obviously, some groups will require more teacher or adult input than others and this must be allowed for.

Managing the pupils

The management of the pupils is a further consideration. Matters of existing skill levels, access by some pupils to ICT in the home, subject knowledge and understanding, and known behavioural problems all enter into the equation. And, of course, even if a computer suite is available, pupils will frequently have to work in pairs or larger groups:

- Pairs and groups are not necessarily a problem. Children learn from each other and, providing that each partner or member is taking an active part and the tasks are rotated, all can make progress.
- The individual personalities of the pupils are a consideration, as they are with all group work. The teacher should consider especially the ICT skill levels within a group and the possible dominance of a self-appointed 'expert'. Usually, mixed-sex groups of similar abilities work best and enable some differentiation.
- Enabling individual work is a constant problem. While careful monitoring will indicate who achieves what, there must be opportunities for each pupil to demonstrate their own capabilities, perhaps through a common assessed task. While time-consuming, this is the only way to be sure what an individual can do.

Occasionally, pupils are seen working at a computer with little or no monitoring or intervention from the teacher at all. This is not teaching, it is using the computer as a childminder, with little regard for the learning outcome and it is not acceptable.

- **Will there be a need for focused teaching?** In other words, will the teacher need to work with a group, either to teach specific ICT skills or to lead the pupils through the exploration of data, an internet search or other activity?
- **Is it feasible for a more experienced pupil (in terms of ICT capability) to give support** (eg in dealing with a printer or software problem?) This both recognises the pupil's skills and can free the teacher or other adult.
- **Has sufficient time been allocated for whole class teaching and demonstration?** You must teach ICT skills and capabilities; these are not acquired by osmosis. While much can be learned of ICT simply by attempting to use the computer, it is no more effective for many pupils than hoping that they will learn to read simply by being given books.
- **With one or two computers, whole class teaching is more effective if a large monitor or projection system is available**. Text on a small monitor is virtually invisible to pupils sitting only a few metres from it. Teaching may need to take place in small groups.
- **Will any demonstrations be easy for pupils to follow?** Watching a pointer moving on the screen is not the same as making it move yourself. Keep instructions simple and brief and back these up with worksheets and lists of key points on the board. Older classes can keep their own notes, perhaps by completing a worksheet before undertaking the activity at the computer.
- **Have you provided an adequate area by the computers to seat the group or class for introductions and demonstrations?**

- **How far should you maintain normal classroom rules and discipline when using ICT** and will you need some extra rules (eg hands off keyboards, headphones off, etc) when you wish to speak to the group? These will quickly become part of your management repertoire.
- **How frequently will you monitor activities**, in order to assess progress with the task, to make teaching points and to pick up on problems before they become disruptions? How well do you know the class and their capabilities? This is as important with ICT as it is with all work. If the complexity is too great for the pupils or stretches them beyond their capabilities without a support safety-net, they can become bored and disruptive.
- **Are there suitable worksheets**, not only to lead the pupils through the activity but also to provide guidance on use of the software or computer system?

Teachers should also remember that they have a responsibility to plan activities that meet the specific needs of individuals and groups of pupils. This principle of inclusion of all pupils, regardless of their special educational needs is an integral part of the national curriculum. Full details of the requirements for ICT are provided in The National Curriculum for England: Information and Communication Technology, in the section titled 'Inclusion: providing effective learning opportunities for all pupils.

Other areas of pupil management that require consideration include the following points.

- Who gets most computer time? It has been shown that in the past it was the able children who often dominated; they were the ones who finished other work first and were then allowed to use the computer as a reward. Those who might have benefited most were more likely to lose out. Indeed, it is pupils with learning difficulties who actually gain more if the work is properly targeted.
- Access to meeting individual needs must be a consideration. To some extent this involves selecting appropriate software, or level of difficulty within the software, but may include provision of tracker balls instead of a mouse, perhaps a touch screen or other access device.
- Children with specific handicaps may require specialist equipment such as braillers, British Sign Language word processors; special keyboard covers for cerebral palsy and similar gross motor problems and perhaps switch-operated equipment. Much of this is common in special schools but may be increasingly found in mainstream schools as part of the move to inclusive education. Specialist advice is needed and should be sought from the local authority.
- Classroom assistants/parents are invaluable but need to be adequately trained and must be properly briefed as to their role.
- An awareness of gender differences is needed, such as girls who are reluctant to use the computer or boys who dominate use but for little gain in productivity or learning. The dominance of male-oriented games software often leads to a perception amongst children that computers are a 'boys' toy.

Organising activities and tasks with limited computer access

With one or two machines available, access will always be difficult and will provide a strong test of your classroom management and organisational skills. However, there are successful methods that can be adopted.

