Concepts of Information Technology (IT)

Section 1: General Concepts

1) Hardware, Software, Information Technology

Understand the terms hardware, software, Information Technology (IT).

1.1 Hardware

Hardware refers to the physical components of a computer. These are the parts that you can see, feel and hear. Examples are the CPU, the keyboard, the monitor, memory, cables, mouse, printer and power supply.

1.2 Software

Software refers to the **programs** that control the computer and make it function.

Note the spelling is program and not programme.

A **program** is a set of instructions that the computer obeys. Computer programs can be extremely long and complex sets of instructions. It is quite common for computer programs to be tens of thousands of lines long. The application programs that you use on your PC for word processing and spreadsheets are in fact even longer.

1.3 Information Technology

Information Technology is a broad term which covers all aspects of the use of computer technology. It includes not only hardware and software, but also communication technology applied to linking computer systems, software engineering, and the administration and use of computer systems.

2) Types of Computer

Understand and distinguish between mainframe computer, network computer, personal computer, laptop, personal digital assistant (PDA) in terms of capacity, speed, cost, and typical users.

In the early days of computer technology, it was easy to categorise computers. Today, even the basic desktop machines are extremely powerful by the standards of a few years ago and rival the early mainframes in computing power.

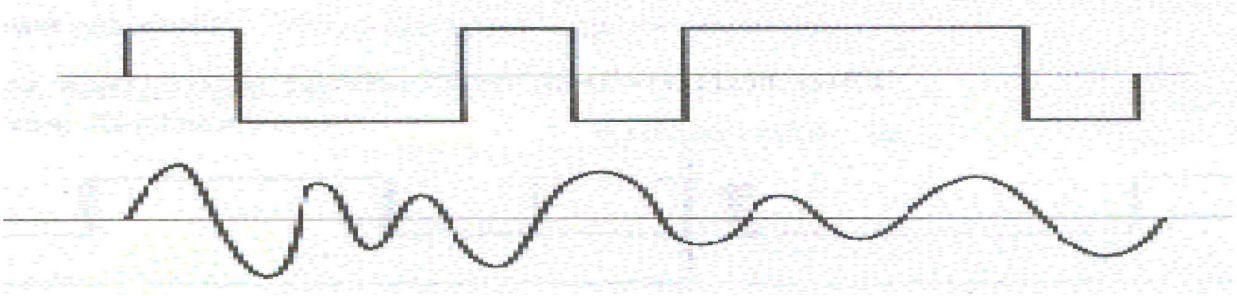
2.1 Mainframes

These are the largest and most powerful of computers. The biggest of these are sometimes called **Supercomputers**. Mainframes are usually only found in large corporate institutions, research organisations, government ministries and tertiary academic institutions.

They provide centralised processing and storage of data. They are usually used for large database systems such as the accounts of a municipality, patient information at a large hospital or student records at a university.

Because desktop (personal computers) and laptops are relatively cheap, many activities such as word processing, creation of spreadsheets and general office tasks are carried out using these types of computers. This frees the mainframe for processing large databases.

Networking, in which computers are connected together and are able to communicate, allows data to be **downloaded** from the mainframe to the personal computer or be **uploaded** from the personal computer to the mainframe. In effect, networking creates one large system comprising all the different computers linked together.



Capacity and speed: Mainframes have the largest capacity in terms of data storage and processing speed. The capacity of a modern mainframe can be hundreds or even thousands of times that of a modern personal computer.

Cost: Mainframes are also the most expensive machines in terms of both initial cost and maintenance. A mainframe can cost millions of Dollars.

Typical users: Because the mainframe provides services to all sectors of a large corporation or institution, users can include systems analysts, programmers, database administrators, data capturers, accountants, accounts administrators

2.2 Network computer

Network computers are also sometimes known as **thin clients** or **dumb terminals**. They provide access to a mainframe via a network and have little, if any, computing capacity of their own. Network computers provide remote access

to a mainframe. They allow the user to input data or commands and receive output. The actual processing would be done on the mainframe.

Capacity and speed: Network computers do not have any processing capacity of their own. Their speed will depend on 1) the speed and capacity of the mainframe; 2) the speed of the network to which they are attached; 3) the number of users accessing the mainframe. Thus in periods of low demand, they will appear to function very quickly but would appear to slow down when the demand on the system is high.

Cost: Network computers are relatively simple devices, hence they are fairly cheap.

Typical users: These would generally be the end-users of the system such as managers, accountants, receptionists, accounts clerks and data capturers.

