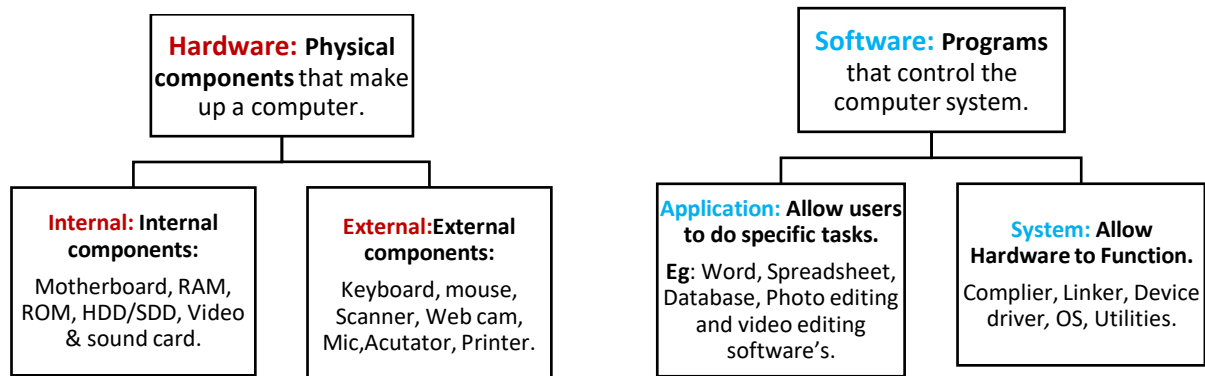


ICT Theory Revision Notes

Chapter 1:



SSD:

Advantages:

1. **Faster** Data Access Time.
2. **Faster** Data Transfer Time.
3. **Lightweight** – Portable.
4. **Less Power** Consumption.

Disadvantages:

1. **Expensive.**
2. Offers **less storage** compared to HDD.

HDD:

Advantages:

1. **Cheap.**
2. Offers **more storage.**

Disadvantages:

1. **Slow** Data Access Time.
2. **Slow** Data Transfer Time.
3. **Heavier** than SDD.
4. **More power** consumption.

CPU (Central Processing Unit): Part of the computer that interprets and **executes commands** from the computer hardware & software.

Operating Systems (OS): Systems that that **enable computer system to work** and allow **user communication** with the computer.

Functions:

1. Controls input, output & storage devices.
2. Deals with errors in computer system.
3. Maintains security of computer.
4. Allowing user communication with computer.

User interface:	Used By:	Advantages:	Disadvantages:
<i>GUI (Graphical User Interface)</i>	Gamer, Photo editor, Web surfer.	<ul style="list-style-type: none"> - User friendly. - No need to learn commands. - Time saving. 	<ul style="list-style-type: none"> - User is not in direct communication. - Restricted to a number of options. - Uses a lot of memory. - Need's an OS.
<i>CLI (Command Line Interface)</i>	Programmer, Analyst, Technician.	<ul style="list-style-type: none"> - User is in direct communication. - Not restricted to a number of options. - Uses less memory. - Doesn't need an OS. 	<ul style="list-style-type: none"> - Not User friendly. - Need to learn accurate commands. - Takes too much time.

Emerging Technologies:

AI Biometrics (*Artificial Intelligence*):

It is a technology that transforms biometrics into a readable code making it easier for the computer to understand.

E.g.: Fingerprint, Voice recognition, Facial recognition, Iris recognition, etc.

3D & Holographic Imaging:

A technology that allows 3-D images to be produced using lights.

Used: Engineering designs, Architecture, Simulations, Medical Imaging, Gaming etc.

VR (*Virtual reality*):

A technology that produces an artificial environment using goggles, sensors, lights, etc.

Used: Military, Education, Advertising, Gaming, Property real estate, etc.

Robotics:

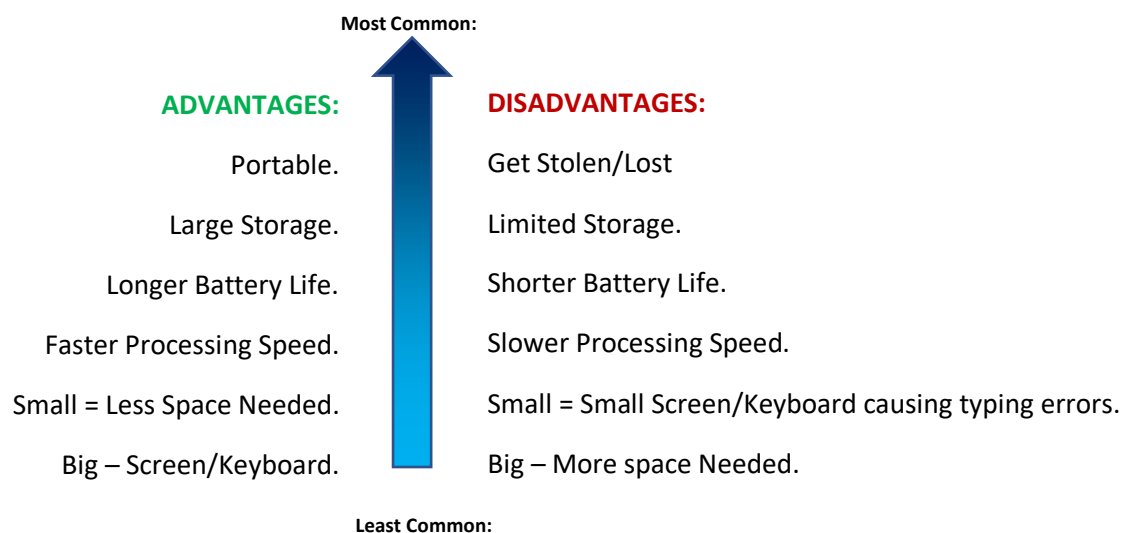
A technology that uses machines to perform tasks done by humans.