- Use short, realistic tasks that most pupils can achieve in the time available, or by setting time limits for the activity. This alone imposes a modicum of competition to which some pupils respond well.
- Set clear targets (eg find information on…, make notes on the word processor and print out by the end of the lesson, complete the entry of the sheets of data, etc).
- Using the computer for short, intensive pieces of work – captions, poems, posters, etc. Some of these may take only minutes, but repeated regularly within different subjects they both reinforce skills and allow for progression over time.
- Set collaborative tasks, for example, paired writing, separate contributions to a joint newsletter, multimedia presentation or similar.
- Encourage pupils to develop a piece of quality work over time (several sessions) where this will help them demonstrate high standards within the subject context or demonstrate higher level ICT skills.
- Where appropriate, allow pupils to work as long as necessary to complete a task.
- Have clear instructions by the computer for basic tasks and the software being used.
- Ensure that pupils can load, save and print without close supervision.
- Have disks, paper, etc near the computer.

Q.3 What is IP Address and Uniform Resource Locator? Explore their uses in teaching and learning process.

The internet has connected even rural areas. From the globalization of the world to the Linking of every person with others throughout the world, we have engulfed a long way indeed. Well, the address must connect the websites and IP address with the machines. However, they are different from each other. The difference between uniform resource locator and internet protocol address is that URL is an address that represents a website or a webserver while the internet protocol address is the numerical combination that's unique and represent a specific network to access the computer or other connected device. A URL or uniform resources locator simply Is a combination of letters or numbers that represents the existence of a website or the webserver on the world wide web. It's like an address of a place where you want to commute. It's created by four elements: location, protocol, hostname, and path. An IP address or internet protocol address is a set of numbers that represents an address of a machine. Well, it's widely used to connect with other devices with encryption and transfer data pieces through that particular IP you have. Every system has a unique IP address like your house number, which is unique and special.

Parameters of Comparison	**URL**	**IP Address**

Definition	A URL is a uniform resource locator that represents a web server or a website.	An IP address is representative of a unique system.
Functionality	With the help of a URL, you can easily have a walk through the website and can see its front end.	With the IP, you can make a connection with other devices to transmit data.
Combination	A URL can consist of alphabets, numbers, or a combination of both.	Well, an IP is made of numbers with dots after some particular number set.
Breaking down address	A URL has a locator, a path, a protocol, and a hostname	Since it doesn't any interface thing because it connects two or more system and with that, it looks AAA.BBB.CCC.DDD where sequence lies between 001 to 255.
Examples	Some URL examples are https:// www.google.com, https://www.abcded.com.	Some examples of IP address are 192.168.0.1, 192.168.0.2.

Q.4 Explain features and functions of Integrated Learning Systems (ILS).

Integrated learning systems are hardware/software solutions that work together to deliver learning content.

Not the most exciting description, but integrated learning systems – or ILSs – are actually pretty cool pieces of tech. ILSs use a wide range of media and methods to enhance learning. It means students no longer need to sit

at a desk and write notes, they can take interactive quizzes, watch videos, create multi-media portfolios, or even enter a whole new virtual world – so they can learn in a way that suits them.

ILS Improvements

The companies responsible for ILS's have continued to develop their products and their approach. The primary advantage of ILSs remains the potential to respond to the needs of individual learners. It appears, companies providing ILS software have begun to respond to some of the concerns we described in Chapter 4 (Fraser, 1998). These improvements have:

- increased the variety of learning experiences
- given teachers greater control in structuring student experiences
- increased options for purchase

1) Some companies have included problem-solving activities which involve writing tasks, science simulations, and multimedia spreadsheets. Some activities are focused on student collaboration.

- In order to implement such activities, companies have incorporated tool software (word processing programs, etc.).

- There is a greater probability ILSs would facilitate the tools activities we describe throughout the book.

2) Some ILSs allow theme based instructions.

- Themes may be accommodated by allowing the existing activities to be reorganized in support of theme units.

- Jostens provides "Vital Tools" - a tool for searching many resources to create theme units.

3) Some ILSs incorporate portfolio options to collect and organize items not easily evaluated by a computer.

4) Some ILSs bring Internet resources into lessons.

5) Some companies have broken up their total curriculum package to allow schools to purchase pieces they need or that meet the standards the schools have been asked to address.

6) Some ILSs allow the integration of third party instructional software.

Committing to an ILS requires a much more intensive decision-making process than what might be involved in making an occasional software purchase. First, there is the matter of the cost. Because an ILS is a complete instructional system for multiple users, the cost of the system will likely be quite high. Typical ILS software will cost $60,000, over and above the cost of the necessary hardware. Even if the computers are in place, an ILS typically requires that the computers be networked, that one additional computer be devoted as a network server, and that a mass storage device such as a CD-ROM or large hard disk be available. Most ILS systems also require an annual licensing fee of $5,000 to $30,000 for a typical computer lab (Smith and Sclafani, 1989).

A second issue to consider is the problem or concern the school wants the ILS to address.

1. Does the school believe that the present curriculum is inadequate or boring?
2. Does the school need a way to document the academic progress that individual students or classes have made?

3. Does the school have some other problem in meeting students' needs?

Often an ILS is considered when the population of a particular school is unusually diverse-the students come from a wide variety of backgrounds, with some considered at-risk. The management system and the ability to present different activities on each computer offer an attractive way to provide for individual needs. The relationship between ILSs and diverse student populations occurs for another reason. A substantial proportion of ILSs are purchased using federal Chapter 1 money. This funding source is available to schools with a substantial proportion of disadvantaged students. Because an ILS is expensive, external funding may be necessary before a school district feels a purchase is possible.

Q.5 What are different types of graphic programs? How will you use them in teaching and learning of science subjects?

A graphic organizer is a strategy for science instruction that teachers can use to help students record information from direct observation as well as from reading in order to create a descriptive model of an organism or a phenomenon. Graphic organizers are visual illustrations of concepts, information, and verbal statements. They can take many forms useful in teaching inquiry process skills in science: descriptive feature charts, T-charts, flow charts, Venn diagrams, tree diagrams, and semantic maps, among others. Graphic organizers provide a picture of key ideas and information on a topic and the relationship of the parts to the whole. Furthermore, research showed that when students constructed their own graphic representation of material in an explanatory text, theyshowed better understanding than those who copied an illustration or wrote a summary (Edens & Potter, 2003; Gobert & Clement, 1999; Tomkins & Tunnicliffe, 2001).

When fiction and nonfiction books are integrated into the teaching of a content area such as science, graphic organizers are useful for organizing information and enabling students to classify observations and facts, comprehend the relationships among phenomenon, draw conclusions, develop explanations, and generalize scientific concepts. For example, an important inquiry process skill is comparing. It is a way of creating order from gathering observations from the natural world and making sense of scientific information that has been read. A teacher can use a T-chart to teach this skill. A T-chart is in the shape of the letter T, with a horizontal line at the top to signify a broad category and a vertical line that allows students to compare attributes of a concept, organism, or phenomenon.With a topic as the title on the horizontal line, students compare two aspects of the topic on each side of the vertical line. These can be mutually exclusive, such as comparing mammals and non-mammals or insects and spiders, or they can compare two types of spiders with different characteristics.

Charts and other graphic organizers have been found to be effective with students who are struggling with learning content at their grade level or who have difficulty learning (Guastello, Beasley, & Sinatra, 2000). To use charts effectively, Baxendell (2003) offered the following research-based recommendations:

1. Use charts consistently. For example, each time that a process with steps is taught, use a flow chart.
2. Make sure charts clearly show the relationship among key concepts, words, and ideas on a topic. Use clear labels.

3. Be creative when using charts across a lesson or unit in science and across content areas.

For example, a chart can be used to introduce a topic after reading a book to activate students' prior knowledge and background experiences, to later clarify problem areas and analyze and synthesize concepts, and, finally, to help students communicate and review what they have learned.

Introduce and model the use of graphic organizers as a strategy for inquiry-based, discovery-focused science. Students can learn to organize and analyze observations from the natural world, such as of organisms or objects, but they can also use information from books to begin using charts and to complement and supplement first-hand observations.

Choose, read aloud, and lead discussions on one or more books about living organisms or other topics using reader response questions and prompts to engage students and connect to their experience of the book and prior knowledge. Ask students to describe what they learned from the reading, discussion, and observation of illustrations, photographs, diagrams, charts, maps, and other graphic representations in a book. Then, model how to organize and record the information on various types of charts to classify, clarify, compare, analyze, and interpret it.

The features of an organism can be displayed on a descriptive feature chart with a horizontal and vertical axis to develop a descriptive model of the organism, such as a butterfly. A T-chart can be used to identify differences among organisms, such as insects and spiders or mammals and non-mammals, by placing one on the left side of the vertical line on and the other on the right side. Flow charts can be used to build a descriptive model of the life cycle of an organism.

After modeling the use of a graphic organizer with a class and engaging them in its development, students can practice using it in pairs, groups, or individually. They can come together again as a class to discuss what they have discovered. Students can also use graphic organizers to communicate to others what they have learned, especially if a class is divided into groups with each group studying a different aspect of a science topic or problem using the jigsaw approach. Finally, graphic organizers are also useful toolsfor students to review a topic, and they can be used for assessment purposes. This same strategy can be used with observations of real world phenomena after modeling with literature.

Graphic organizers produced by students can be displayed as posters in the classroom, as a page in a student-written book, on an overhead projector transparency or in a PowerPoint presentation, or in an online blog on a topic to communicate and clarify for others what the students have discovered.