Course Name	: Computer Theory and Applications
Course Code	: APBPH 1105
Course level	: level 1
Credit Units	: 4 CU
Contact Hours	: 60 Hrs

Course Description

The Course deals with the introduction, background and significance of computers, computer hardware and software, networking and the internet, the various computer devices and their applications such as operating systems, input/output devices etc, to students. The Course explains some practical applications such as Ms Word, Ms excel, Power point and their presentation and browsing the internet. It provides prior knowledge to computer language program which can be helpful at further stages of Computer studies.

Course objectives

- To help students attain basic knowledge of the computer
- To help students to become familiar with the use of internet and browse the World Wide Web through routine practice.
- To enable students develop foundational skills for information technology.

Course content

Introduction to computers

- Information management
- Why were office systems less beneficial than computerized systems
- Why computers are better than people
- Limitations of computers
- Effects of office automation on business
- Definition of computers
- Characteristics of computers
- Types of computers

Hard ware concepts

- The processor and its elements
- Manual input devices that include keyboard, web camera, the monitor, mouse
- Automatic input devices that include modems, magnetic ink character recognition, optical mark reading, magnetic stripe cards
- Output devices that include VDU, speakers, printers,
- Storage devices that include; hard disks, floppy disks, Flash disks, tape storage

Networks and data communications

- Configurations that include; centralized, decentralized and distributed processing as well as key features of distributed processing
- Networks that include: Local Area Network(LANs), Wide Area Networks(WANs),Metropolitan Area Network(MAN), storage Area Networks
- Client-server computing
- Data communication that include; oral, paper and electronic data communication

- Data transmission equipment that include; coaxial cables, modems, multiplexers

Software Concepts
- Definition of software
- Operating system
- Functions of an operating system
- Windows, MS-DOS, features of windows 95, features of windows 98
- Application software and packages
- Examples of word processing programs
- Spread sheets
- Examples of spread sheets

Personal Information Managers (PIM)
- Importance of PIM
- Examples of PIMs
- Integrated packages
- Utility programs
- Viruses
- Types of viruses and how they are transmitted

Programming Languages
- Low level language i.e Machine code, assembly
- High level language
- Advantages of high-level languages over low-level language

Assessment
Course work 40%
Exams   60%
Total Mark 100%

<div align="center">

CHAPTER ONE

</div>

1:0   ATTRIBUTES TO INFORMATION

Everything that we do, either in our personal life or as part of the activities of work depends on information. Therefore, information is a key resource for success of most of the companies and organisations.
Information refers to facts or knowledge about something, which could be important for decision-making.

1:1   INFORMATION MANAGEMENT

Like any other resource, i.e. machines, money, etc. Information must be controlled and organised. It should be managed (collected, organised and controlled). Information management is accomplished by the factors considered below:

i)   Identifying current and future information needs
Information is always needed for current decisions e.g. current sales performance, and any likely future changes e.g. need for future expansion.

ii)   Identifying Information Sources
In order to make good decisions, the information used must be collected from proper sources e.g. if the company sales are affected by weather, then reliable information about weather should be collected from Meteorological Department.

iii) Collecting the Information

Some information may easily be collected using any simple means, but other information may only be got after using wise tactics or a series of procedures e.g. a profit for the month, or year.

iv) Storing the Information

Information collected should always be stored securely and accessibly to enable future use and reference.

v) Ensuring that information is communicated to the right person who needs it

Always information should only be communicated to people who need it and kept away from those who don't deserve it.

1:2 DEFINITIONS

Data

These are the raw materials for information. Any thing that the computer can work with, either numbers of any kind, texts, facts, etc.

Information

This refers to processed data. Items that have been re-arranged so as to give the user a meaning, which could be vital for decision-making.

Qualities of good information

Good information has a number of specific qualities for which accurate is a useful mnemonic (symbol).

Accurate

Information should obviously be accurate because using incorrect information could have serious and damaging consequences.

Consistency

Especially in accountancy, information should always be consistent e.g. if the March report of slow paying students is prepared on the basis that slow paying students are those who have not paid within 60 days, but the August report considers students who have not paid within 30 days, then is not valid to compare the two reports.

Clarity

The information should always be clear to the user. If the user can't understand the information, then he certainly can't use it properly.

Reliability

Information must be trusted by the managers who are expected to use it. An information source may therefore play a great role here.

Communication

Information should always be communicated to the right person.

Channel of communication

Depending on the type of information being communicated and to person(s) for whom it is intended, a proper channel should always be used.

Volume and brevity

Information should be brief, so long as this does not mean that it is incomplete or inaccurate. Huge volumes of information may be hard to absorb even if all of it is relevant.

Timing

Information should always be delivered in time, as information delivered shortly after a decision is already taken is always useless however relevant and accurate it is.

Cost

The benefits to be achieved from the information should out way the costs involved in obtaining and communicating it to the people concerned. This may either be in the short or long run.

Question:

What is information? What are the main qualities of good information?

1:3   TECHNOLOGY FOR INFORMATION

Information handling and processing in offices has been made easy due to enormous development in office machines and computers.
However on the other hand the manual systems exist along side computerised systems.

Why manual office systems are less beneficial than computerised systems.
♦Labour productivity is usually lower, particularly in routine and operational applications.
♦Processing is slower where large volumes of data need to be dealt with.
♦Risks of errors are greater, especially in repetitive work like payroll calculations.
♦Information is generally less accessible.
♦It is difficult to make corrections or alterations.
♦Quality of output is less consistent and not as high as well-designed computer output.
Why computers are better than people
♦For storing information

- It's more accurate than humans
- It works faster than humans
- Its automatic i.e. carries out many operations without human input
- It is diligent i.e. works for long hours without getting tired
- It's used for entertainment
- It's used for communication e.g. email, Internet
- It's used for data base management i.e handling large volumes of information (data)
- It's used for computations

LIMITATIONS OF COMPUTERS
- Less flexible than humans
- Have to be explicitly "told" what to do
- If an unanticipated situation arises, PCs can produce erroneous results
- Have no potential to work out a solution

1:4 OFFICE AUTOMATION

This is majorly composed of word processing, spreadsheets, databases, telephone and fax (facsimile) and networks.

Effects of office automation on businesses
Office automation has an enormous effect on business in a variety of ways:

- **Routine processing**

The processing of routine data can be done in bigger volumes, at greater speed and with greater accuracy than with non-automated - manual system.

- **The paperless office**

There might be less paper in the office (but not necessarily so) with more data processing done by keyboard. Data storage done electronically other than using papers**.**

- **Management information**

This is likely to change both in nature and quality, as more information will easily be available and accessible, through information analysis done easily and so on.

- **Organisation structure**

This may change, as the PCs are likely to be locally controlled in an office or branch, creating a shift to decentralisation.

- **Customer Service**

This can improve especially if the customers can call an organisation and the feedback the staff give to callers is from the organisation's on-line data base.

1:5 HOME WORKING
Advances in communication technology have, for some tasks, reduced the need for the actual presence of an individual in the office. This is particularly time for tasks involving computers.

The advantages of home working for an organisation involve the following:

a) Cost saving on space

Rental changes are a little high and if some employees can do their work from home, then this will reduce on the space occupied and thus the rental fees.

b) A larger pool of labour
More applicants are expected especially for clerical positions, especially from people who are committed else where and office time tables may collide.

c) Freelance employees
This category of employees will be good for the organisation as there will be no sick pay, holiday pays and salaries especially when there is no sufficient work.

The advantages to the individual
♦No time wasted commuting to the office.
♦The work can be organised flexibly around the individual's domestic commitments.
♦Jobs that require concentration may sometimes be done better at home without the office disruptions.

Disadvantages
To the Organisation
The major disadvantages to the organisation are normally lack of control as managers will have no close supervision of the workers.

To the Individual
♦Isolation
If just forced to work from home, this may cause barriers to social life experienced in offices.

♦Intrusions
A home worker is vulnerable to home interruptions e.g. a kid or members of the family who may forget that the individual is home working.

♦Adequate Space
It may not be always possible to obtain a quiet space at home in which to work.

♦Freelance home workers normally have fewer rights compared to office stationed workers.

Question:
Today home working is booming in employment sector, what do you think has led to this and what advantages does the organisation get from this kind of trend?

1:6 IT AND ACCOUNTING (ACCOUNTING PACKAGES)

Years back, accounting records were only prepared manually, developments in information recording technology has however advanced and now the same accounting records can be made using computers e.g. ledgers, trial balances,

profit and loss accounts, balance sheets, etc. The only difference is that these various books of accounts have TO be count invisible and can only be called out.

The advantages of accounting packages compared with a manual system are as follows:
♦Non-specialists can use the packages.
♦A large amount of data can be processed very quickly.
♦Computerised systems are more accurate than manual.
♦Double entry is automatic

If you enter the details of an invoice the system automatically updates the sales account, the VAT account, the debtor's ledger control account and the memorandum of sales ledger account. There is no need to enter the information four times.

♦Integration; all ledgers and records can be linked up.
♦Easy information analysis in terms of trial balance or a debtors' schedule.