2.3 Personal computers

Personal computers or **PCs** for short are the type of computer that most users are familiar with. Because they are usually found on users desks, they are also sometimes called **desktop computers**. **Operating systems** such as **Linux** and **Windows** were designed specifically for personal computers. The same applies to the thousands of application packages that are available including **OpenOffice.org** and Microsoft **Office.** A typical PC consists of a main unit housing the CPU and disk drives, a VDU (Video Display Unit), a keyboard and a mouse. PCs are self contained computing systems that can be used for thousands of different tasks from creating a simple document to controlling a large industrial machine.

Capacity and speed: Because of the rapid advances in technology, the PC of today is more powerful than many mainframes of a few years ago. There is little sign that the rate of development is slowing down. Typically, a modern PC can store the equivalent of a few million pages of printed text and carry out millions of instructions in a second. What complicates the issue of speed in talking about PCs is the use of graphics. Most applications make intensive use of graphics. This demands enormous computing power. Computers, which would otherwise appear to be very fast, can appear to be quite slow because of the demands placed on them by the graphics used in an application. Other components, such as the graphics card, also play a role in the speed of a PC.

Cost: There has been a steady decline in the cost of computing power. Although the cost of PCs has been fairly steady, the computing power that has been supplied has increased drastically. The cost of a personal computer is greater than that of a network computer or PDA but less than that of a laptop and a very small fraction of the price of a mainframe.

Typical users: Everyone is a potential user of a personal computer since there is virtually no sphere of human activity that does not make use of information technology. The list could include scientists, researchers, mathematicians, statisticians, technologists, engineers, students, teachers, accountants, actuaries, managers, doctors, librarians, receptionists, book-keepers, writers, and journalists. These are just a very few.

2.4 Laptop

Laptops are similar to personal computers except that they comprise an integrated unit. Instead of a separate monitor, the lid contains a screen. The keyboard is built into the base. Usually they make use of a touchpad instead of a mouse. The term **notebook computer** is often used instead of laptop computer.

The main feature of a laptop is its portability. This is possible, not only because of the reduced size and weight, but also through the use of a built-in battery which is able to power the computer for a few hours without being connected to a mains power supply. Laptops are also designed around low power and smaller devices. For example, laptops use small 2½" hard drives as opposed to the 3½" drives of desktops. In addition, these drives have special components built-in to protect them against movement.

Capacity and speed: These are the same as for personal computers.

Cost: Because of the more expensive components and the smaller market for laptops, these are usually quite a bit more expensive than personal computers. Increased volumes and improvements in manufacturing techniques will bring the price of laptops down in the future.

Typical users: Although the users could be any of those mentioned under personal computers, cost tends to limit the users to those who need portability or who can afford the cost. You would find them most commonly used by people such as managers and journalists. It is quite common to see a laptop and the desk of senior members of staff and personal computers on the desk of staff. This is not always a matter of status but often due to the fact that managers tend to take work home with them.

2.5 PDA / Personal Digital Assistant

The **PDA** is the smallest of all computers. Their main task is to maintain a diary and keep contact lists. On many you are able to make use of a word processor or spreadsheet, but, because of physical constraints, the amount that can be done is far more limited than on a PC. PDAs vary considerably in the features they contain. Top of the range cell phones now contain a PDA.

Usually, all the components of a PDA are solid state – they do not contain any moving parts. Some of the larger PDAs, often called subnotebooks, may contain a

miniature 1½" hard drive. One feature that distinguishes a PDA from a subnotebook is that the latter has a built-in keyboard whereas the PDA makes use of a light pen and character recognition for data input.

Most PDAs are able to connect to a personal computer so that data can be exchanged. A common feature is **synchronisation** where software on the PC automatically updates both the PC and PDA at the same time by using the most up-to-date data on each.

Capacity and speed: PDAs have much less storage capacity and are slower than personal computers. They were designed with convenience and low power requirements in mind rather than power.

Cost: Usually a PDA is less expensive than a personal computer, but top of the range PDAs can actually be more expensive than an average personal computer.

Typical users: Typical users are those with high mobility who need to keep track of their agendas. These would include managers, representatives and doctors.

Cost comparisons

The cost of a computer depends on a range of factors including the components, labour and demand. As a result, any price that is quoted will be out of date within weeks. Further, as demand increases for one type of computer and decreases for another, their relative prices will change.

The following table attempts to give a graphical representation of the relative prices of different types of computer: