WORLD OF ICTs

INFORMATION COMMUNICATION TECHNOLOGY (ICT)

Refers to electronic means of capturing, processing, storing and communicating information.
or
ICT is used to refer to manipulation, storage, retrieval and transmission of digital data.
or
Is a combination of telecommunication and computing technologies to enhance communication.

COMPONENTS OF ICT

1. Information
2. Communication
3. Technology

Information:
Refers to processed data or meaningful data or summarized data. Devices used to disseminate information include; TVs, Radios, Photocopying machines etc.

Communication
Refers to the electronic transfer of data from one point to another. ICT devices involved include; Telephones, Cellular Phones, Fax Machines.

Technology
Refers to the technique and way of doing something. Technology includes Computers, Satellite systems, microwaves etc.

The following are some of the components/equipment used in ICT:
Computers, Television Sets (TVs), Radios, Telephones, Digital Cameras, Cellular/Mobile phones, Fax machines, Printers, Scanner, Projectors, Photocopying machines, Satellite Systems, Microwaves, Tablets, I-pads, PDAs, Smart Phones, Compact disks, Biometric devices, internet and network hardware and software platforms etc.

INFROMATIOM TECHNOLOGY (IT)

Is the use of computers in business, education and everyday life

AREAS OF ICT APPLICATION

1. Business
2. Education
3. Research
4. Health
5. Banking
6. Security
7. Politics and Governance (E-Gov. and E-Admin)
8. Entertainment, Art and Leisure
9. Homes
10. Offices.
11. Society

12. Industries
13. Agriculture
14. Transport
15. Technical and Scientific uses
16. Space Technology
17. Biotechnology

THE ROLE OF ICT IN BUSINESS

1. Storage of business records
2. Prepare income statements and balance sheets.
3. On-line banking (e-banking) e.g. use of ATMs, Mobile Money and Electronic Funds Transfer (EFT).
4. Use of paperless money e.g. Visa Cards/Smart cards.
5. Business communication.
6. On-line shopping/e-shopping.
7. To carry out business calculations
8. Presenting projects and ideas using presentation software.
9. Develop and manage payroll systems.
10. Creation of Memos, letters and reports.
11. Tracking inventory and generating invoices and reports.
12. Generation of bills e.g. power, water, telephone etc.
13. Reservation/booking in Hotels, Railways and Air ticketing
14. Marketing and advertisement of goods and services
15. E-commerce (Electronic commerce).

THE ROLE OF ICT IN EDUCATION

1. Computers are used as teaching and learning aids
2. Provides easy access to educational resources/materials.
3. Students can learn by themselves when the teacher is not around
4. Students can easily get feedback immediately after answering questions or assignments i.e. Computer Assisted Assessment (CAA).
5. Storage of information for future reference
6. Students can learn at their own pace
7. To carry out research work (E-Library).
8. On-line Assessments for failure classes
9. Students' records can easily be stored.
10. E-learning/On-Line classes
11. Computer Based Training (CBT)
12. Computer Aided Learning (CAL)

THE ROLE OF ICT IN SOCIETY

1. Communication e.g. e-mail
2. Entertainment e.g. listening to music, playing computer games, watching movies
3. Storage of information.
4. Training in computer skills
5. Carrying out research work.

THE ROLE OF ICT IN HOMES

1. Budgeting and preparing taxes
2. Personal financial management
3. Access to news
4. Access to weather conditions
5. Entertainment/leisure
6. On-line shopping/e-shopping
7. Storage of personal data
8. Paying bills through phone services such as mobile money
9. Home interior and exterior designs
10. Accessing educational materials through the internet.
11. Carrying out Personal research
12. Carrying out personal training
13. Enhancing security in homes
14. Creation of personal websites

THE ROLE OF ICT IN OFFICES

1. Storage of office data for future use
2. Communication e.g. e-mail and video conferencing.
3. Research purposes
4. For document processing e.g. letters, reports and memos
5. Calculate payrolls, balance sheets and prepare income statements while in office.
6. Presenting projects and presentations by means of presentation software
7. Creation of Websites
8. Carrying out E-commerce and E-shopping (On-line Shopping)

THE ROLE OF ICT IN HEALTH CARE

1. Carrying out tests and diagnosis of medical conditions using computer software.
2. Storing/keeping patients' records in order to provide easy access to patient's treatment and diagnosis history.
3. Accounting i.e. Billing patients.
4. Carrying out medical research by use of internet.
5. Computers control life support machines in intensive care units (ICUs) using sensors that monitor the patient.
6. Use of computer controlled devices during operations that require greater precision like laser eye and heart surgery.
7. ICT helps implant computerized devices that allow patients to live longer (life support systems).
8. Computer aided surgery for training doctors prior to performing surgery on a live human being.
9. Used to perform body surgeries by using a probe which is attached to the monitor.
10. Production of medical journals and research diagnosis papers and reference books.
11. Data analysis
12. Tele-medicine through the use of computers with videos conferencing capabilities enables rural clinical officers to seek expertise from urban and international doctors/medical consultants.

13. Provides access to doctors/experts from other countries hence reducing travel time patients.
14. Creation of medical databases
15. Maintaining medical histories

THE ROLE OF ICT IN SECURITY

1. Use of PINs in banking e.g. ATMs
2. Access control – used to restrict access to certain places e.g. offices, hotel rooms
3. Use of passwords to protect data/information from unauthorized access and misuse
4. Use Closed Circuit Television sets (CCTVs) and cameras in super markets
5. Communication during war. E.g. Use of radios calls.
6. Detecting finger prints.
7. Computer based military training.
8. Computer simulations allow the military to train soldiers for several combat situations.
9. Guiding missiles to designed targets.
10. Keep databases of finger prints which are automatically analysed by the computer
11. Use of computer based face recognition and scene monitoring and analysis helps the police force in leading to arrest of traffic offenders and criminals.
12. ICT is used in defense for electronic news gathering.
13. Detection and tracking of targets.
14. Use of radar systems in warfare.
15. Use of military laser and guided missile systems

THE ROLE OF ICT IN BANKING

1. Processing cheques through MIC R (Magnetic Ink Character Recognition)
2. For Electronic funds transfer (EFT) through Mobile phones and internet
3. Withdraw and deposits of money using Automated teller Machines (ATMs)
4. Keeping records of customers in a database
5. Enables branchless banking through computer networking.
6. Prepare Bank statements e.g. bank reconciliation,

THE ROLE OF ICT IN INDUSTRIES

1. Quality control
2. Production Scheduling
3. Pay roll management
4. Use of Robotics in doing assembly work.
5. Carrying out Industrial research.
6. Transportation.
7. Sorting parts.
8. Inspection of products for identification.
9. Loading and off-loading in manufacturing industries e.g. use of robots.
10. Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM)
11. Data sensing and lodging.

THE ROLE OF ICT IN ENTERTAINMENT

1. Listening to music
2. Playing computer games.

3. Watch a Movie/Video.
4. Planning a vacation
5. Recording music both Audio and Video.
6. Read a book (e-books), magazine or a novel on-line
7. Edit or retouch photos
8. Compose and edit videos
9. Social networking e.g. faces booking, twitter etc.
10. Edutainment i.e. watching educative as well as entertaining programs. It can be a TV or computer program.

THE ROLE OF ICT IN AGRICULTURE

The application of ICT in agriculture is increasingly important. E-agriculture is an emerging field aimed at enhancing agriculture and rural development through use of ICT.

The roles of ICT in Agriculture include:

1. **Office automation** – is the application of computers and other equipment to increase the productivity of agricultural organizations.
2. Use of **Geographical Information Systems** (GIS) especially in precision farming. GIS is used in decision making such as what to plant, where to plant and when to plant using historical data and sampling.
3. In agriculture, use of **Global Positioning System** (GPS) provides benefits in geo-fencing, map making and surveying.
4. Automatic milking systems – are computer controlled stand-alone systems that milk the dairy cattle without human labour. E.g. an Agricultural robot.
5. E-commerce i.e. on-line purchasing, order of agri-inputs and agri-equipment.
6. Transportation of food products
7. Value addition i.e. quality management, food safety, storage and marketing.
8. Food processing
9. Packaging and preservation
10. Sensitization of farmers using presentation software

THE ROLE OF ICT IN TRANSPORTATION

1. Control traffic in major towns.
2. On-line booking.
3. Control computer enhanced shuttles or rockets.
4. Data recorders for vehicles.
5. Real time fleet tracking.
6. Electronic ticketing systems.
7. Radio frequency identification (RFID) for asset tracking
8. Tag and track inventory, stock and other items throughout the supply chain.
9. Global positioning systems (GPS).

ROLE OF ICT IN SPACE EXPLORATION

1. Helps in navigation e.g. determining direction.
2. Communication between space and ground or earth
3. Used in flight simulation.

4. To research on the possibility of human survival and other living organisms on other planets.

THE ROLE OF ICT IN E-GOVERNANCE

E-governance is the use of ICT in delivering services

Or

Is the use of ICT to improve government interaction with citizens.

The aim of e-governance is to make them thorough with e-governance applications and responses to the technology driven administration.

ADVANTAGES OF E-GOVERNANCE

1. ICT facilitates sharing of information and ideas by different nations of the world.
2. Improves governance and strengthens democracy.
3. Fosters transparency among government institutions by enhancing interaction between government and the citizens.
4. Improves trust and accountability in the government
5. Creates awareness among citizens
6. improves citizens welfare
7. Empowers citizens
8. Enhances national economic growth
9. Provides a voice to people who have been isolated and invisible.

E-ADMINSTRATION

Is the conversion of paper processes to electronic processes.

OBJECTIVES OF E-ADMINISTRRATION

To foster transparency and accountability leading to better governance.

THE ROLE OF ICT IN LOCAL GOVERNMENT ADMINISTRATION (E-ADMIN.)

1. Speeds up the flow of information and its use in the decision making.
2. Enhances communication
3. Increases productivity of employees.
4. Acquisition of skills and knowledge
5. Encourages participation of citizens in governance.

PROBLEMS THAT HINDER E-ADMINISTRATION

1. High levels of Illiteracy in rural areas. ICT requires various kinds of literacy and inability to read and write is a serious problem to the e-governance or e-administration.
2. Lack of ICT skills.
3. High costs of ICT equipment such as computers, Satellite systems
4. Power failure or lack of power
5. Absence of cyber cafes/internet café.

GREEN COMPUTING/GREEN IT

Green Computing or Green IT refers to environmentally sustainable computing/IT.

Or

Computing practices which are environmentally friendly.

or
Environmentally friendly computing.
Or
Use of computers without affecting or causing harm to the environment.

PRINCIPLES OF GREEN COMPUTING

1. Reduce
2. Reuse
3. Recycle

BENEFITS OF GREEN COMPUTING/GREEN IT

1. Reduction in the use of hazardous/dangerous materials.
2. Maximize energy efficiency during the product's life span
3. Promote recyclability, bio-degradation of the defunct products and factory waste.
4. Saves energy/power
5. Saves more time and money spent on manufacturing electronic items by recycling it.
6. Cost effective i.e. it pays over time
7. Reduces carbon emissions
8. Environmentally friendly i.e. protects the environment.

HOW GREEN COMPUTING IS PRACTICED IN OUR SOCIETYY

1. Use of hibernate or sleep mode when away from a computer for extended periods.
2. Use flat screen/LCD monitors instead of CRT monitors
3. Buy energy efficient notebook computers, instead of desktops
4. Activate the power management features for controlling energy consumption.
5. Turn off computers at the end of each day
6. Make proper arrangements for safe electronic waste disposal
7. Refill printer cartridges rather than buying new ones
8. Instead of purchasing a new computer, try repairing existing device
9. Dispose of e-waste according to federal state and local regulations.
10. Employ alternative energy sources for computing workstations, servers, networks and centers e.g. use of inverters and solar systems.
11. Power up and power down energy –intensive peripherals such as laser printers according to need.
12. Implementation of energy-efficient central processing units (CPUs), servers and peripherals.
13. Use of solar energy directly converted from light into electrical energy this reduces on exploitation of natural resources less consumption and related forms of pollution.

MEASURES OF GREEN COMPUTING

1. Use of energy efficient hardware/Low power hardware devices such as Notebooks, Laptops, Monitors, Servers, Printers, Low power CPUs, Solar powered Desktop computers etc.
2. Better use of resources e.g. reduced paper consumption and low energy utilization.
3. Virtualization – use of computer software to simulate hardware. E.g. physical servers simulated to virtual servers that run as software on a small number of larger computers. Virtual servers can still be configured to appear as machines on the network.

4. Cloud computing – type of computing where software applications, processing power and data are accessed remotely over the internet.
5. Improved repair, re-use, reduce, recycling and disposal.
6. Less pollutant manufacturing – reduction in the use hazardous chemicals in the manufacturing of computer equipment.

ELEMENTS OF GREEN COMPUTING

1. Environmental Saving activities
   - Proper disposal of IT equipment/e-waste.
   - Switching off computers when not in use.
2. Electronic Products Environmental Assessment Tools (EPEAT) for IT firms.
3. Green computing groups or associations - use of LCD instead of CRT monitors.
4. Software products like Little Green Genie which monitor and reduce on the impact of carbon circulation in the air – use of energy efficient devices e.g. Laptops,

CLOUD COMPUTING

Is the execution of organizational computing activities through computer networks.
Or
Is the practice of using a network of remote servers hosted on the internet to store, manage and process data rather than using a local server or personal computer.
Or
Is a type computing that relies on sharing computing resources through the internet rather than using local servers or personal devices to handle applications.
Or
Refers to the use and access of multiple server-based computer resources over a digital network.

ADVANTAGES OF CLOUD COMPUTING

1. Sharing of resources i.e. converged infrastructure and shared devices.
2. Maximizes effectiveness of the shared resources.
3. Environmentally friendly, reduces environmental damage because it uses less power, Air conditioning and rack space is which is required for a variety of functions.
4. Reduces cost of hardware.
5. Less maintenance costs.
6. Provides unlimited storage space in the cloud.
7. Automatic software integration.
8. Provides easy access to information anywhere, anytime.

TELECOMMUTING

Telecommuting is a type of employment where an employee of the company performs office duties at home electronically over a company network or internet.
Or
Is a situation where an employee performs office duties and tasks at home using a computer connected to the workplace network.

BENEFITS OF TELECOMMUTING TO THE EMPLOYEE

1. It is cost effective, the employee saves travel time and travel costs
2. Working in a comfortable environment hence no stress.
3. There is an opportunity to attend to their families while doing office duties.
4. Employees can work at their time of convenience thus more flexibility.
5. Employees are saved from bad weather such rain.
6. Favours people with disabilities i.e. people who cannot move.
7. Increased income because most home based jobs are not taxed.

BENEFITS OF TELECOMMUTING TO THE EMPLOYER

1. Less equipment needed .e.g. computers, desks, printers etc.
2. The employer saves on the cost of hiring big office premises, thus less rent required.
3. Increased productivity i.e. Workers may be more productive at home due to limited distraction by coworkers, workplace politics etc.
4. Less parking needs are provided.

DISADVANTAGES OF TELECOMMUTING

1. Reduced face –to-face interaction, workers may have no regular contact with other workers.
2. Office sensitive documents may be at risk in employees
3. It is hard for workers to motivate themselves.
4. Limited chances of being promoted. i.e. hard to gain recognition for their efforts through promotions or performance reviews.
5. Difficult to shutout your personal life while working at home.
6. Poor staff relationship between teleworkers and non-teleworkers.
7. Career stagnation i.e. difficult for a manager to monitor performance of a teleworker.
8. Difficult in demonstrating workload. Workers in office may perceive you as doing less work while at home.
9. Some telecommuters do not get clear performance targets or goals because managers consider employees in office to be hard workers than telecommuter.
10. The fast food industry could suffer as fewer workers can hurry out to grab a quick lunch.

ADVANTAGES OF ICTs

1. Very fast and reliable communication systems e.g. use of e-mail, Cell Phones.
2. ICT has improved research i.e. data capture, storage and manipulation through the use of computers.
3. Enhanced security through use of Access control, use of CCTV and Surveillance Cameras, etc.
4. Improved education systems e.g. e-learning/virtual learning.
5. Improved banking systems i.e. Electronic Funds Transfer (EFT), E-banking using ATMs and Mobile money services on cellular phones.
6. Hi-tech manufacturing systems i.e. increased use of robots, CAD and CAM programs.
7. Provision and access to important information on the internet.

8. ICT can help people overcome disability e.g. by use of screen magnification/screen reading software that enables partially sighted or blind people to work with ordinary text rather than Braille.
9. Creation of paperless environment where information can be stored and retrieved through digital medium.
10. Creation of a virtual world e.g. "Seventh Continent" where every aspect of life is computerized.
11. Low communication costs through use of Electronic and Social media platforms.
12. Improved access to educational materials e.g. on-line tutorials
13. ICT has Created new job opportunities such as flexible and mobile working and use of call centers or out sourcing.
14. Improved transportation systems. E.g. tracking of goods in transit, and on-line air ticketing.
15. ICT offers new tools and new opportunities i.e. ICT has provided access to new tools that did not exist before e.g. digital cameras, Mobile Phones, I-pads. Tablets etc.
16. Electronic payment (E-payment) of bills using phone services and internet.
17. Entertainment, infotainment and edutainment
18. Exchange of information around the world.
19. Allows distant families to keep together.
20. Promotion of inter-relationships e.g. pen pals
21. Offers employment opportunities. The career opportunities in the ICT industry include:
    - Computer Hardware Engineers
    - Computer Programmers
    - System Analyst
    - Database Managers
    - System Administrator
    - Information Management Managers
    - Computer Graphics Designers
    - Network administrator
    - Computer Scientist
    - Web Designers
    - Computer Instructor
    - Computer Technician

NEGATIVE EFFECTS OF ICT

1. Moral decay/degradation/degeneration due to exposure to illicit materials available on the net. E.g. pornography has led to negative behaviour.
2. System break down may cause loss of information which might be disastrous.
3. Health problems e.g. Eye strain, back pain, Stress, Obesity, Monitor radiation
   Reduced physical activity can lead to health problems e.g. Heart disease problems, Obesity, Diabetes, eye strain, back pain etc.
4. High cost of maintenance and repair of computers and other equipment
5. Over dependence on computers has led loss basic mental and spelling skills.
6. Lack of ICT legislation has led to misuse of data, computer misuse, health safety and obscene publication.
7. ICT has led to increased costs of education and learning.
8. Waste of study time e.g. engaging in unproductive work
9. ICT has led to increased unemployment. New jobs created by ICT are fewer than those lost. Some jobs have been replaced by computers and this has led to deskilling of some people such as secretaries, Copy typists, Filing clerks, Office messengers, reduced number of

manual jobs as most jobs are now done by computers e.g. assembly work has been replaced by computer controlled machines e.g. robots and Fork lift trucks.

10. Limited Security and privacy on the internet is
11. ICT has also led to high rate of forgery/fraud on the internet.
12. The equipment consumes a lot of power thus high power bills.
13. There is need to continually upgrade your skills in ICT because of the fast pace of change in ICT. People need to continuously learn new skills or themselves become unemployed.
14. ICT has promoted on-line adultery e.g. social networks such as face book, has led to increases break down of marriages.

HEALTH HAZARDS CAUSED BY ICT

Health and safety is crucial to effective operation of computers. The following are some of the health problems associated with prolonged use of computers include;

1. **Stress/Depression**
   Caused by freezing computers, misbehaving software, lost work, noise from fans, printers, power inputs etc. Stress can also be caused by financial problems, Work place environment, personal relationships, Health (heart disease and hypertension),
2. **Computer Vision Syndrome**
   Is an umbrella term for all eye problems e.g. blurred vision, overall eye tiredness and even Glaucoma.
   The most common form of Computer Vision Syndrome is a condition termed **dry eye**, which results in itchy, sore and even illusion that something is stuck in your eye. This is caused by extensively long period looking at a computer screen.
3. **Eye strain**
   Eye strain can also be caused by electro-magnetic radiations from over bright CRT monitors. Eye strain can also be caused by looking at a fixed object for a long period of time e.g. a computer screen.
4. **Back pain**
   This is caused by poor sitting posture.
5. **Mental Effects**
   Depressions and loneliness in case of a long term tele-commuter who never sees workmates and rarely leaves office.
6. **Obesity**
   Is caused by lack of physical activity especially for people who take long hours working on the computer without physical exercises.
7. **Fatigue**
   Caused by long hours of work while using a computer
8. **Dry skin**
   Can be caused by air conditioning which does not allow the body to sweat.
9. **Finger deformation**
   Finger deformation is caused punching of a computer keyboard.
10. **Repetitive Strain Injury (RSI)**
    Refers to the injuries resulting from wrist, hand, arm and muscle strain due to forced repetitive movement.
11. **Carpal Tunnel Syndrome (CTS)**

Is a stress related injury caused by repetitive movement of joints especially the wrist and can lead to numerous musculoskeletal problems.

12. **Musculoskeletal problems**
    This occurs due to improper use of office equipment such as chairs. Chairs should be adjustable so that legs are at a right angle. The back should have good support for the spine and lower back.
13. **Neck Pain**
    Caused by raised computer monitor above the head level.
14. **Computer Addiction.**
    Caused by excessive use of computers.

SOLUTIONS TO THE ABOVE HEALTH PROBLEMS

No.	Health Problem	Solution
1.	**Eye Strain**	- Avoid using a flickering monitor. - Regulate amount of light from the monitor. - use anti-glare screen to control radiation from the monitor.
2.	**Back pain/Backache**	- Sit upright with your back resting on the back rest chair.
3.	**Neck pain**	- Position your monitor on the same level with eyes.
4.	**Fatigue**	- Take short breaks during work
5.	**Obesity**	- Do enough physical exercises.
6.	**Dry skin**	- Good ventilation
7.	**Stress/Depression**	- Take time to relax - Take a walk - Good training in the use of office equipment. - Good working environment**.**
8.	**Finger Deformation**	- Practice touch typing i.e. ensure all the fingers touch the buttons on the keyboard.
9.	**Computer Vision Syndrome**	- Take eye rests
10.	**Carpal Tunnel Syndrome (CTS)**	- use ergonometric equipment.
11.	**Repetitive Wrist Injury (RSI)**	- use ergonomic keyboard with arm rests.

ERGONOMICS

Ergonomics is the process of designing or arranging workplaces, products and systems so that they fit the people who use them.

Ergonomics aims to create safe, comfortable and productive workplaces by bringing human abilities and limitations into the design of a workplace, including the individual body size, strength, skill, speed, sensory abilities (vision, hearing) and even attitudes.

To achieve best practice design, ergonomists use the data and techniques of several disciplines:
1. **Anthropometry:** body size, shapes, population and variations.
2. **Biomechanics:** muscles, levers, forces, strength etc.
3. **Environmental physics:** noise, light, heat, cold, radiation, vibration, body systems (hearing, Vision, sensations etc.)
4. **Social psychology:** groups, communication, learning, behaviours etc.

EXAMPLES ERGONOMIC EQUIPMENT

1. Chairs.
1. Mice.
2. Keyboards.
3. Sit to stand workstations.
4. Desks.
5. Back supports.
6. Footrests.
7. Document holders.
8. Laptop and Tablet solutions.
9. U Top Laptop Stand.

TOPIC 2: COMPUTER MANAGEMENT

BOOTING

Booting is the process of starting of a computer.

Boot is short for Bootstrap, the process of starting a computer and loading the operating system and other basic software.

The entire process of making a computer ready for use. The computer is switched on, then it undergoes Power On Self-Test (POST) and finally the Operating System is loaded.

METHODS OF BOOTING A COMPUTER

1. Cold Booting
2. Warm Booting

COLD BOOTING

Is the process of starting a computer which has been initially off.

THE STEPS OF COLD BOOTING A COMPUTER

1. Connect all the peripheral devices (devices attached to the computer system unit externally) e.g. Keyboard, Mouse, Monitor, Printers etc.
2. Switch on the Mains i.e. power from the wall socket
3. Switch on the UPS or Stabilizer if available.
4. Switch on the System Unit
5. Switch on the Monitor.

WARM BOOTING

Is a process of starting a computer which is already on power.

Warm booting is also termed as Re-booting or Re-setting or re-starting a computer.
To reboot is to restart a computer and reload the operating system.

Note:

In warm booting, ROM does not test RAM or the peripherals.

WAS OF WARM BOOTING /REBOOTING A COMPUTER

There are two ways of warm booting or re-booting a computer:

1. Soft reboot
2. Hard reboot

SOFT REBOOT

Restarting programs and the operating without shutting down the computer.
Or
An action that uses software to restart a computer without removing it from power.
A soft reboot can be done by:

1. Pressing ALT + CTRL + DEL keys simultaneously.
2. Pressing the RE-SET button
3. Using the Operating System Command.

HARD REBOOT

An action where a computer is physically removed or unplugged from the power socket and plugged in again causing an initial boot of the machine.
This method is used when a computer freezes, a state when the operating system and software functions are not responding.

REASONS FOR WARM BOOTING A COMPUTER

1. When an application or operating system freezes/hangs/ does not respond.
2. If the computer fails to fully boot.
3. After installation of a new software (application or utility).
4. When a peripheral or hardware component has failed to function/work.
5. Improper connection of peripheral devices.
6. During/After installation of operating system, a computer may restart several times before completing the process.
7. After changing user control settings (CMOS/BIOS settings).
8. When a user wants to clear a malicious infection like malware, spyware, viruses that are in memory.
9. After software update.
10. After uninstalling software.
11. After uninstalling hardware.
12. After installing a new hardware.
13. When the computer system slows down.
14. When there is suspected system tapping.
15. When switching from one operating system to another (Multiple O.S)

16. After malware/virus scanning.
17. When a deadlock occurs.
18. When application software fails to work
19. Program bugs.
20. Power interruptions like power fluctuations or power flux.

COMPUTER INTERFACES AND SETUP

A computer interface is a connection between a computer system unit and external components/peripheral devices operated under its control.

Peripheral devices connect to interface cards inside the computer through the input/output ports and cables.

PORTS

In hardware terms, a port is an interface between the computer and other computers or peripheral devices.
or
A computer port is a virtual or physical connection point or interface between a computer and an external or internal device.
Internal ports may connect such devices as hard drives and CD ROM or DVD drives; external ports may connect modems, printers, mice, monitors, Webcam projectors and other peripheral devices.

TYPES OF PORTS

1. **SERIAL PORTS**
   In computing, a *serial port* is a serial communication physical interface through which information transfers in or out of the computer one bit at a time.

   It is used to connect a modem, data acquisition terminal or other device via a serial interface.

   Computer refers to serial port as **Com1**and **Com2**.

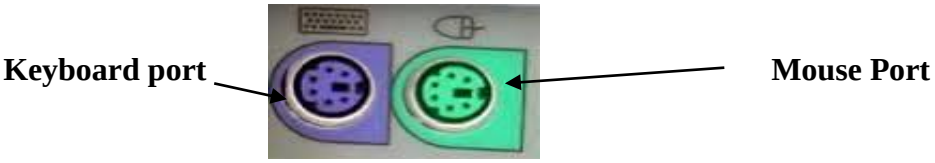
   

   Serial ports send and receive one bit at a time via single pair (Ground and -/+)
   Serial port/connector also known as RS-232C or RS-232p

2. **PS/2 PORTS (Personal System 2 Ports)**

   - PS/2 is a type of *port* used by older computers for connecting input devices such as PS/2 keyboards and PS/2 mice.

The color-coded *PS/2* connection *ports* (purple for keyboard and green for mouse). Type, Keyboard and computer mouse data connector.



3. **VGA PORT -** Used to connect the computer to the display screen

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4. **PARALLEL PORT -** is used to connect printers, computers and other peripheral devices on a PC.

The parallel printer cable transmits 8-bits at a time over several sets of wires. The computer refers to it as LPT1 (Line Printer Terminal 1) or (Line Printer Terminal 2) LPT2

5. **UNIVERSAL SERIAL BUS (USB) PORTS**

USB ports – Used to connect USB devices to the computer such as USB Keyboard, Mouse, Printer, MODEMs, and Scanners.

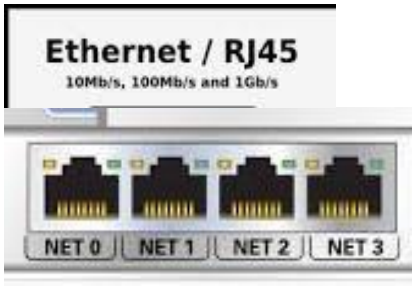
The maximum number of devices that can be connected to a single computer with USB computer ports is 127.

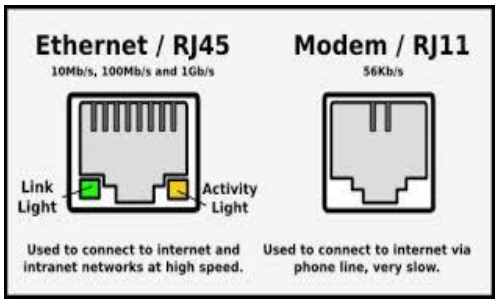
Note: USB works a port as well as a Bus.

6. **FireWire (IEEE 1394) port:** Firewire ports are used to connect equipment to the computer, such as digital camcorders which have firewire

7. **RJ-11 (phone) Connectors:** - connects phones and modems.

8. **Network/Ethernet (RJ-45 Connectors):** These are used to connect computers to an Ethernet network.

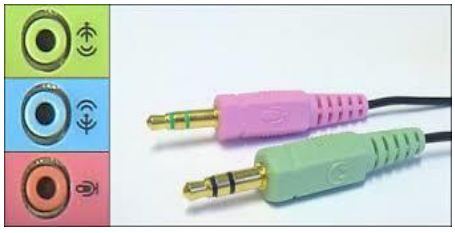




9. **Audio Connectors**

Three of these connectors can be found on an average sound card, and are used to connect to microphones (usually pink), speakers (usually green), and other audio devices (usually blue).

The external device connector is usually a silver or gold-plated plug that fits into a round hole.



10. HDMI PORT

HDMI (*High Definition Multimedia Interface)* is a compact audio/video interface for transferring video and digital audio data from an HDMI source device to a computer monitor, projector, Digital TV or Digital audio device.

HDMI port is an input/output connection for transfer of digital HD video and multichannel audio over a single cable.

12. DVI PORT

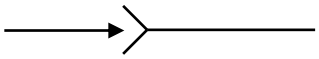
DVI (*Digital Video Interface)* is video display interface used to connect a video source such as a display controller to a display device such as a computer monitor.

DIFFERENCE BETWEEN MALE AND FEMALE PORTS

The female port is generally a receptacle that receives and holds the male connector.
Male ports/plugs have prongs which go into the slots of female ports. They need to make them different so they will fit together. If they were the same they would not fit together.

Male Ports

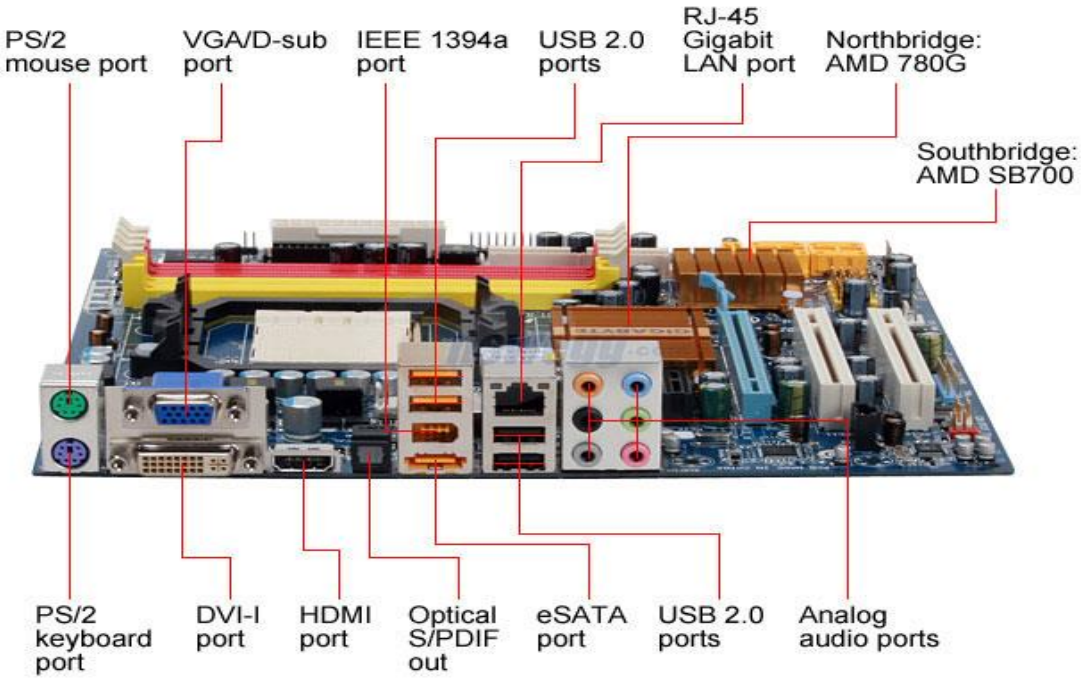
A male port is a port that has pins onto which a unit with holes fits. It is also called male receptable.



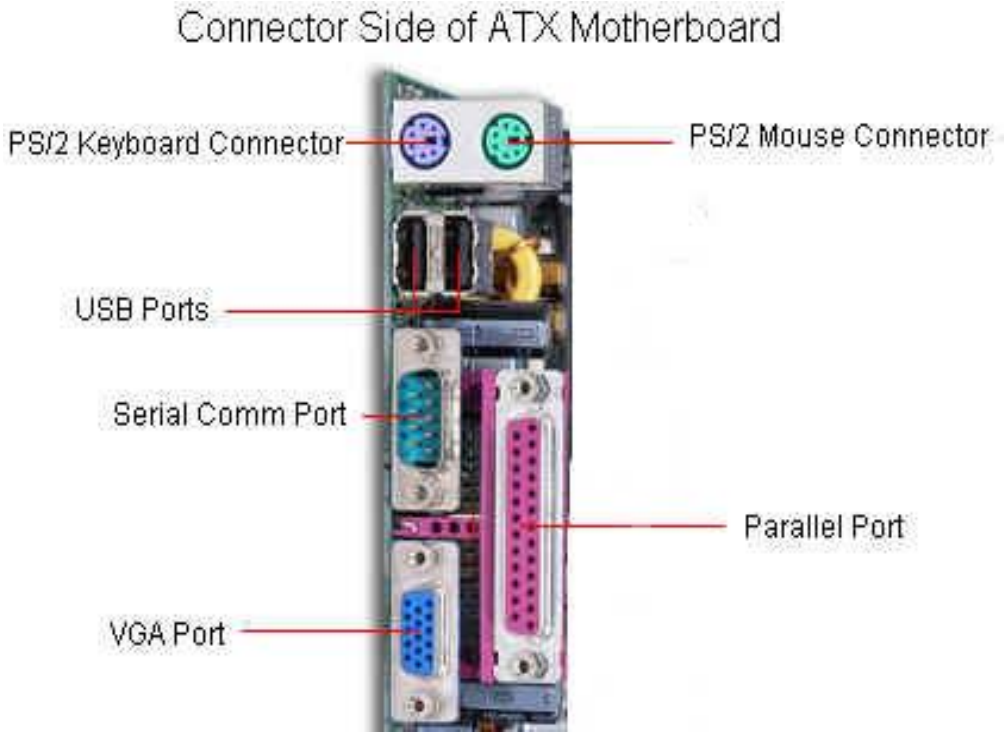
Female Ports

These are ports with holes into which male plugs can fit. They are also known as female receptacles. Examples of female ports include; VGA, PS/2, parallel port etc.

BELOW IS A MOTHERBOARD SHOWING VARIOUS PORTS



SOME OF THE COMMON PORTS BEHIND A PC



BOOTING A COMPUTER WITH WINDOWS XP/Windows 7/8

Simply switch on the computer and Windows XP or Windows 7/8 will automatically start up.

THE CONCEPT OF A COMPUTER PROGRAM

Refers to a series of step by step instructions which tell the computer what to do.
or
A set of instructions that tell the computer how to accomplish a task.

DIFFERENT WAYS OF STARTING A PROGRAM/APPLICATION IN WINDOWS

Applications can be launched in several ways:

- Click the application on the Start menu. (Click Start All-programs →Choose the application you want).
- Double-click the application shortcut icon on the desktop.
- Double-click the application executable file in My Computer.
- Launch the application from the Run window or command line.

FILE MANAGEMENT

Software programs make it easier for user to manage files on the computer system. However, not all files are used by all software programs; cross platform compatibility and application software compatibility should be taken into account.

A FILE

- A file is collection of related information treated as a single unit by the computer.
- Refers to a named collection of data or information.
- Is a collection of related data.

Each piece of information entered into the computer must be stored in a file. Each file should a different file name for easy identification.

TYPES OF FILES

- **Program Files -** Contain software instructions. E.g. Executable files (also called Binary files) – files which actually start programs.
- **System Files -** These are files which control the running of the computer system. Never attempt to delete them or move them from their system folder.
- **Data Files -** Often called *document files*, contain data, not programs, i.e. they contain material that you or someone else has created and stored using application software.
- **ASCII files/Text Files** - are files which contain text only (no formatting, such as boldface or italic, and no graphics). The characters are in ASCII code (American Standard Code for Information Interchange Code). This file format is used to transfer documents between incompatible platforms, such as IBM and Macintosh (Mac).
- **Image/Graphic Files -** These are files that contain digitized graphics.
- **Sound (Audio) files -** Files that contain digitized sound.
- **Video Files -** These are that contain digitized video images.
- **Driver Files -** Files that allow the computer to interface with the peripheral devices. E.g. for a printer to communicate with the computer, printer drivers must be installed on the computer.

FILE AND FOLDER NAMING

1. File and folder names can be composed of letters, numbers or both (alphanumerical).
2. A Windows file name can be up to 255 characters long for Microsoft Windows XP and higher.
3. Special characters such as Question marks (?), Colon (:) and slashes (/,\) are not allowed in the filename.
4. All Files have names, and all file names consist of two parts-the name and extension-separated by a period.
5. Files should have different names for easy identification.
6. A file name consists of a unique name, which describes its contents and a three or four character extension, which describes a file type.
7. The file name is separated from its extension with a period (full stop).

An example of a file name is "Report.Doc" where "Report" is the name and "doc" is the extension.

Extensions are often added automatically by the applications software. By default Windows XP hides file extensions.

WINDOWS FILE SYSTEM NAMING RULES:

- Maximum of 255 characters may be used for a filename
- Characters such as a period (.) or a slash (\ /) are not allowed
- An extension of three or four letters is added to the filename to identify the file type
- Filenames are not case sensitive

FILE EXTENSIONS

This is a suffix /group of letters occurring after the period in the file name indicating the type of the file contents. i.e. A file extension is a suffix that describes a file type.

Or

Refers to the last three/four/five characters after a period (.) that make up the entire file name.

EXAMPLES OF FILE EXTENSIONS

File Type	Extension
Program Files	•EXE (Executable file) •COM (Source program File) e.g. Command.com •BAT (Batch File) e.g. Autoexec.bat •DLL (System support file)
System Files	•SYS (system) e.g. Config.sys •INI (Initialization file) •DAT (Data Files) •PWL (Password Files)
Driver Files	•DRV •VXD •386
Document Files	•DOC or DOCX - Document File (Microsoft Word and WordPad files). •WPD (Word perfect file)

	•WPR (Lotus WordPro file) •RTF (Rich Text Format) also supported by WordPad •PDF Portable Document Format (Acrobat Reader File)
ASCII/Text Files	•TXT (files created using WordPad or Notepad.
Data Files	•DOC or DOCX (Microsoft Word) •XLS or .XLSX (Microsoft Excel File) •MDB (Microsoft Access File) •PPT or .PPTX (PowerPoint presentation file) •PUB (Microsoft Publisher file) •PMD (Adobe Page Maker file)
Image Files	•EPS (Encapsulated PostScript Image file) •TIF (Tagged Image File) •JPG (Still Image file – compressed according to Standards of Joint Photographic Experts Group) •JIF (Graphics Interchange Format image file) •BMP (Windows Bitmap image file) •PNG
Audio/Sound File	•WAV (Wave sound file) •MID (Musical Instrument Digital interface file) •MP3 (MPEG Layer 3), •WMA, •WA •FLS, •MP4A •AUX •AIF •AUD •CDA • AU
Video Files	•MPG (for MPEG-1 or MPEG-2 •AVI (Audio Video Interleave) AVI is a multimedia container format. • MP4 (MPEG Layer 4) • 3gp
WinZip Files	•ZIP (a compressed file) it may contain one or more files or folders. •WinRAR

FILE PATH AND PATH NAME

A path is a route taken to reach a folder /directory in question.

A path is described fully by a path name. The path name begins with the name of the drive, followed by the root directory, then Profile then folder name and then the intermediate sub-folders/directories separated by the Backslash.

Example of a file path: C:\Admin\Desktop\Abu\letter.Doc

C:\	- (drive name (Hard disk) where the file is stored or located)
Name	- (Letter)
File type	- Document
Admin	- Profile (in Windows)
Folder name	- Abu located on the Desktop.

TYPES OF FILE SYSTEMS

A file system is created automatically whenever a hard disk is formatted.
The file system provides the directory structure that organizes the user's operating system, application, configuration, and data files.

Examples of file systems:

- The FAT32 file system (FAT – File Allocation Table).
- The New Technology File System (NTFS)

Others include:

- Ext2 (Second Extended file System for Linux Kernel)
- ReiserFS (computer file system contained within the Linux Kernel)
- XFS (64 bit journaling file system for Linux)

However, the most common file types used with Microsoft Windows are FAT32 and NTFS.

WORKING WITH FOLDERS

- A folder is a virtual storage location for files and sub-folders on a computer system.
- Also called a directory in command line interface.
- A folder is a virtual container where files are stored on the computer system.

TYPES OF FOLDERS

When Microsoft Windows XP/7/10) is installed on the computer, it automatically creates some folders by default. These are called system folders. However, the user can create as many folders as possible.

SYSTEM FOLDERS

- **Documents and settings** – contains a sub-folder for each user profile, each user who has logged on to the computer or network domain through a computer.
- **Program Files**
  This is a folder where most installed programs install the files they need in order to run.
- **Temp Files**
- The OS and various other application programs might store temporary files in this folder.
- **My Documents**
  Stores document files created by various application software and other files that you might want to access.

- **My Pictures**
  This is a sub-folder under my documents folder which special capabilities for handling picture files.
- **My Music**
  This is a sub-folder under my documents folder which special capabilities for handling music files.

OTHER FOLDERS

- **Network Folders**
  Folders shared from another computer over a network
- **Shared Folders**
  Is a folder shared from your computer over a network

MANAGING FILES AND FOLDERS

Microsoft Windows provides various utilities with tools to manage common operations. The most two popular tools are My Computer and Windows Explorer.

MY COMPUTER

My computer displays the available resources on your computer, including icons for the disk drives such as Floppy Disk Drive, Hard disk drive, CD-Drive and network drives.

- You can display the contents of your floppy disk, hard disk, CD and network.
- You can also search for and open files and folders, and gain access to options in Control Panel to modify your computer's settings.
- Files can also be moved and copied using My Computer.
- Using My Computer, you can also view the dick properties of your computer system.

Opening My Computer

1. Click start
2. Click my computer

Or

You can also double click my computer icon located on the desktop to launch my computer.

My computer window.

To view information stored on any of the drives in my computer window, double click the drive letter e.g. to view to view the contents of a Hard disk, double click Local Disk (C:).

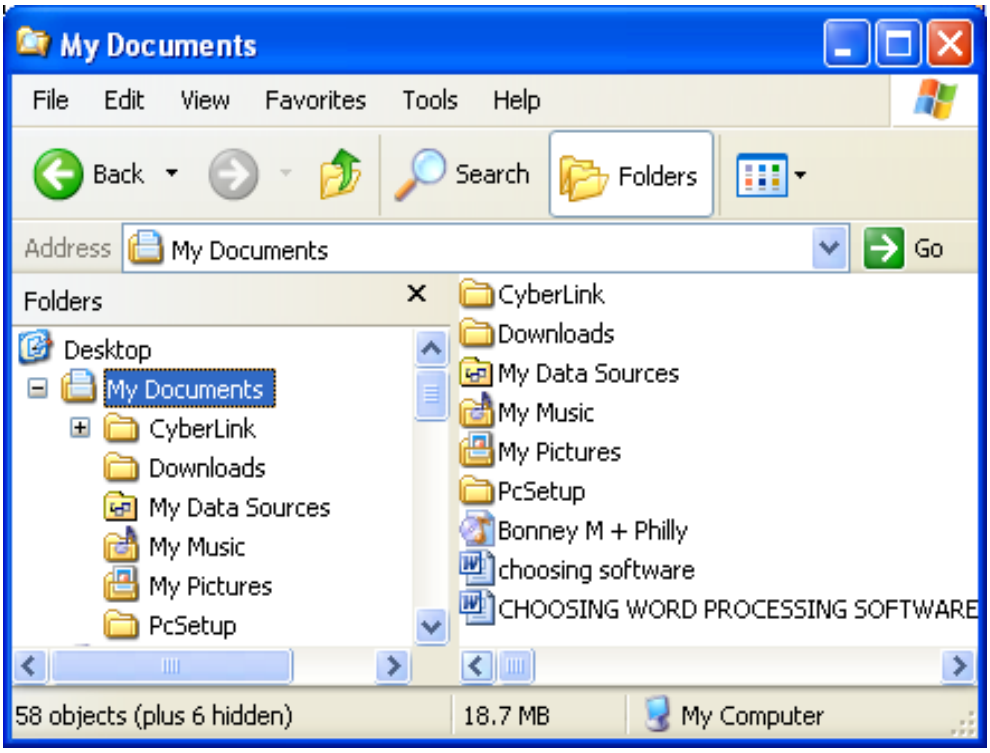
WINDOWS EXPLORER

Windows Explorer is a windows utility used for organizing files and folders on the computer system.
Windows explorer displays the hierarchical structure of files, folders and drives on your computer system. It also shows any network drives that have been mapped to the drive letters on your computer. E.g. A:, C:, D:, E: and so on.

Using windows explorer you can copy, move, rename, delete and search for files and folders on the computer.
In addition, you can use windows explorer to share your computer with other people.

Opening/Running Windows Explorer

1. Click Start
2. Point to All Programs
3. Point to accessories,
4. Click windows explorer. The Explorer window will appear



To view information stored under a given or drives in the Explorer window, click the drive letter or folder e.g. to view to view the contents of a Hard disk, double click Local Disk (C:) or click on my documents folder to see the files.

WORKING WITH FILES AND FOLDERS

- Most Windows tasks involve working with files and folders.
- Windows uses folders to provide a storage system for the files on your computer, just as you use manila folders to organize information in a filing cabinet.
- Folders can contain many different types of files, such as documents, music, pictures, videos, and programs.
- You can copy and move files from other locations, such as another folder, computer, or the Internet, to folders you create. You can even create folders within folders.

VIEWING FILES AND FOLDERS

Windows provides several new ways for you to arrange and identify your files when viewing them in folders, such as My Documents.

When a folder is open, you can access each of the following view options on the **View** menu.

1. Extra Large
2. Tiles view
3. Large icons
4. Small icons
5. Medium icons
6. List View
7. Details View
8. Content view

To change from one view to another, Right click an empty area in the right pane, from the Pop-up menu, point to view and then click the view you want

CREATING FOLDERS

1. Right-clicking a blank area in a folder window or on the desktop.
2. Point to **New**, and then clicking **Folder**.
3. A new folder is displayed with the default name, **New Folder**, selected.
4. Type a name and then press **ENTER**

SELECTING FILES OR FOLDERS

Selecting a single file or folder

- Click the file or folder you want to select.

Selecting a group of files or folders in a sequence

1. Click the first file or folder you want to select.
2. Press and hold down SHIFT, and then click the last file or folder you want to select.

Selecting a Non – continuous group of files or folders

1. Click the first file or folder you want to select.
2. Press and hold down CTRL, and then click the additional files or folders you want to select.

Renaming Files or Folders

1. Right click the file or folder you want to rename
2. From the Pop-up menu, Click rename.
3. Type the new name, and then
4. Press ENTER on the Keyboard.

   Or

1. Click the file or folder you want to rename.
2. Click again for the second time, the insertion point will appear
3. Type the new name, and then press ENTER

Copying a file(s) or folder(s)

1. Right-Click the file or folder you want to copy.
2. From the Pop-up Menu, Click Copy
3. Right-Click the drive or folder you want to copy to,
4. Click Paste.

Copying a file(s) or folder(s) by Dragging

1. Click the file (s) or folder(s) you want to copy
2. Press and hold down the CTRL key and then drag the files/folder to the new location

Moving a file(s) or folder(s)

1. Right-Click the file or folder you want to Move/cut
2. Click Cut
3. Right click the drive or folder you want to move to,
4. Right click, Paste.

Moving a file(s) or folder(s) by Dragging

1. Click the file (s) or folder(s) you want to move
2. Press and hold down the SHIFT key and then drag the files/folder to the new location.

Note:

Make sure the destination for the file or folder you want to move is visible. For example, if you are moving a file from the My Documents folder to the desktop you might need to resize Windows Explorer so the desktop is visible.

Deleting a File(s) or Folder(s)

1. Select the file(s) or folder(s) you want to delete.
2. Press Delete
3. You will need to confirm the deletion by clicking yes

   Or

1. Select the file(s) or folder(s) you want to delete
2. Right click the selected files or folders and from the pop-up menu, click delete.
3. You will need to confirm the deletion by clicking yes.

DESKTOP

Is the user's workspace on the computer screen (area of the screen where you work from).

MAJOR ICONS ON THE COMPUTER'S DESKTOP

1. Recycle Bin
2. My Computer
3. Network Places
4. Internet Explorer

CUSTOMIZING DESKTOP

The user can customize the desktop by changing themes, Background and Screen Savers, resolution etc.

To customize the Desktop, do the following:

1. Right click an empty area of the screen.
2. Click personalize

   -To change the background, click Desktop Background, choose the option you and click save.

   - To setup a screen saver, Click Screen Saver and select the screen Saver you want and click ok.

WORKING WITH THE RECYCLE BIN

The recycle bin is a windows folder that is used to store deleted items from Windows. When you delete files and folders from your hard disk, they are placed in the recycle until you empty the recycle bin.

Items deleted from a floppy disk or network drives are permanently deleted and are not sent to the Recycle Bin.

Deleted items remain in the Recycle Bin until you specifically instruct windows to empty recycle bin (decide to permanently delete them from your computer). As long as these items still in the recycle Bin, they take up hard disk space.

RESTORING DELETED ITEMS FROM RECYCLE BIN

1. On the desktop, double-click recycle Bin.
2. To restore an item, right-click it, and then click Restore.
3. To restore all of the items, on the Edit menu, click Select All, and then on the File menu, click Restore.

DELETING ITEMS IN THE RECYCLE BIN

1. Double click the recycle Bin
2. To delete an item, right-click it, and then click Delete.
3. To delete all of the items, on the File menu, click Empty recycle

Note: Files and folders deleted from the Flash Disks and Memory cards are **not** sent to the recycle Bin, they are permanently deleted.

EMPTYING RECYCLE BIN FROM DESKTOP

1. Right click the recycle bin folder on the desktop.
2. From the pop-up menu, click empty Recycle Bin.

COMMON UTILITIES

Utility software refers to system software designed to analyze, optimize, enhance and maintain a computer in good working condition.

A utility program is a type of system software that performs a specific task, usually related to managing a computer, its devices or its programs.

Utility Programs are generally used to support, enhance or expand existing programs on the computer system.

EXAMPLES OF COMMON UTILITY PROGRAMS INCLUDE:

1. **Backup Utility -** Used to make a backup copy or duplicate copy of the information stored on your computer's hard drive.
2. **Data Recovery -** Restores or recover data that has been physically damaged, deleted or corrupted.
3. **Virus Protection Utility/Anti-virus Utility -** Is a utility program that scans memory, hard drives and diskettes to detect and remove viruses.

   Examples of virus protection utility/ Anti-virus Utility programs include:

   1. Kaspersky Antivirus.
   2. Avast Antivirus.
   3. Comodo
   4. Bit Defender
   5. Norton Antivirus software.
   6. McAfee Virus Scan.
   7. AVG Antivirus.
   8. Symantec Antivirus.
   11. Avira
   12. Escan
   13. Webscan.
   14. Pecillian Antivirus.
   15. Panda Antivirus.
   16. Dr. Solomon Antivirus Toolkit.
   17. Trend Micro Antivirus.

9. Quick Heal
10. F-secure

4. **File Compression Utility -** A utility program that compresses or reduces the size of a file to optimize disk space.
5. **Data Compression Utility -** Is a Utility program removes redundant elements, gaps and unnecessary data from the computer storage space so that fewer bits are required to store or transmit data.

   To compress a file or folder, do the following:
   - Right click the file you want to compress
   - Click Properties
   - Click General Tab and then click Advanced Button
   - Check the box for compress contents to save disk space.
   - When done, click Ok.
6. **Search Utility -** Helps the user to locate/find files and folders on the computer.
   In Windows 7 Operating System, to find a file or folder, simply type the name of the file/folder in search bar and press enter.
7. **Data Recovery Utility -** Restores data which has been physically damaged or corrupted. Data can be damaged by virus, bad software, hardware failure or power fluctuations that occur while data is being written or recorded.
8. **Defragmentation Utility -** Is a utility that stacks scattered disk elements together to acquire more storage space.
   Defragmenting a disk involves analyzing the disk and then consolidating fragmented files and folders so that they occupy a continuous space, thus increasing computer performance during file retrieval.

   Conditions that may lead to disk fragmentation & file system corruption include:
   - Improper shutdown of a PC
   - Viruses
   - Failing drive
   - Using a disk utility designed for one file system or O/S on a drive formatted with a different file system or O/S version.

   To defrag the disk, do the following;
   - Click Start
   - Click All programs
   - Click Accessories
   - Click system Tools
   - Click Disk Defragmenter
   - Click Defragment Disk Button.

9. File Viewer
Is a utility that displays and copies the contents of a file.

10. Uninstaller
Is a utility that removes an application, as well as any associated entries from the computer.

11. Screen Saver Utility
Is a utility that causes the monitor's screen to display a moving picture/image or blank screen if no mouse or keyboard activity occurs for a specified period of time.

12. Disk Formatting Utility

Formatting refers to the act of erasing the content from the disk. Formatting Initializes/Prepares a disk for future use or storage of files.

Formatting erases all the data that has previously stored on the disk and the disk become completely empty.

Situations when Disk Formatting may be required

1. When the operating system has been corrupted
2. Virus infection
3. When installing a new hard disk
4. When installing an Operating System
5. When the disk is used up/full

13. CHKDSK Utility

Is a utility used to create and display status reports for the hard disk. CHKDSK also corrects file system problems such as a cross linked file and scan for and attempt to repair disk errors.

To run the CHKDSK IN Windows XP/Windows7, do the following:

- Right click the disk you want to check
- Click Properties, the disk properties dialog box appears which shows the current status of the selected disk drive
- Click Tools Tab
- Click **check now button** in the error checking section.
- Choose your options: You can automatically fix File system errors and/or scan for and attempt to recover bad sectors.
- Click Start Button

14. Disk Cleanup Utility

Enables you to clear your disk of unnecessary files such as unused files and temporary internet files, which are probably taking disk space.

To run the Disk Cleanup utility, do the following:

- Click Start
- Click All programs
- Click Accessories
- Click Disk cleanup
- Select the Drive you want to cleanup
- Click Ok.

PRINT MANAGEMENT

To produce a hard copy of your work, you must produce a copy on paper using a printer.

To print a copy, do the following;

1. Click File
2. Click print, the Print dialog box will appear

3. Open the Printer list box using the down arrow button and select the print you want to use to print your work from the list if there are a number of printers installed on your computer.
4. Specify the number of copies using the up and down arrow buttons or type the number of copies in the box, otherwise the default number is 1.
5. To print specific pages, Type the pages or range e.g. 1, 3, 5-12.
6. When done, click ok or print button

TOPIC 3: COMPUTER LABORATORY CARE AND MAINTENANCE

THE BOOTING PROCESS

- When the computer is switched on, the basic input/output system (BIOS) performs a power-on self-test (POST) to check on all of the internal components.

- The BIOS contains a setup program used to configure settings for hardware devices. The configuration data is saved to a special memory chip called a complementary metal-oxide semiconductor (CMOS).

- POST checks to see that all of the hardware in the computer is operating correctly including the peripheral devices. If a device is malfunctioning, an error or a beep code alerts the technician that there is a problem and an error message is displayed on the screen. The end of POST is marked by a Beep Sound.

- After POST, the computer looks for the Operative System from Drive A: (Floppy Drive). Should Drive A: be empty, and then it loads Operating system from drive C: (Hard disk).

BACKEND PROCESSES THAT OCCUR DURING BOOTING OF A COMPUTER

Refers to the invisible processes that take place during booting which a user does not see directly.

The booting process has got several backend processes to attainment of the computer's run-time environment. These processes include:

1. Power On-Reset
2. POST (Power On Self-Test)
3. BIOS (Basic Input Output System).
4. CMOS configuration and checkup
5. Memory checkup.
6. Loading the Operating System.

THE BOOT PROCESS OF A PERSONAL COMPUTER USING MICROSOFT WINDOWS.

1. The power supply sends a signal to the computer in the system unit. (Power-On Reset)
2. The processor looks for the BIOS.
3. The BIOS performs POST.
4. The results of the POST are compared with the data in the CMOS CHIP.
5. The BIOS looks for the system files in the boot disk.
6. The boot program loads the kernel of the OS into the RAM from the storage.
7. The OS loads configuration information and displays the desktop screen.

BOOT SEQUENCE

The order of drives that a system BIOS follows when looking for the Operating System to boot after the computer has performed POST.

For example; The BIOS may be instructed to first look for the Operating System (OS) from Drive C: (Hard disk) and then drive A: (Floppy Disk).
If the OS is stored on Drive C: the BIOS will need look no further, however, if the BIOS does not find the OS on Drive C: then it will next look to Drive A: and so on depending on the configuration of the boot sequence.

Note:
Users can change the order of the boot sequence through the CMOS setup.

DIFFERENCE BETWEEN POST AND BIOS

POST (Power On Self-Test) is the procedure through which the computer checks its components to see if they are available and are functioning properly	**BIOS (Basic Input Output System)** is a program that directs the POST process.

COMPUTER LITERACY

Computer literacy refers to having knowledge and understanding of what a computer is and how it can be used as a resource.
or
It also refers to the comfort level someone has with using computers and other applications that are related to computers.

Note:
Individuals who are very computer literate are sometimes called power users.

Computer competence
Computer competence refers to applying your skills with computers to meet your information needs and improve your productivity.

It also means being able to transfer basic skills to new systems and new software.

Information Literacy
Information Literacy is ability to access, organize, evaluate and use information from various sources.

Advantages of being Computer Literate
1. Increases one's employment opportunities.
2. There is a possibility of earning high salary than others.
3. Greater access to resources.
4. Easy Communication, you can stay in contact with the world. I.e. family, relatives and loved ones in other states through the internet.
5. Enables you to make intelligent and informed decisions. Using the computer, one can analyse data and take informed decision about the future course of action.

6. Helps one to understand and take advantage of the new and emerging technologies and careers in ICT industry
7. Helps increase work performance or productivity in the work place, understanding how to use computers effectively will help you become more productive and valuable employee, no matter which profession you choose. Using computers, tasks are completed faster and better.
8. A computer literate person will be constantly in need to upgrade his/her skills. He/she will also develop a self-learning attitude which is extremely conducive in any type of job.
9. Enables one to analyse and solve problems more quickly.
10. Saves time that would be taken to do tasks manually.
11. Enables one to understand the ethical, legal, moral and societal implications of technology today.
12. You will be able to avoid hackers, viruses, internet headaches, protect your privacy and security from those you do not know.
13. You will be able to maintain, upgrade and trouble shoot your computer, make good purchasing decisions and incorporate the latest technologies into your existing equipment.
14. Teaches important new skills.
15. Computers are excellent learning tools because the multimedia makes education fun as well as informative.
16. Promotions in a work place in case of a vacancy.

DISADVANTAGES OF BEING COMPUTER LITERATE

1. It reduces more basic skills like spelling and mental calculations.
2. It is bad for eye sight. You are advised to take an eye break every 20 minutes.
3. Contributes to obesity due to lack of physical activity.
4. Tends to cut the child off from other people around him, as he stays busy with the computer. I.e. isolates the child making him/her less social and interactive.
5. Waste of more productive time due to involvement in unproductive activities.

COMPUTER LABORATORY

A computer Lab is a room/building with computing facilities to enable efficient teaching and learning activities to take place.

or

A computer laboratory is a room or building that is specially designed and prepared to provide safe and conducive environment for using computer systems.

Or

Is a collection of computers specifically stationed in one room or building for public use.

Computer Labs are frequently found in public buildings, such as Libraries, Schools, Colleges, Universities, Community Centres and some large churches.

QUALITIES OF A GOOD COMPUTER LAB

1. It should be away from dusty areas such as main roads, classrooms etc.
2. The room should be well ventilated
3. Well distributed power sources/sockets to provide electricity to the computers and other devices.

4. Adequate space for computers and users i.e. Should be spacious
5. The computer Lab should be easily accessible to the users.
6. Availability of fire-fighting equipment. E.g. gaseous fire extinguisher
7. Protection from weather elements such as wind.
8. Should have enough security.
9. Should be Clean at all times
10. Air conditioning to regulate room temperature and cooling machines.
11. Availability of a First Aid Box

ITEMS REQUIRED IN THE COMPUTER LAB

NO.	ITEM	USE
1.	**Blower/Compressed air**	- Removes/blows away the dust from the System Unit and other hardware components that have been with dust.
2.	**Gaseous Fire Extinguisher**	- To put off any fire outbreak. - To fight fire
3.	**Surge Protector/Suppressor**	- To regulate and protect the computers from high power voltage. - To safeguard the computer from power fluctuations/ Surges/spikes.
4.	**Anti-glare Screen/Screen Filters**	- Is used to avoid eye strain and fatigue caused by over bright CRT Monitors. - It also reduces electromagnetic rays (radiation) from the CRT monitors.
5.	**Waterproof Covers**	- To prevent water from reaching the main parts of the computer system. - Protects the computer from moisture and liquid substances.
6.	**Dust Covers**	To prevents dust from entering the computer equipment
7.	**Hub**	- A device that connects a number of computers together to make a LAN. - Is a networking device that is used to connect computers in a network.
8.	**Switches**	Is a device that allocates traffic from one network to another.
9.	**Gateways**	Is a network device that allows access from one network to another.
10.	**Burglar Proof**	- Prevents breakage into the laboratory
11.	**Router**	Connect/interlink different networks and forwards data packets from one point of a network to another.
12.	**Air Conditioner**	- Used to regulate room temperature. - Cool machines in the computer Laboratory
13.	**Woolen Floor Carpet**	To Absorb/minimize dust in the computer Lab - To maintain room temperature. - Reduce on the effects of electroshocks just in case of

		leaking electricity. - Reduce on the effects of damage of when small objects fall. - Absorbs moisture and keeps the Lab warm all the time. - Reduces accidents like falling. - Carpets are frame resistors.
15.	**Security Cameras Intruder Alarms and CCTV (Closed Circuit Television)**	- To detect intrusions - Monitor/record intruders.
16.	**UPS** (Uninterruptable Power Supply)	- Power backup device that provides alternative source of power in case of power failure.
17.	**First Aid Boxes**	- Consists of a set of medical supplies (bandages and medicines) for giving first aid in case of injury in the computer lab

AREAS OF LABORATORY SECURITY

PHYSICAL SECURITY
Describes the security measures that are designed to deny unauthorized access to facilities, equipment (hardware) and resources.

ELEMENTS OF PHYSICAL SECURITY

- Burglary proof
- Key Cards/Access Badges
- CCTV cameras
- Strong walls
- Safes
- Alarms
- Door Locks

Electric power Security
Computers require electricity to operate. As such, problems can arise when there are power irregularities such as power spikes or power surges.

Power irregularities can also be caused by atmospheric conditions such as lightening in buildings with poor or defective wiring.

Power spikes or power surges can cause physical damage to many of the components of your computer, especially the hard drive.

To protect your computer against power problems do the following:

1. Connect all power wires in a way so that they cannot accidentally disconnect.
2. Connect the computer to a Surge protector (Suppressor) to help avoid damage from power spikes.
3. Employ a UPS device to keep computers running in the event of power outage.

UNINTERRUPTIBLE POWER SUPPLY UNIT (UPS)

A UPS is a power backup device that provides alternative source of power in case of a blackout. It has three functions:

1. It regulates amount of power into the computer thus reducing eliminating power surges and blackouts.
2. Provides back-up power to the computer in case of power failure.
3. Alerts the user in case of power blackout by producing a beeping sound.

SAFETY PRECAUTIONS TAKEN IN THE COMPUTER LAB

Safety precautions are the measures put in place to prevent damages. Below are some of the safety measures taken in the computer laboratory.