Disadvantages
The advantages of computerised accounting systems far out weight the disadvantages, particularly for large businesses. However, the following may be identified as possible disadvantages.

♦The initial time and costs the system, training personnel and so on.
♦The need for security checks to make sure that unauthorised personnel do not gain access to data files.
♦The necessity to develop a system of coding and checking.

♦Lack of audit trail. It is not always easy to see where a mistake has been made.
♦Possible resistance on the part of staff to the introduction of the system.

Types of accounting packages

The most widely used packages are as follows:
Small business (1-10 people)
♦Sage Line 100 or Line 50
♦Quick books
♦Tas books

Small to medium (10-30 people)
♦Sage Sovereign
♦Pegasus opera
♦Exact
♦Multisoft prestige

Medium - sized businesses (30-200 people)
♦ Sun-accounts
♦Tetra chameleon
♦Scala
♦Dynamics

Large business (200 - 2000 people)
♦Coda
♦JBA

Very large businesses
♦SAP
♦Oracle
♦Dun & Brad Street

<div align="center">

CHAPTER TWO

HARD WARE CONCEPTS

</div>

2:0 INTRODUCTION
Under this chapter, we shall look at the following:

♦ Computer components

- ♦ Characteristics of a computer
- ♦ The Processor
- ♦ Other peripherals
- ♦ Manual input devices
- ♦ Automatic input devices
- ♦ Output devices
- ♦ Storage devices

2:1 COMPUTER COMPONENTS
Hardware – these are the physical parts of the computer e.g the mouse, monitor, and keyboard
Software – these are the invisible components of the computer. They are the programs and instructions, which run the computer
User- should be trained personnel
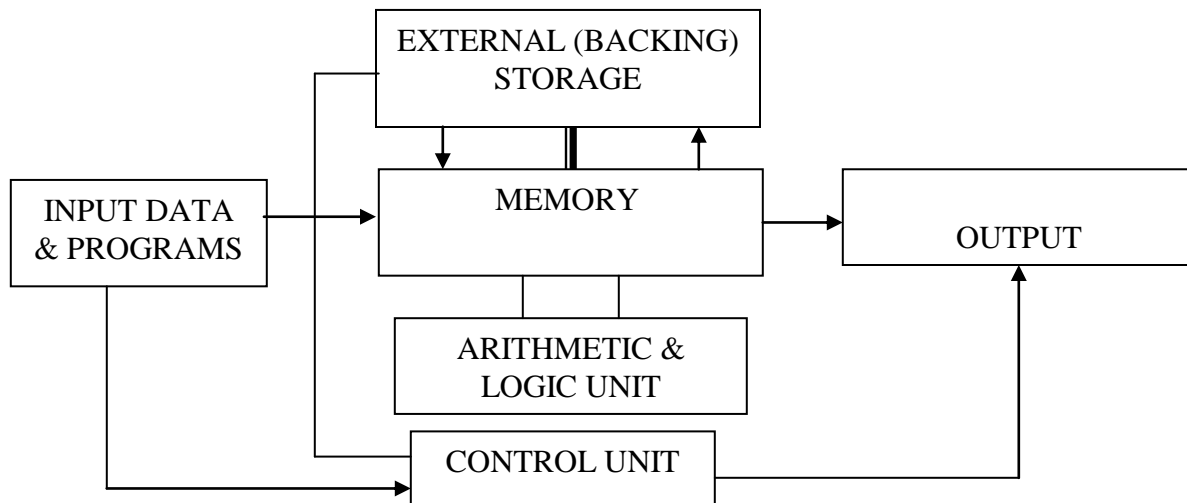
2:2 COMPUTERS

Definition:
A computer is a device, which will accept input data, process it according to programmed logical and arithmetic rules, store and out put the results.

A computer is therefore a mixture of physical things like keyboards, mice, screens, circuits and cables (hard ware) and intangible arithmetic and logic (software).

Hardware means, the various physical components (tangible) as opposed to the non-tangible software elements.

CHARACTERISTICS OF COMPUTERS (Assignment)
- ♦ Machine
- ♦ Processing
- ♦ Versatile- performs multiple functions easily
- ♦ Electronic
- ♦ Automation
- ♦ Storage- stores a lot of information in a very small space
- ♦ Accuracy
- ♦ Compatibility
- ♦ Consistency

Types of Computers

These are categorised by size and output
By Output
    i)   Digital
    ii)   Analogue

By Size
i) Super computers
ii) Main frame computers (at times called enterprise servers)
iii) Mini computers, now often called mid-range computers
iv) Micro-computers, now commonly called PCs.

We shall group (iii) and (iv) as 'Small business computers'.

Super Computers
A super computer is used to process very large amounts of data very quickly. They are particularly useful for occasions where high volumes of calculations need to be performed, for example in meteorological or astronomical applications.

Main frames
A main frame computer system is one that has at its heart a very powerful central computer, linked by cable or telecommunications to hundreds or thousands of terminals, and capable of accepting simultaneous input from all of them.
♦ Other characteristics include:
♦ Has centralised service departments
♦ Handles multi-level output
♦ Very high processing speed
♦ Have disk drives like magnetic tapes
♦ Very large size therefore handles big tasks and can support many users
♦ Stores vast amount of data
♦ Industrial use
♦ Expensive but slightly smaller than super computers
♦ Support services for data preparation, control and programming

Medium and small business computers

Mini computers
A mini computer is a computer whose size, speed and capabilities lie some where between those of a main frame and a PC.

Characteristics
♦ Smaller than mainframe computers
♦ Have smaller storage capacity and are slower
♦ Linked to other computer workstations
♦ Handles multi-level output
♦ Are large in size
♦ Disk drives include tape drives
♦ Environmental control is not necessary
♦ Limited output and input peripherals

Personal Computers

The 'personal computers' (or 'micro computers') are the most common computers available in most of the businesses and even in homes.

Characteristics

♦ Small for personal use.
♦ Low output
♦ Operated in desks
♦ Most common computers in business
♦ Handles relatively big tasks
♦ Have fairly good processing speed
♦ Have limited input and output devices
♦ Compilers and interpreters are permanently stored in hardware as ROM
♦ They are often linked together in a network to enable sharing of information between users.

File servers

A file server is more powerful than the average desktop PC and it is dedicated to providing additional services for users of networked PCs.

A very big net work may use a 'main frame' as its server, and indeed main frames are beginning to be refereed to as 'enterprise servers'.

Portables

The original portable computers were heavy, weighing around five kilograms, and could only run from the mains electricity supply. Subsequent developments allow true portability.

i)The Laptop. Powered either from the electricity supply or using a rechargeable battery. It uses 3½" disks, CD - ROMS, liquid crystal or gas plasma screen and is fully compatible with desktop PCs.

ii) The notebook is about the size of an A4 pad of paper. Some portables are now marketed as 'sub-note books'.
iii)The pocket computer or hand held, may or may not be compatible with a true PC.

Much as PCs (portables) may be very popular because of their easy way of transportation and occupation of smaller space in offices, they have some draw backs;

i)   Key board ergonomics
     The keys are too small, or too close together for easy, quick typing.
ii) Battery power
     They normally don't last for long periods.

A typical PC specification may involve the following:

♦ Intel 233 mttz pentium 11 processor 33. 6 kpbs internal fax modem.
♦ 64 MB FAST EDO RAM (expandable to 512 MB)
♦ 6.4GB hard disk drive, 15" SVGA colour monitor LR, NI up to 1024 x 768 energy star compliant.

Advantages

♦ Easy to transport
♦ Occupy small spaces in offices

2:3   THE PROCESSOR
The processor is the 'brain' of the computer.

Definition
A processor is the collection of circuitry and registers that performs the processing in a particular computer and provides that computer with its specific characteristics.

The processor (sometimes referred to as central processing unit (or CPU) is divided into three areas.

♦ The Arithmetic and Logic Unit, (ALU)
♦ The Control Unit,
♦ The Main Store or Memory (RAM & ROM)

In modern computer systems the processing unit may have all its elements - arithmetic and logic unit, control unit and the input/output interfall on a single 'chip'.

Definition
A chip is a small piece of silicon upon which is etched an integrated circuit, which consists of transistors and their interconnecting patterns on an extremely small scale.

The chip is mounted on a carrier unit which is 'plugged' on to a circuit board called the mother board with other chips, each within their own functions such as sound (a 'sound card') and video (a 'video card').

Arithmetic and Logic Unit (ALU)
The ALU is the part of central processor where the arithmetic and logic operations are carried out. These include arithmetic (e.g. adding and multiplying) and logical functions such as comparison, movement of data, etc.

Control Unit
The control unit receives program instructions, one at a time, from the main store and decodes them.
♦ It then sends out control signals to the peripheral devices.
♦ Registers are paths that connect the ALU to the main memory
♦ Data buses are wires connecting the micro processor to the memory through which data flows
♦ An address is a pattern of channels that identify a unique storage location
♦ Toner is an electronically charged dry ink substance used in printers

Memory
The computer processing is normally much faster if the computer has the information it needs readily to hand.
The computer's memory is also known as main store, internal store or immediate access storage. The memory will hold the following.

i) Programs, the control unit cuts on program instructions that are held in the store; these program instructions include the operating systems.
ii) Some input data. A small area of internal store is needed to take in temporarily the data that will be processed next.
iii) A working area. The computer will need an area of store to hold data that is currently being processed or is used for processing other data.
iv) Some output data. A small area of store is needed to hold temporarily the data or information that is ready for output to an output device.
Each individual storage element in the computer's memory consists of a simple circuit which can be switched on or off. These two states can be conveniently expressed by the numbers 1 and 0 respectively.

Each 1 or 0 is a bit.

Bits are grouped together in groups of eight to form bytes.
A byte may be used to represent a character for example, a letter, a number, or any other symbol. The characters formed can be grouped together to form words or figures, etc.

Since a byte has 8 bits, there are 2^8, or 256, different combinations of 1s and 0s, which is sufficient to cover numeric digits, upper and lower case alphabets, punctuation marks and other symbols.

The processing capacity of a computer is in part dictated by the capacity of its memory.
Capacity is calculated in kilo bytes (1kb = 2^{10} (1024), (megabytes = 2^{20} bytes), and gigabytes (2^{30}) or Kb, Mb and Gb.

Port
This is a socket in the CPU into which peripherals can be connected

Expansion Slot
These are access slots to where computer cards can be fixed on a CPU during upgrading

Types of Memory
There are basically two types of memory i.e. RAM and ROM.

RAM: (Random Access Memory)
This is the memory that is directly available to the processing unit. It holds the data and programs in current use. Data can be written on to or read from Random Access Memory.

RAM is 'volatile'. This means that the contents of the memory are erased when the computer's power is switched off.

Memory Cache

Primary cache
This is a small capacity but extremely fast memory chip which save a second copy of the pieces of data most recently read from or written to main memory. When the cache is full, older entries are 'flushed out' to make room for new ones. Primary cache is often part of the same chip as the CPU.

Secondary cache
This is a larger, slower cache between the primary cache and the main memory.
The principal here is that if a piece of data is accessed once it is highly likely that it will be accessed again soon after words, and so keeping it readily to hand will speed up processing.

ROM (Read Only Memory)
This is a memory chip into which fixed data is written permanently at the time of its manufacture. New data cannot be written into the memory, and so the data on the memory is unchangeable and irremovable.

ROM is 'non-volatile' memory, which means that its contents do not disappear when the computer, power source is switched off.
A computer's start-up program, known as a 'boot strap' program, is always held in a form of a ROM. 'Booting up' means running this program.

When you turn on a PC you will usually see a reference to BIOS (Basic Input/Output System). This is part of the ROM chip containing all the programs needed to control the key board, screen disk drives and so on.

2:4 OTHER PERIPHERALS

♦**Uninterrupted Power Supply (UPS)**
It stabilises the power thus enabling the user to save his/her work before the power supply is completely terminated. Hence it's called a stabiliser.

2:5 MANUAL INPUT DEVICES
These are input devices, which are quite labour - intensive. They include the following:

Keyboard
This is a board of keys, which includes the alphabet, numbers (0-9) and some basic punctuation, together with other keys. It is used to enter data into the computer's main memory. It resembles a typewriter except for some keys like the function keys (F1, F2 etc), control keys, alter keys, escape keys etc. It mainly has three parts:
♦The alphabetical keypad – these include letter keys A-Z
♦The functional keypad – (F1-F12)
♦The numeric keypad - (0-9)
There are 2 types of keyboards:

Standard Keyboard	Enhanced Keyboard
♦Older style	♦Latest style and most common
♦Has 10 function keys on the left hand side of the keyboard	♦Has 12 function keys at the top of the keyboard
♦Cursor keypad is on the right and is used for numeric entry	♦Has shift, control and alt keys on both sides of the space bar

The Function Keys
F1 – is used for help
F2 – is used for page setup/programming
F3 – is used for page break down or break up
F4 – is used for moving a group of words from one position to the other
F5 – is used for password
F6 – is used to replace a word
F7 – is used for exiting/closing the screen
F8 – is used for sizing the appearance of the screen
F9 – is used for envelope set up
F11 – is used for highlighting the appearance of the screen

Other Keys
Caps lock- is used for writing capital letters
Shift keys- used to obtain the uppercase character of a button
Enter Key – used for creating spaces between lines. They also move the cursor to the next line. It also executes commands
Back space key – is used to erase letter by letter at any cursor point. A cursor is a blinking feature that indicates a point of insertion i.e the point where the next character will appear
Space bar – it creates space between words
Delete key – it deletes error at cursor point
Insert key – it is used to insert a missing letter in a group of words
Home keys – it is used to take the cursor back home
End key- it takes the cursor either at the end of the line or end of the document
Page up/down – takes the cursor at the upper or down page
Tab key – it is used for making paragraphs
Arrow keys – are used for moving through the document
/ Forward slash

\ Back slash
: Full colon
* Asterisk
. Period
; Semicolon
? Query
, comma

Web Camera
It enables the user to take photographs and view the other person online

The VDU (Visual Display Unit) – the Monitor
This can be used in conjunction with a keyboard to display text to allow the operator to carry out a visual check on what she has keyed in.
It can also be used to give messages to the operator, and the operator can respond to messages by keying in new instructions. The monitor gives a soft copy of the data held by the computer. It's both an input and output device.

Types of VDUs
♦ Coloured screens which display information in various colours
♦ Monochrome screens which display in black and white
♦ Graphic screens which display information in graphs

Mouse
This is often used in conjunction with a keyboard, particularly in windows - based systems. It may be used in place of a keyboard. It's used with windows programs to provide additional flexibility to the user
Even joysticks and track balls may also be used as the mice.

Parts of a mouse
♦ Left- for clicking
♦ Right- for popping
♦ Middle- moving up and down the document

2:6 AUTOMATIC INPUT DEVICES
These include the following:

Modems
When the modem converts analogue signals to digital signals during data transmission, is said to be an input device.

Magnetic ink character recognition (MICR)
MICR is the recognition by a machine of special formatted characters printed in magnetic ink. This is done using ink, which contains metallic powder and special typewriters.

Optical character recognition and scanners
OCR is a method of input involving a machine that is able to read characters by optical detection of the shape of those characters. Optical (or laser) scanners can read printed documents by recognising the characters, convert them into machine code and record them.

The advantage of OCR over MICR is that the OCR can read any ordinary typed or printed text provided the quality of the input document is satisfactory.

The disadvantage however, evolves around the distinction between O and 0, then 1 and I which is a bit hard.

Optical Mark Reading (OMR)

This is normally used for numeric characters. Values are denoted by a line or cross in an appropriate box, whose position represents a value, on a pre-printed source document (or card). The card or sheet is then read by a device which senses the mark in each box and translates it into machine code.

An example would be a multiple choice question paper.

Bar Coding and Electronic Point of Sale (EPOS)

A bar code reader is a device, which reads bear codes, which are groups of marks which, by their spacing and thickness, indicate specific codes or values. Normally used in super markets.

EPOS devices use bar coding and act both as cash registers and as terminals connected to a main computer.

This enables the computer to produce useful management information such as;

♦ Sales details and analysis
♦ Stock control information

And all this very quickly

Magnetic Stripe Cards

These can be used at the door entrances where the card is passed over the reader which senses the information to the computer to open the door if the holder of the card is supposed to enter. They are also used in banks by Automated Teller Machines (ATM).

Voice recognition

A computer soft ware has been developed that can convert speech into computer sensible form. The input device needed here is Microphone. The available software currently require the user to speak very slowly, dictating one word at a time - but this all can at best be 90% accurate.

Question

a) What is the major distinction between ROM and RAM.
b) Briefly describe 8 (eight) input devices to computers.

2:7 OUTPUT DEVICES

These are devices that communicate the results of processing from the computer to the user. This could be a process or just an instruction. They include the following:

Visual Display Unit (VDU)

As out put devices, these can usually be used where there is no requirement for a permanent out put and when the volume of the out put is small. E.g. in cases of a single enquiry or current balance on account.

Speakers

These tend to output audio stored information e.g. at the airport, the computer through loud speakers may pass announcements to passengers, or you can listen to your favourite music from the computer using its speakers, etc.

Modem

This acts as an output device when the digital signals are converted into analogue signals so as to be transmitted over a telephone line.

Printers

This is a device that prints texts, graphics or images on paper producing hard copy (hard copy refers to a document on the paper as distinct from that one of the screen).

Classification of Printers

Printers can be classified as:
- Impact printers
- Non- impact printers

IMPACT PRINTERS

These mechanically strike the paper during the printing. The print elements i.e. hammer, ribbon and ink strike the paper to deposit the characters on it after relieving signals from the computer's central processing unit. Impact printers are comparatively noisy and slow.

Examples include:
Dot matrix printer- the characters it prints consist of series of dots arranged in a pattern to form the characters.
Daisy wheel – The printing mechanism involves a wheel on which available characters are located. In the course of printing, the wheel rotates as it impacts the required characters onto the paper.

NON - IMPACT PRINTERS
Here with these printers, the paper is not mechanically struck, but the printing is quickly done with the print elements like laser beams, heat, ink to produce hard copies.

Examples of these include:
Laser printers, Inkjet printers, Epson printers etc.

Differences between impact and non impact printers

- Non-impact printers are fast compared to the slow impact printers.
- Impact printers use inked ribbons yet non-impact printers use thermo or electrostatic principles.
- Impact printers are cheap yet non-impact printers are expensive due to the technology used to make them.

- Impact printers are generally noisy while non-impact printers are quite quiet.

Another classification of printers would be based on single print output i.e., character, and line or page printers.

Character printers print character-by-character - hence comparatively slow.

Line printers print an entire line at a time - hence comparatively fast and more expensive than character printers but less costly than page printers.
Page printers print the whole page at a go thus the fastest and most expensive printers.

A character can be, a number, letter, symbol, etc.
Plotters
These are devices that produce hard copy of complex drawings such as graphs, engineering, drawings, maps, curves, etc.

2:8 STORAGE DEVICES
These are items/devices that can be used to store Data or Information for subsequent use. They include the following:-

Disks
This is a device that aids in reading and writing information to and from a secondary storage device. They are the predominant form of backing storage medium nowadays because they offer direct access to data, an extremely important feature.

Data is held on a number of circular, concentric tracts on the surfaces of the disk, and is read or written by rotating the disk past read/write heads, which can write data from the CPU's memory on to disk, or can read data from the disk for input to the CPU's memory. he mechanism that causes the disk to rotate is called a disk drive.

The Disk Drive
This is the media where computer programme files reside e.g. hard disk, floppy disk, CD-Roms, magnetic tapes etc

Hard disks
A modern business PC invariably has an internal storage medium, but external disks may be used too. Everything stored by a user on the computer is stored on the hard disk. Internal storage medium. Stores most computer applications. Capacity usually 100MB. Designed with letters – C to S
Hard disks are metallic storage device on which data and information are magnetically stored on round metallic platters. Hard disk of different storage capacities are available e.g. those of 40 MB, 2GB, 4GB, 10GB, etc.

There are also removable disk packs which can be used for back-ups, mass storage or for moving files between computers.

Examples include;
♦ IDE (Integrated Drive Electronics)
♦ Zip drive
♦ Jaz drive, etc.

Floppy disks
Computer data or information can be stored externally on floppy disks.
A floppy is a flat circular plastic platter held permanently in a plastic case. A normal average floppy disk is about 3½". This can hold up to 1.44 Mb of data.
Diagram

Write protect notch

Label

Protective casing

[3½" disk]
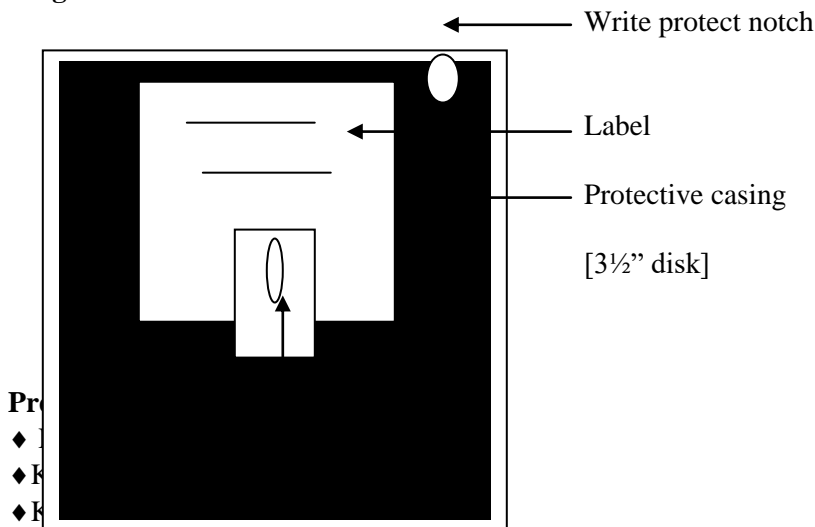
Pr
♦
♦ K
♦ K
♦ Keep away from dust
♦ Avoid throwing about
♦ Write protect to combat viruses

Differences between floppy disks and hard disks

♦ Floppies area flexible yet hard disks are permanently fixed though a few of them (hard disks) can be moved.
♦ Floppies are plastic yet hard disks are metallic.
♦ Hard disks store more information that floppies
♦ Floppies have lower reading capacity than hard disks.

Compact Disk-Read Only Memory (CD-Rom) Drives
External storage medium. Storage capacity is more than the floppy disk, hard drive. Designed with letters D to E

Flash Disks
More storage capacity than CDs. Holds about 178 floppy disks or 120 MB. Has high data transfer speed and compatible to operating systems like Windows XP. 2000

Tape Storage
Tape cartridge is another but now less commonly used storage device. It is not any different from audio or video cassette tape except that some are larger than normal audio cassettes.
Like any audio or video cassette, data has to be recorded along the length of the computer tape and so it is more difficult to access. It is not usually possible to read from and then write on to a single piece of tape. Reading and writing are separate operations using separate heads and so two drives are necessary for the two operations. Tape store more data than floppies. Fast tapes which can be used to create a back-up file quickly are known as tape streamers.

File update on tape storage facility is in a such way that, the changes are made on the current tape and get recorded on a completely new tape. This means that every time a change or update is to be made a completely new tape is made from the previous tape containing the most recent updates. This is what we call the grandfather - father - son relationship.

Its main advantages as far as data back-up is concerned is that should the son get lost or messed up in any way, t hen the most recently updated tape, before the son, i.e. father is obtained and changes that occurred since the production of the son are done to the father to come up with another sons - replacing the lost one.

CD-ROMS (Compact Disk - Read Only Memory)
These are small silvery disks that are read by the CD-ROM drive using a laser. They are called read-only because you can't change the data on them. Your computer can only read and copy the data on them.

Most soft ware these days are purchased on CD ROM, CD ROMs have massive libraries of data, vast collection of stereo sound chips, high colour graphics all of which take up a lot of storage space.

DVDs (Digital Video Disks) ROM
These are almost like CD-ROMs only that DVDs have more storage capacity (5 GB) with excellent access speeds, internet - based technologies which promise three - dimensional worlds, CD-quality sound and video.

Question
a) Of what advantage are the external storage systems.
b) Briefly describe 4 (four) external devices you know.

CHAPTER THREE

NETWORKS AND DATA COMMUNICATIONS

3:0 Introduction
Under this Chapter we shall look at the following;
♦ Configuration
♦ LANS, WANS, MAN and client-server computing
♦ Data communication

3:1 CONFIGURATIONS
The term configuration refers to the way in which computers are linked together.
♦At one extreme an organisation may have just a single 'stand-alone' computer that can only be used by one person at a time.
♦At another extreme, an organisation may have hundreds or thousands of computers, all able to be used simultaneously and to communicate with each other.

Centralised Processing
Centralised processing means having all the data/information processing done in a central place such as a computer centre at head office. Data will be collected at 'remote' (i.e. geographically separate) offices and other locations and sent in to the central location.

At the central location there will be:
♦A central computer, probably a large main frame
♦Central files, containing all the files needed for the system.

Decentralised Processing
Decentralised processing means having the data/information processing carried out at several different locations, away from the 'centre' or 'head office'. Each region, department or office will have its own processing systems, and so:
♦There will be several different and unconnected computers in the various offices;
♦Each computer will operate with its own programs and its own files.

Multi-user and distributed systems
In practice, information systems do not have to be entirely centralised or entirely decentralised, and a suitable mixture of centralisation and decentralisation is now normally used.

i)Local offices can have their own local systems, perhaps on PC, and also input some data to a centralised processing system.
ii)Computer systems can be networked, and there might be:
♦A multi-user system; or
♦A 'distributed' data processing system

Multi-user Systems
With a multi-user system there is a central computer with a number of terminals connected to it. The terminals are dumb terminals, which means that they do not include a CPU and so cannot do independent data processing.

A dumb terminal is that terminal which has no capacity for data processing.

Note:
An intelligent terminal however, is that terminal that can carry out data processing on its own without relying on the central computer.
♦The terminals in a multi-user system might be sighted in the same room or building as the central computer, or may be geographically distant from the central computer, connected by an external data link.

Definition
Remote Access
This describes access to a central computer installation from a terminal, which is physically distant.

Remote Job Entry

This is used to describe a method of processing in which the computer user inputs his data to the computer from a remote terminal.

Distributed Processing

A distributed system is a combination of processing hardware located at a central place, e.g. a main frame computer with other, usually smaller computers located at various sites with in the organisation.

The central and dispersed computers are linked by a communication network.

A typical system might consist of a mainframe computer, linked to local mini-computers, linked to desktop PCs as intelligent terminals (see NB above), and to a range of peripheral equipment.

Key features of distributed processing include:
a)   Computers distributed or spread over a wide geographical area.
b)   A computer can access the information files of other computers in the system.
c)   The ability for computers within the system to process data 'jointly' or 'interactively'.
d)   Processing is either carried out centrally, or at dispersed locations.
e)   Files are held either centrally, or at dispersed locations.
f)   Authority is decentralised as processing can be performed autonomously by local computers.
g)   End- users of computing facilities are given responsibility for, and control over their own data.

3:2 NET WORKS

A network is an interconnected collection of autonomous processors. With a network there is no single central computer.

There are two main types of network, a local area network (LAN) and a wide area network (WAN). The key idea of a network is that users need equal access to resources such as data, but they do not necessarily have to have equal computing power.

LANS, WANS and client-server computing.

LANS (Local Area Networks)

Definitions:

A LAN is a network of computers located in a single building or on a single site. The parts of the network are linked by computer cable rather than via telecommunications lines.

WANS (Wide Area Network)

These are networks on a number of sites, perhaps on a wide geographical scale.
WANS often use mini computers or main frames as the 'pump's that keep the data messages circulating; where as shorter-distance LANs normally use PCs for this task.

Differences between WANs and LANs

1.   A WAN covers a greater geographical area unlike a LAN usually limited to a single building or site.
2.   WANs will send larger computers as file servers.
3.   WANs will send data over telecommunication links while LAN will use a cable.
4.   WANs are normally larger than LANs and have more terminals linked to the network.
5.   A 'WAN' can link two or more LANs using gateways.

Metropolitan Area Network (MAN)
This connects computers in a municipality

Storage Area Network (SAN)
These are computers connected by use of unique characters e.g. passwords

Definition
A gateway is a device that is used to connect two networks of a similar type.

Client - server Computing
As the name suggests, client server computing describes the relationship between the devices in the network.
Client
A client is a machine which requests a service e.g. a PC running a Spreadsheet programme which it requests from a storage machine (the sever).
A server on the other hand, is a machine dedicated to providing a particular function or service requested by client.
Servers include; files servers, print services e-mail and fax servers.

Types of file servers:

Low end file server
This is used in a network of about six people or users running a couple of software applications and a database.

Mid range file server
This might support 20 to 30 users.

High end file server
Is used in a large dependent network of about 50-100 users, handling transactions, processing and an accounting system.

Network Operating System
This is a set of programmes responsible for the smooth running of a network.
When computers and other devices are linked/connected to form a network, they won't have the characteristics of networked computers (like sharing of data) unless the network operating system is installed.
It has the following functions;
♦It establishes the link between the nodes of the network.
♦It monitors the operations of a network.
♦It controls the recovery process when the system or part of it breaks down.

Examples of network operating systems include:-
Novell network, Windows NT, UNiX, etc.
Advantages of Client Server Computing

1. **Greater resilience**
Processing is spread over several computers. So client server systems are more resilient. Should one computer/server breakdown; other locations can carry on the processing.

2. **Sharing programmes and data files**
This can be shared by all the PCs on the network. With stand alone PCs, each will have its own data files and might be unnecessary duplication of data.

3. **Sharing of data**
Each PC in a network can do the same work, providing flexibility in sharing workloads. In a peak period, two or more people can share the work without having to leave their own desks**.**

4. **Sharing peripherals**

In some cases, say LAN, five PCs might share a single on-line printer where as if there were a stand alone PC, each might be given its own separate printer.
Computer sharing of peripherals is significantly of benefit especially where resources are scarce or expensive.

5. Compatibility
Client-server systems are more likely than centralised systems to have windows interfaces, making it easier to move information between applications e.g. spreadsheets and accounting programs.

Disadvantages of client-server computing

Main frames are better than client-server computing at dealing with large volumes of transactions.
It is easier to control and maintain a system centrally. Client-server computing does not favour data security compared to centralised systems.

Each location may need its own expert network administrator to keep things running smoothly. This creates unnecessary duplication of skills and over manning.
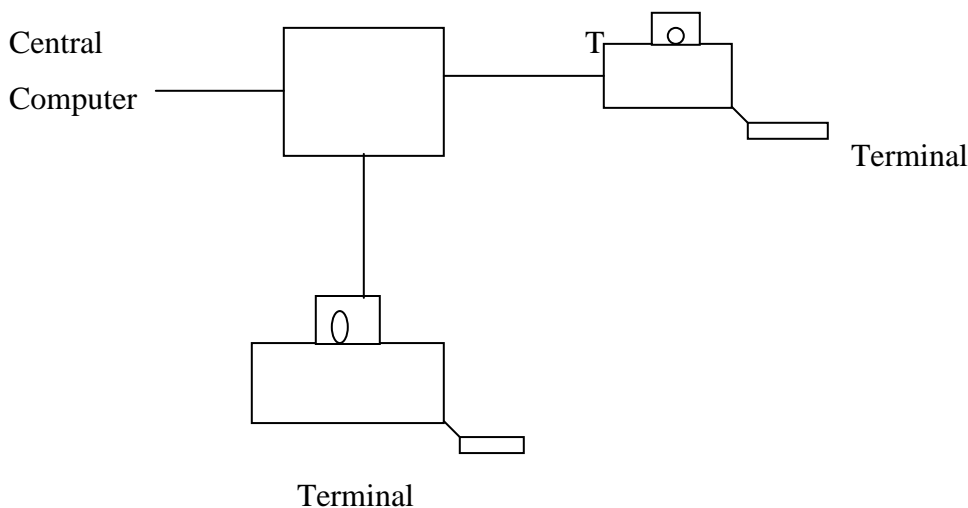
3:3 NETWORK TOPOLOGY
This means the physical arrangement of nodes in a network.

A node
This is any device connected to a network. It can be a computer, or a peripheral device such as a printer.

There are several LAN topologies including; the ring network, star network, bus network and Hierarchical network.

Star Network

Central Computer

Terminal

Terminal

A number of small computers or peripheral devices are linked to a central unit. The central unit may be a host computer or a file server.

A host computer is a large centralised computer, usually a mini computer or a main frame. This topology is common for linking several micro computers to a main frame.

The bus network



Terminal

Bus

Terminal

Printer
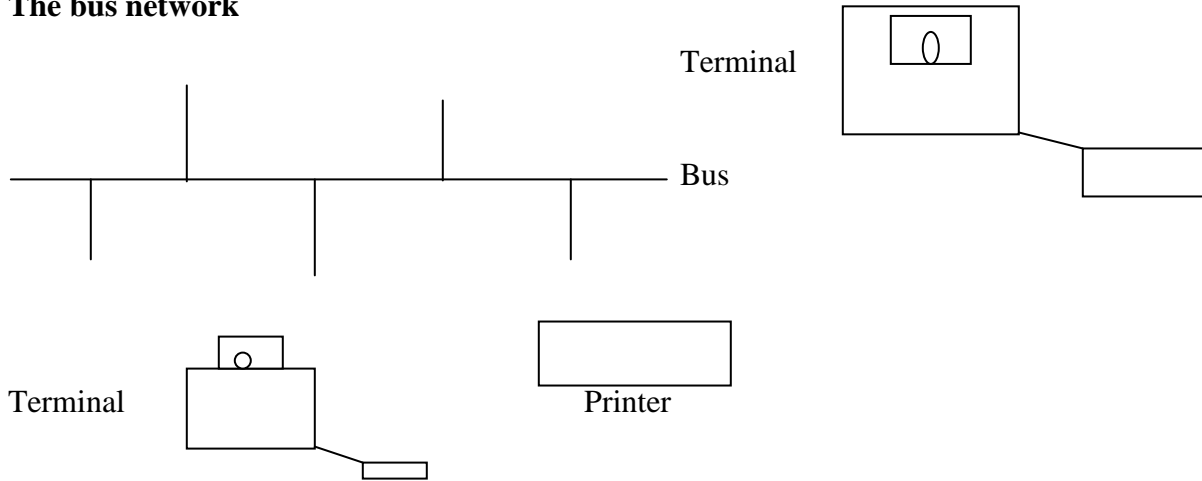
In the bus network, each device handles its own communication control. There is usually no host computer or file server.

A file server is a large capacity hard disk storage device and it basically stores data and programs.

All communication in a bus network travel along a common cable called a bus. As it passes along the bus, the information is examined by each device on the network to see if its intended for it. This topology is suitable where a few micro computer are to be linked.
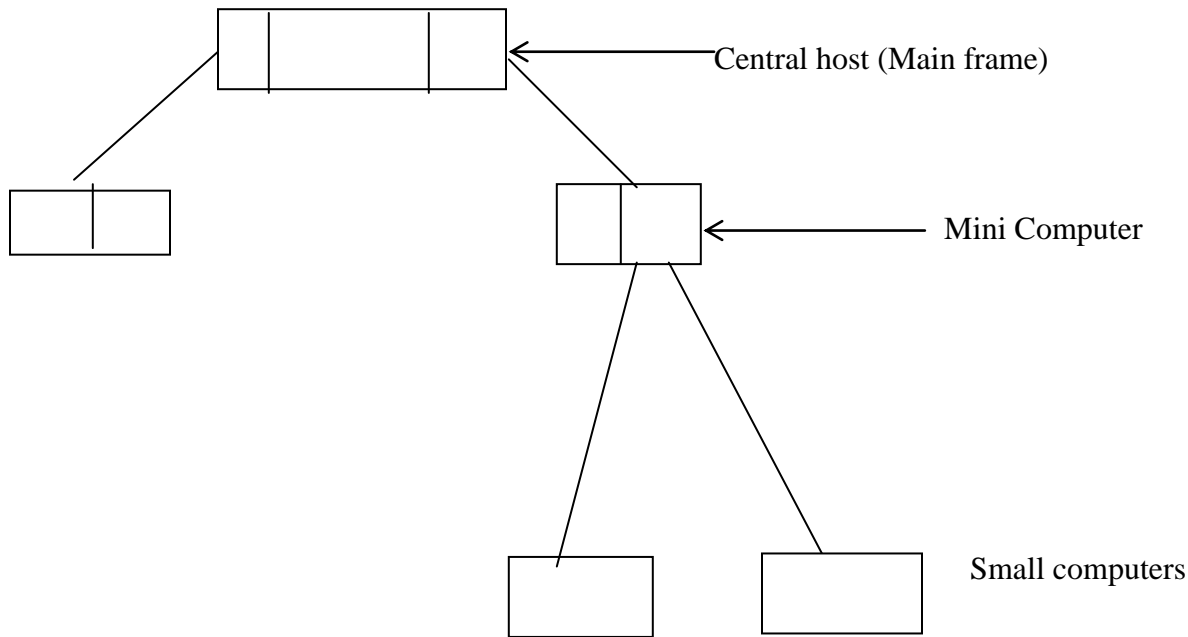
The Ring Network

Terminal

Terminal
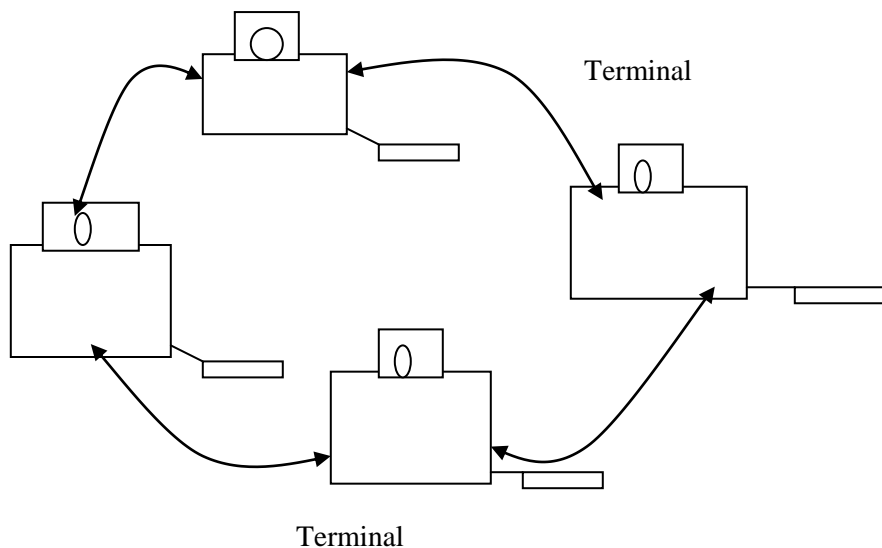
Each node is connected to two (2) others forming a ring.

Messages are passed around the ring until they reach the correct destinations. This is the least frequently used topology.

Hierarchical (Hybrid) Network

A hierarchical network consists of several computers linked to a central host computer just like a star network. However, these other computers are also hosts to other smaller computers or peripheral devices.

The host at the top of the hierarchy could be mainframe computers, then the last level micro computers.

This topology is useful in centralised processing in organisations e.g. different departments within an organisation may have individual micro computers connected to departmental mini computers, the mini computers in turn may be connected to the organisation's main frame which contains data and programmes accessible to all.

3:4 DATA COMMUNICATION

There are three methods of data communication:
1. Oral communication
2. Paper communication
3. Electronic data communication

Oral Communication
This may occur in a face-to-face situation or by telephone.
It may involve one calling the other on phone asking for particular information, which may be given verbally on the phone.

Paper Communication
Paper-based communication involves the use of internal memoranda, computer print outs and monthly accounting reports.

E.g. copies of despatch notes raised might be sent to the relevant department to be physically matched with customer's order, so that invoices can be raised.

This method means that there is a permanent 'hard copy' record of each transaction. This method may be cheaper that electronic communication, as data communications links do not need to be set up.

The disadvantages are that there may be delay in the delivery of information, particularly between sites. Also the necessity for data transcription increases the risk of error.

Electronic communication
Here information is exchanged via computers, enhancing the amount and quality of information communicated. Details of despatches of goods from stock might be automatically passed to the sales ledger or accounting sub-system by the ware housing or stock control sub-system so that invoices can be processed.

Advantages of Electronic Communication
Speed is guaranteed since the transmission is almost instant.

Accuracy is always good since there is some kind of automation.

This method eliminates much of human processing.

Data Transmission Equipment

a) Coaxial Cables
A coaxial cable consists of one central conductor, which is surrounded with an insulator and then with the other conductor. In this way, the outer conductor prevents interference from reaching the inner coax cables are used for high-speed network data links. Also used for TVs signals e.g. Aerials.

b) Modems
For data transmission through the existing 'analogue' telephone network to be possible, there has to be a device at each end of the telephone line that can convert (Modulate) the data from digital form to analogue form, and (Demodulate) from analogue form to digital form, depending on whether the data is being sent out or received along the telephone line.

This conversion is done by devices called modems. There must be a modem at each end of the telephone line.

Digital means 'of digits or numbers'. And is in coded (binary) form.
c) Multiplexors (Concentrators)
These are devices, which are used to send data from several sources down a single line at the same time.

Multiplexing involves combining or merging signals. It accepts signals from several communicating devices and directs transmission to and from a computer along a single carrier channel.

It codes data in a special way so that it can be sorted out at it destination.

Terminals   Multiplexor
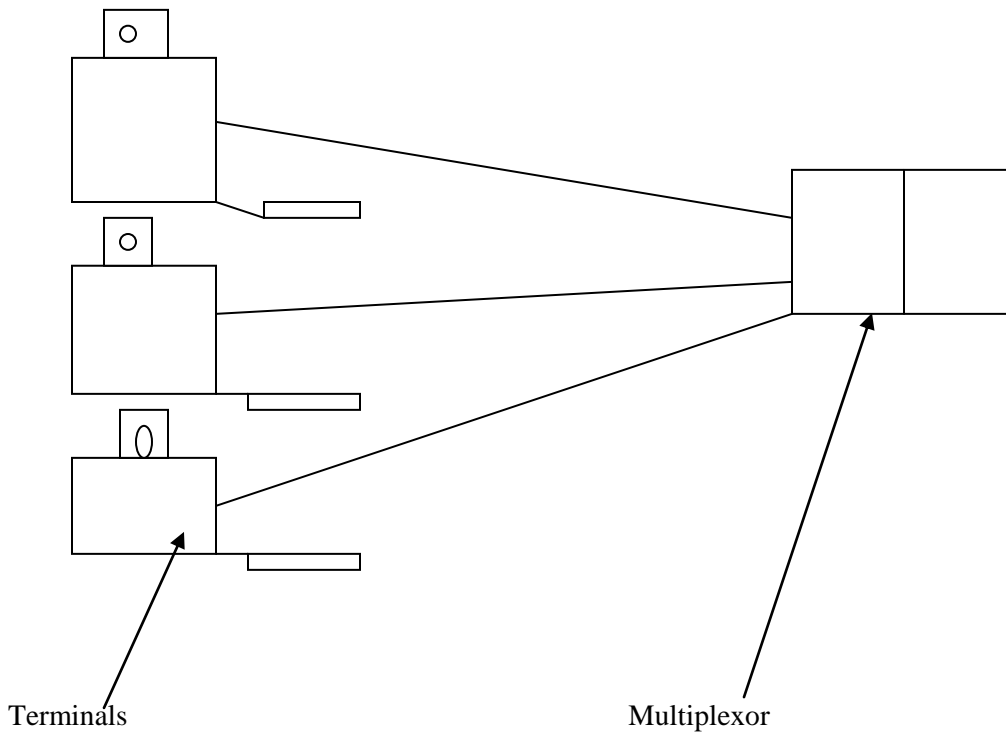
It saves line charges as only one telephone line will be required to connect several computers.

Terminology key terms

Band Width
The amount of data that can be sent down a telecommunications line is in part determined by the bandwidth.

Definition:
Bandwidth is the range of frequencies that the channel can carry.
Frequencies are measured in cycles per second, or in Hertz. The wider the band width, the greater the number of messages that a channel can carry at any particular time.

Band Rate
This is a measure of the speed of transmission and roughly equates to number of bits per second.

Interfaces
The point of interaction between the computer and the user, principally in terms of using a display screen for in put and retrieval of information. The two principals forms of interface are often described as Graphical user interface.

Protocols
This is an agreed set of operational procedures governing the format of data being transferred, and the signals initiating, controlling and terminating the transfer.

This helps in cases of data transmission errors, which can get detected, and also take steps to recover the lost data.

Question;
1. a) What is a computer?
    b) List and briefly describe the major components of a computer.

SOFTWARE CONCEPTS

4:0 Introduction
Under this Chapter we shall look at the following:-
♦ Operating system
♦ Application programs
♦ Utility programs
♦ Programming languages

Definitions
Software refers to the programmes that tell the computer what to do. Soft ware is by far the most valuable asset of a computer user.

A program is a set of instructions that a computer follows in order to produce the desired results or effects. There are 3 (three) categories of soft ware (programs):

i)   The operating software;
ii) The programming languages and language translators
iii) The application software

4:1 OPERATING SYSTEM
Also referred to as the executive program

Definition:
This is a program or suite of programs, which provide the bridge between application software (such as word processing packages, spread sheets or accounting packages) and the hardware.
An operating system controls the action of other programs, which are said to run under it - under its control. It looks after such actions as disk access.

NB: All application soft ware is designed to run under a specific operating system.

Functions of an operating system
1. It checks the initial set up of the computer once it has booted - up or started via the BIOS.
(BIOS) Basic Input Output System is that module forming the part of an operating system, which controls the input and output of data to peripherals i.e., a disk, key board, monitor, mouse, etc. At times it can be stored on ROM.

2. It checks whether the hardware including peripheral devices i.e. printers, are functioning properly.
3. It calls up program files and data files from disk storage into memory.
4. Opening and closing of files, checking of file labels etc.
5. Maintenance of directories or folders in storage. A directory is a file storage.
6. Controlling input and output devices including interaction with the user information executed one by one.
7. Controlling system security e.g. monitoring the use of passwords. Ask for a password before anything is done.
8. Handling of interruptions e.g. machine failure and error reporting.
9. Managing multitasking

Multi tasking is an action which allows the computer to appear to be running several programs simultaneously e.g. sending a document you have completed for typing on a printer while working on another document and at the same time listening to your favourite tracts on CD.

Multitasking needs a suitable operating systems and sufficient memory to hold all programs and the data to be processed by each program. The main problem with multitasking is ensuring that programs don't interfere with each other. This is done by restricting the way the CPU gains access to programs.

PCs operating systems include, MS-DOS (Microsoft Disk Operating System), MS Windows 3.X, MS - Windows 95, 98, 2000, OS/2 by IBM Co., Windows NT, UNIX, Net-ware. These are all version of operating system.

4:2 WINDOWS

Early incarnations of windows, culminating in Windows 3.1 and Windows for Work groups 3.11, were not genuine operating systems in their own right, but were really an operating environment for an older Microsoft system called MS-DOS.

MS-DOS, very hostile to beginners, had all application programs run under it.

In 1993, Microsoft launched Windows N.T, a complete operating system for networks, then Windows 95, 98 and 2000.

Features of Windows 95

Features of Windows 95 include the following:-
a) A 'desktop', from which everything in the system branches out. Disk drives, folders (directories) applications and files can be placed on the desktop.
b) A 'task bar' which is always on top and which includes a start button and buttons representing every open application.
c) Long file names are supported.
d) There is a recycle bin for easy deletion of files.
e) Easy integration with widely used networking software is possible.
f) Multitasking is available (see definition above).

Windows '98
Features of Windows 98
a) It is easier to use
User interface enhancements include easier navigation, such as single-click
launching of Applications, icon highlighting, forward/backward buttons, and an
easy to customise start menu.

b) Greater reliability
More refinements and upgrades were made to Windows 95 and include;
♦ An internet-base resource site
♦ Testing user's hard disk and fixing problems automatic
♦ Enhanced back up and restore function

c) It is faster
The application loading, system start up, and shut down time are faster.

d) Web integration
There are a variety of features designed to enhance internet access and use of
Internet facilities.

e) It is more entertaining with its better graphics and video capabilities and better support for games, hard ware such as joysticks. Later versions can even allow people to use digital video disks (DVDs), digital television and even watch normal TV programs on their PCs.

4:3 APPLICATION SOFTWARE

This consists of programs, which carry out a task for the user as opposed to programs which control the workings of a computer.

Whenever a computer is being used, it will be under the control of an application program, e.g. controlling stock, word processing, preparing accounts, etc.

Application Packages
These are ready-made programs written to perform a particular job.

a) Off- the-shelf application packages
These are ready-made packages distributed or sold by software vendors or manufacturers.

b) Tailor made application packages
These are programs made at the customers' request encompassing customers' desires. The customer normally gives a programmer his specifications and what he wants the program to do. The programmer studies the specification compares them with the available off-the-shelf packages and if there is none that can satisfy the customer needs, then he can write a new program for the customer.

General Purpose Package
These are off-the-shelf programs that can be needed for processing of a general type though the computer user can employ the package to a variety of users of his own choice.

Spreadsheets and Word processors are examples.

Application Suites
An application suite or soft ware suite is a collection of top-of the line application program from the same vendor.

A typical software suite will often include:-
a) A Word processor - word processing program
b) Spread sheet
c) Data base
d) Presentation graphics
e) Personal information manager

Examples of application suites
♦ Microsoft office
♦ Lotus Smart Suite
♦Novell Perfect office
♦Corel Draw (for graphics)

Microsoft Office	**Lotus Smart Suite**	**Novell Perfect Office**
1. Ms-Word	Word Pro	Word Perfect 6
2. Ms- Excel	Lotus 1-2-3	Presentation
3. Access	Approach	
4. Ms - Power Point	Freelance graphics	
5. Ms - Outlook	Lotus Organiser	

Word Processors: (Word Processing Programs)

A word processor makes your writing efforts look good. Master pages of a novel, grocery lists, etc. With the right paper you can use a word processor to create file folders, labels, brochures, business cards, greeting cards, letter heads etc. all types of professional documents i.e. letters, memorandum, invoices, etc.

Examples of Word processing programs,
♦ Word perfect for Windows
♦ Ms-word
♦ Word Pro
♦ Word Star, etc.

Spread Sheets
A spreadsheet program is much like a bookkeeper ledger sheet with rows and columns. You can use spreadsheets programs for all kinds of instant calculations such as finding the amount of interest you will pay on a loan.

You can change and update information instantly, correct mistakes without erasing and even process charts or graphics showing statistics within no time.

You use a spreadsheet program where you want columns and rows of numbers, financial calculations etc.

Examples of Spreadsheet programs
♦ Lotus 1-2-3
♦ Microsoft Excel
♦ Quattro Pro
♦ Consolidation

Data Base Programs
These help in management of lists of data with great ease e.g. a list of clients' addresses, items in stock, etc.

Examples of Data base programs include:
♦ Dbase IV
♦ Parodox for Windows
♦ Ms - Access
♦ Ms - Fox Pro
♦ Approach
♦ Oracle etc.

Presentation Graphic Programs
These kind of programs can help to come up with quality drawings.

They can also enable you create printed reports; handouts or notes to be used while you are speaking.

Enable you to create a self-running slide show-cartoons, that can play on any computer.

Enable you to create slides for business presentation including texts, graphs or clip art images e.g. a company logo.
Examples of presentation graphic programs
♦ Ms- Power point
♦ Freelance graphics
♦ Presentations
♦ Havard graphics
♦ Adobe persuasion
♦ Corel presents

4:4 PERSONAL INFORMATION MANAGERS (PIM)

These help you keep track of appointments, to list things you have to do and information on your contacts.

PIMs can do the following:
♦ List all phone calls you need to make in a day
♦ Check co-workers schedules, conflicts and automatically set up meetings that every one can attend
♦ Prioritise your daily tasks so that the most important work gets done first
♦ Track completed work so that you can tell some one exactly when you finished a certain report
♦ Let you check your workload for a day, week or month at a glance

Examples of PIMs include:
♦ Ms-Outlook
♦ Lotus organiser
♦ Schedule +
♦ Act!, etc.

4:5 INTEGRATED PACKAGES

An integrated package is a single program that modules such things as word processing, spread sheets, graphics, data base management and communications.

Accounting programs usually comprise modules integrated to form a large compile system or program. There may be a module for each of the sales ledger system, the purchase ledger, nominal ledger, trial balance, etc.

Popular integrated packages include:
♦ Ms Works
♦ Claris works
♦ Geo work pro

4:6 UTILITY PROGRAMS

These are programs or set of programs that enhance the work of an operating system.
Utility programs i.e. Norton's utilities can recover data, manipulate files, re-organise data on disks, check for and fix errors on disks, etc.

Vaccines and a virus guards are also utility programs intended to protect virus infection.

VIRUSES
A virus is a piece of soft ware which infects programs and data and possibly damages them, and which replicates itself.

Viruses need an opportunity to spread. The programmers of viruses therefore place viruses in the kind of software, which is most likely to be copied. This includes;

a) Free soft ware (e.g. from the internet)
b) Pirated software (cheaper than original versions)
c) Games software (wide appeal)

Types of Viruses

Trojans

A Trojan is a program that while visibly performing one function, it secretly carries out another e.g. as you can play a game, it secretly destroys data or files. Trojans don't copy themselves on target disks.

Worms
This normally survives by copying and replicating itself inside the computer system it has entered without necessarily altering that system.

Bombs (Logic and time bombs)

Time bombs
These are normally released at given dates in a year, say fools day, etc.

Logic bombs
These are normally triggered by certain events e.g. a disk utilised up to a certain percentage.

Identification of Viruses
Some viruses are detected before they do any damage while others are identified when they are activated.
Viruses may be controlled in the following ways;
1. Use of virus guards
These guard against virus infections. Unfortunately, new powerful viruses can attack and break through some virus guards.
2. Use of anti-virus software e.g. Doctor Solomon's took kit.
These are programs used to clear viruses from a system. They must always be upgraded to deal with new virus.
3. Organisations must have procedures to guard against the introduction of unauthorised software to their system.
4. Organisations, as a matter of routine, should ensure that any disk received from outside is virus free before the data on the disk is down loaded.
5. Firewalls
6. Any irregularities in a widely used program must be rectified as they come to light.

Transmission of Viruses
Viruses are transmitted in a number of ways
♦ Using infected disks in non-infected computers.
♦ Buying software from non certified vendors can result in buying infected software.
♦ Buying software, which are not well tested-say from the Internet.
♦ Getting connected to an infected network.

4:7 PROGRAMMING LANGUAGES

Computer programs are normally manufactured/written using programming languages.
There are two recognised levels of programming languages.
♦ Low level language
♦ High-level language

 a) **Low Level Languages**

(i) Machine Code (first generation language)
This program is as old as the computer itself. It was the 1st language used to
Program Computers and indeed is the only language the computer recognises
and understands.

Instructions in machine language are written or coded as Os and Is (Binary digits). Every program must be written in machine codes before the computer can do any thing with it. These languages are so hard to learn and complicated that is why the assembly language was subsequently developed.

(ii) Assembly Language (second generation language)
These are also machine specific, but the tasks of learning and writing the language is made easier than with machine language because they are written in 'symbolic' form.

Instead of using machine code, the programmer is able to use easily learned and understood operation mnemonics e.g. ADD, SUB and MULT.

b) High-level Languages
To over-come the low level language difficulty of machine dependency, high-Level languages were developed. Such programming languages, with an extensive vocabulary of words and symbols, are used to instruct a computer to carry out the necessary procedures, regardless of the type of machine being used.

Advantages of high-level languages over low-level languages include:

♦ The productivity of programmers is improved as program writing can take place in a very short time compared with low-level language.
♦ The programs developed can be used on any types of computers without getting re-written.
♦ They speed up testing and error correction.
♦ High - level languages are easier to understand and use.

A) Third generation languages
These are problems oriented programming languages, which have been created to deal with particular types of data processing problems. They include:

a) COBOL - is used for business data processing.
b) BASIC - Beginner al purpose symbolic instruction code) - designed for beginners, particularly on microcomputers.
c) FORTRAN is a scientific language
d) Pascal suitable for structured programming.
e) C- An advanced language originally used for programming in the UNIX, now also used to develop windows programs.

Other programming languages include C++, ALGOL, APL, PILOT, SNOBOL, etc.

Compilers and Interpreters
The high - level language program has to be translated into machine code before it can be used. This is done by **compiler programs**, by turning a source program into an object program.

An interpreter does the same sort of job as a compiler, but in a different way.
It takes a program written in a high level program language and executes it, statement by statement (i.e. instruction by instruction) directly during the running of the program.

B)   Fourth Generation Language (4GL)
These are languages intended to help computer users or programmers develop their own application programs more quickly and cheaply.

♦ A 4GL requires fewer lines of code to write and develop a program than a 3 G Language.

♦ A 4GL, by using a menu system for example, allows users to specify what they require, rather than describe the procedures by which these requirements are met.
The detail is done by the 4GL software.

LIST OF ABBREVIATIONS

ABBREVIATION	ABBREVIATION IN FULL
4.GL	Fourth Generation Language
ALU	Arithmetic Logic Unit
AOL	America on Line
AS II	America National Standard Code for Inform date Interchange
ATM	Automated Teller Machine
BASIC	Beginners All Purpose Symbolic Codes
BIOS	Basic Input – Output System
BIT	Binary Digit
BTM	Business Teller Machine
CD	Compact Disk
CIS	Computer Information System
CLS	Clear Screen
COBOL	Common Business Oriented Language
CPU	Central Processing Unit
CU	Control Unit
DBMS	Database Management System
DDL	Data Definition Language
DEEP BLUE	Computers are modern computers that are an IBM computer programmed to play Chess with the world class champion, Garry Kasorok. Programmed to make 1 million moves in a second, which defected the world chess champion in the world.
DEL	Delete
Dir	Directory
Disk Drives	Media where computer programme files reside e.g., Hard disks, floppy Disks, CD-ROM, Magnetic tapes etc.
DML	Data Manipulation Language
DOS	Disk Operating System
DPC	Desktop Personal Computer
Drives	External storage medium storage capacity more than floppy and less then hard disk drive, designed with letters D…E.
DTP	Desk top Publishing
DVD	Digital Video Disk
E-mail	Electronic Mail
EMF	Electronic Magnetic Fields
EPOS	Electronic Point of Scale
EWN	Enterprise Wide Network – Any Private Network connects all of organization CPS no matter what they run or where they are located.
Expansion Slots	are access slots on the C.P.U where new computer cards can be fixed when upgrading (expanding) a computer. When adding another floppy drive, adding a CD ROM Drive a higher memory chip.
Floppy Disks Drives.	External storage medium, less storage capacity than Hard disks drive designed with letters
FORTAN	Formula Transaction
GB	Byte

GUI	Graphical User Interface - medium through user interacts with a CP
Hard Disk Drive	Internal Storage mechanism stores most computer applications. Capacity 100MB designed work letters
HLL	High Level Language
IBM	International Business Machine
ILL	Intermediate Level Language
INTERNET	International Network
IRR	Internal Rate of Return
ISP	Internet Service Provider – Provides Internet to users who register at 15 P using other dial to dedicated access.
IT	Information Technology
KB	Kilo Bytes
KIPS	Kilo Instructions Per Second - its Speed
KISS	Keep it small Simple
LAN	Local Area Network
LLL	Low Level Language
MAN	Metropolitan Area Net – Work
MB	Mega Byte
MICR	Magnetic Ink Character Recognition
MIPS	Millions Instructions per Second
MODEM	Modulation Demolecular
MS DOS	Micro Soft Disk Operating System
Ms Excel	Micro soft Excel
MULT	Multiply
NPV	Net Present Value
NT	Net Work
OCR	Optical character Recognition
OS	Operating System
OUR	Optical Work Reading
PC	Personal Computer
PIN	Personal Identification Number
Ports	Are connections (sockets) on the C.P.U which a computer components (Device) like a printer, mouse, modern etc. Can be connected.
RAM	Random Access Memory
ROM	Read only Memory
SAN	Storage Area Network
SDLC	System Development Life Cycle
SSDM	Special Standard System Development management maintenance
SSM	Special Standard System Management/maintenance
SQL	Structured Query Language
SUB	Subtract
TCP/IP	Transmission Control Protocol/internet Protocol system used to transfer information from one computer to another.
UPS	Uninterrupted Power Supply
URL	Uniform Resource Locater
VAN	Value Added Network
VDU	Visual Display Unit
W.W.W	World Wide Website
Web Server	Software that delivers web pages and contains of web sites.

References and further reading

- Kempf, Karl (1961). *Historical Monograph: Electronic Computers Within the Ordnance Corps*. Aberdeen Proving Ground (United States Army).
- [a] Phillips, Tony (2000). "The Antikythera Mechanism I". American Mathematical Society. Retrieved 5 April 2006.
- [a] Shannon, Claude Elwood (1940). *A symbolic analysis of relay and switching circuits*. Massachusetts Institute of Technology.
- Digital Equipment Corporation (1972) (PDF). *PDP-11/40 Processor Handbook*. Maynard, MA: Digital Equipment Corporation.
- Verma, G.; Mielke, N. (1988). *Reliability performance of ETOX based flash memories*. IEEE International Reliability Physics Symposium.
- Meuer, Hans; Strohmaier, Erich; Simon, Horst; Dongarra, Jack (13 November 2006). "Architectures Share Over Time". TOP500. Retrieved 27 November 2006.
- Lavington, Simon (1998). *A History of Manchester Computers* (2 ed.). Swindon: The British Computer Society. ISBN 9780902505018.
- Stokes, Jon (2007). *Inside the Machine: An Illustrated Introduction to Microprocessors and Computer Architecture*. San Francisco: No Starch Press. ISBN 978-1-59327-104-6.
- Felt, Dorr E. (1916). *Mechanical arithmetic, or The history of the counting machine*. Chicago: Washington Institute.
- Ifrah, Georges (2001). *The Universal History of Computing: From the Abacus to the Quantum Computer*. New York: John Wiley & Sons. ISBN 0471396710.