1. Switch on the computer hardware system starting from the mains (power from the wall socket), UPS, System Unit and then Monitor.
2. Avoid making connections when the computer is running/ on power e.g. connecting a keyboard, monitor, mouse etc.
3. Avoid abrupt switching off and on of the computer system. Use the normal procedure/way of shutting down the computer.
4. Place the computers in a dust free environment. Dust covers should be used to cover computers when not in use.
5. Good ventilation to allow fresh air circulation the lab.
6. The computers should not be exposed to direct sun light.
7. Food and liquids/drinks should be **NOT** allowed near computers.
8. Computers should be regularly serviced at least one year or more frequently if the environment is very dusty.
9. It is good practice to record of daily conditions in case computer failure.
10. The floppy disks and CDs have to be well protected all the time especially those used for installation.
11. Installation disks for programs must have backups and should be kept safely in their jackets and must be kept away from sunlight and magnetic fields.
12. In areas where power fluctuations occur, it is important to use either a UPS or stabilizer to ensure a steady input of power to the computer system.
13. Proper aeration. i.e. the room must have proper fresh air circulation.
14. The room temperature must be at least 20^{o}c. This explains why most computer Labs are air conditioned.
15. Back up important files regularly.
16. Install and update the antivirus software regularly to be able to detect and remove viruses from the computer system.

COMPUTER LAB RULES

1. No food or a drink or tobacco in any form is allowed in the computer lab.
2. You should not move lab equipment and cables from one place to another.
3. Keep sound and noise levels to a minimum level.
4. Avoid disruptive behaviour
5. No illegal copying of any material from the computer lab.
6. Avoid unnecessary printing and use of paper and materials.
7. Turn off the mobile phones (Avoid Cellular phones)
8. Seek help on something that you do not know or understand
9. Operate equipment with great care.
10. Do not install any software on your own; software may be installed by the Lab administrator only.
11. Do not modify/change any system files.

COMPUTER LAB ENVIRONMENT

Safety practices are the activities that are continuously done to prevent damages in the laboratory.
Below e some of the safety practices taken in the Computer laboratory.

1. Place computers in temperature controlled rooms
2. Keep computers away from air conditioning or heating vents.
3. Keep computers in a dust free areas
4. Keep computers and media a safe distance from electrical or magnetic fields.
5. Ensure cables are not kinked or twisted.
6. Route cables so that they will not be stepped on or rolled over by chairs.
7. Use antistatic mats and pads to reduce the chance of ESD damaging your equipment.
8. Store hazardous or toxic materials in a secured cabinet.
9. Keep the floor clear of anything that might trip someone.
10. Clean work areas on a regular basis.
11. Follow local codes and government rules whenever disposing of batteries, solvents, computers, and monitors.

SERVICING AND MAINTANENCE OF COMPUTER SYSTEMS

Computer servicing is an activity which is regularly done to keep computers in good working condition and extend their life span.
Computer Repair is the process of restoring a computer which has been damaged to a good working condition.

WHY COMPUTERS SHOULD BE SERVICED

1. To prolong the life span of hardware and software.
2. To ensure the proper functioning of the computer.
3. To update outdated software programs such as antivirus, Operating System, application software.
4. To increase the efficiency of the computer.
5. To increase functionality of the computer.

6. To remove aging hardware or faulty hardware and replace with new hardware components thus preventing system failure
7. To remove dust and other cruft that may accumulate as a result of air cooling. If the cooling is not filtered then regular computer cleaning may prevent short circuits and overheating.
8. To backup important data stored on the computers, so that in the event of failure, the data and system may be reconstructed.
9. To install new software programs.
10. To run/install software upgrades e.g. Anti-virus
11. Disk cleanup may be performed to remove unnecessary files e.g. temp files
12. Disk defragmentation may be performed to combine fragmented files so as to improve system performance.

Activities involved in Servicing and Maintenance of Computers.

1. Repairing and replacing damaged parts.
2. Upgrading software.
3. Installing power guards/surge protectors.
4. Scanning devices before use
5. Disk cleaning
6. Emptying recycle bin
7. Firewall activation
8. Disk defragmentation
9. Upgrading software
10. Blowing dust off
11. Installing software.
12. Covering computers with dust or water proof jackets.

TOOLS USED TO REPAIR COMPUTERS IN THE COMPUTER LABOLATORY

A computer technician uses many tools to diagnose and repair computer problems.

Hardware tools are grouped into four categories:

1. ESD tools
2. Hand tools
3. Cleaning tools
4. Diagnostic tools

ESD TOOLS

Electrostatic discharge is the release of static electricity when two objects come into contact. An example is a shock that some receives when she/he walks across a carpet and touch a metal doorknob.

There are two Electrostatic discharge (ESD) tools:

The antistatic wrist strap – protects the computer equipment when grounded to a computer chassis.

The antistatic mat - protects the computer equipment by preventing static electricity from accumulating on the hardware or on the technician.

HAND TOOLS

Most tools used in the computer assembly process are small hand tools. They are available individually or as part of a computer repair toolkit. Toolkits range widely in size, quality and price. Some common hand tools and their uses are:

1. ***Straight /Flat-head screwdriver*** - used to tighten or loosen slotted screws.
2. ***Phillips-head screwdriver*** (large and small)- used to tighten or loosen cross-headed screws.
3. ***Torx screwdriver*** - used to tighten or loosen screws that have a star-like depression on top, a feature that is mainly found on Laptops.
4. ***Hex driver*** – used to tighten or loosen nuts in the same way that a screwdriver tightens or loosens screws (sometimes called a nut driver).
5. ***Tweezers or part retriever***- used to manipulate small parts.
6. ***Part retriever*** – used to retrieve parts from locations that are too small for your hand to fit.
7. ***Wire Cutters*** – used to stripe and cut wires.
8. ***Needle –nose pliers***- used to hold small parts.
9. ***Flashlight***- used to light up areas that you cannot see well.
10. ***Wire stripper*** – used to remove the insulation from the wire s that it can be twisted to other wires or crimped to connectors to make a cable.
11. ***Crimper*** – used to attach connectors to wires.
12. ***Punch-down tool***- used to terminate wire into termination blocks. Some cable connectors must be connected to cables using a punch down tool.
13. ***Chip extractor***. – used to remove the CPU
14. ***Wrap plugs***
15. ***Small mirror***
16. ***Small dust brush***
17. ***Electrical tape***
18. ***Scissors***
19. ***Soft, lint- free cloth***
20. ***Power supply tester***
21. ***Cable tester***

CLEANING TOOLS

1. ***Soft cloth***- used to clean different computer components without scratching or leaving debris.
2. ***Compresses air***- used to blow away dust and debris from different computer parts without touching the components.
3. ***Cable ties*** – used to bundle cables neatly inside and outside of a computer.
4. ***Parts Organizer*** – used to hold screws, jumpers, fasteners and other small parts and prevents them from getting mixed together.

DIAGNOSTIC TOOLS

Diagnostic tools are tools used to test and diagnose equipment. These include;

1. ***Digital Multimeter*** – is a device that can take many types of measurements. It tests the integrity of circuits and the quality of electricity in computer components.
   A digital multimeter displays the information on LCD or LED.
2. ***A loopback adapter,*** *also called a loopback plug*- used to test, the basic functionality of computer ports. The adapter is specific to the port that you want t test.
3. ***The Toner probe***- is a two part tool. The toner part is connected to a cable at one end using specific adapters, such as an RJ-45, coaxial cable or metal clips. The toner generates a tone that travels the length of the cable. The probe part traces the cable. When the probe is in near

proximity to the cable to which the toner is attached, the tone can be heard through a spear in the probe.

COMPUTER CLEANING MATERIALS

COMPONENT	MATERIAL USED
Computer system unit case and outside the monitor	Use mild cleaning solution and lint-free cloth
LCD screen	Use LCD cleaning solution or distilled water and lint-free cloth
CRT Screen	Use distilled water and lint-free cloth
Heat Sink	Use compressed air
RAM	Use isopropyl alcohol and lint-free cloth
Keyboard	Use handheld vacuum cleaner with a brush attachment
Mouse	Use glass cleaner and a soft cloth

Precaution taken when Cleaning Monitor

1. Never use a watery (wet) cloth to clean your screen
2. Never put your screen near magnetic media
3. Never open a monitor for inside cleaning.
4. Never clean a monitor when it is on power. Gratitude
5. Always ask a technician for help.

PREVENTIVE MAINTENANCE

Refers to the maintenance performed while the machine is still working in order to keep it in good working condition and prevent it from breaking down. It includes lubricating, tightening and replacing parts.

Or

Systematic inspection, detection, correction and prevention of incipient failures before they become actual or major failures.

Or

Is the act of a regularly scheduled check of the computer hardware or software to help ensure it continues to operate properly.

The Purpose of Preventive Maintenance

Preventive maintenance reduces the likelihood of hardware or software problems by systematically and periodically checking hardware and software to ensure proper operation.

Preventive Maintenance can be divided in:

1. Hardware maintenance
2. Software maintenance

Below is list of preventive maintenance tasks you can take with your computer.

1. Cleaning your computer hardware
2. Downloading the latest drivers for your hardware
3. Downloading the latest updates for your software
4. Verifying you have the latest Anti-virus protection updates on your computer
5. Running disk software utilities such as Defrag and Scandisk on your hard drive.
6. Deleting unused programs or files on your computer

Benefits of preventive maintenance

1. Reduced computer down time and repair costs.
2. Increased data protection
3. Extended life of the components
4. Increased equipment stability