Used: Military (Drones), Medical, Industries, Factories, etc.

Types of computers:

	Advantages:	Disadvantages:
PC/Desktop:	1.Large storage capacity. 2.Easy to Upgrade . 3.Easy to Repair . 4. Big Monitors . 5.Faster processing speed.	1. Not portable . 2. Takes up desk space . 3. Needs separate Hardware . 4. Trailing wires .
Laptop:	1. Portable . 2. No trailing wires. 3. All in one Hardware.	1. Easier to get stolen . 2. Limited Battery life. 3. Keyboard and mouse is slow.
Tablets:	1. Portable . 2.Fast to Switch on. 3.Longer battery life. 4. Don't generate heat.	1. Easy to loose/get stolen . 2.Limited memory. 3. Slow and error prone typing. 4. Doesn't support many file formats.
Smart Phones:	1. Portable . 2.Longer battery life. 3. Fast to switch on. 4. Can make phone calls.	1. Easy to loose/get stolen . 2.Limited memory. 3. Slow – error prone typing. 4. Small screen.
Smart Watches:	1. Portable . 2.Easy to measure fitness. 3. Custom strap designs.	1. Easy to loose/get stolen . 2.Small in size – not readable. 3.Cannot run heavy computer apps.
Mainframe Computers:	1.Fast processor speeds. 2.Large storage capacity. 3.Supports multiple OS's.	1.Expensive. 2.Not user friendly. 3. Needs a lot of air-conditioned space.

Types of Computers ADV & DI-ADV Series:

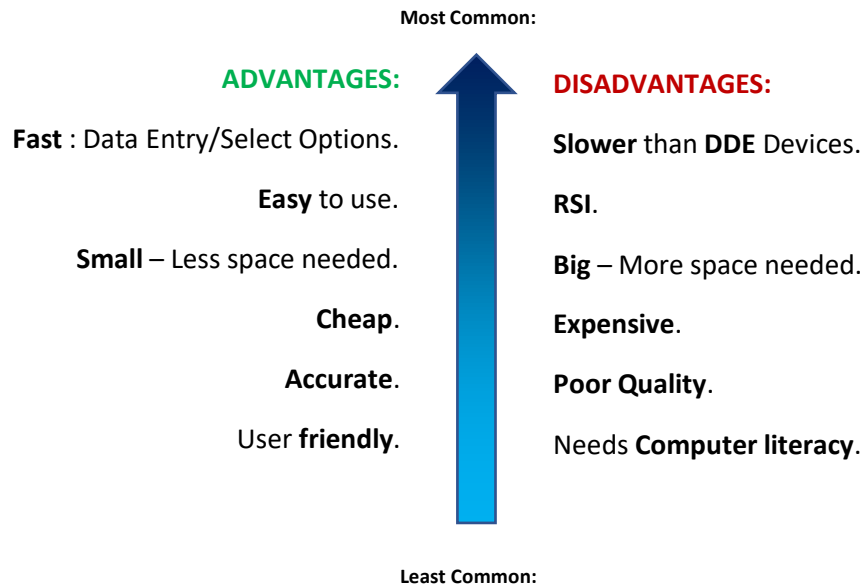


Chapter 2:

Input Devices:

	Advantages:	Disadvantages:
Keyboard:	1. Fast Data Entry . 2. Easy to use. 3.Easy verification checks.	1.Difficult to use for people with RSI . 2. Slower than DDE devices. 3.Takes up desk space.
Concept Keyboard:	1. Fast Data Entry . 2. Easy to use. 3.Waterproof (best in restaurants).	1.Difficult to use for people with RSI . 2.Slower than DDE devices.
Numeric Keyboard:	1. Fast numeric data entry . 2. Easy to use. 3.Portable.	1.Difficult to use for people with RSI . 2.Slower than DDE devices. 3.Limited to Numeric Data.
Mouse:	1. Faster to select options. 2.Small – doesn't take desk space . 3. Portable . 4.Quick Navigation .	1.Difficult to use for people with RSI . 2.Difficult to use on rough surface . 3. Fragile – Easily damaged.
Touch Pad:	1. Faster to select options. 2.Small – doesn't take desk space . 3. Portable . 4.Works on any surface .	1.Difficult to use for people with RSI . 2. Slow Navigation . 3.Cannot do drag and drop tasks.
Tracker Ball:	1. Faster to select options. 2.Small – doesn't take desk space . 3. Portable . 4.Easy for people with RSI .	1. Expensive . 2.Need to be Device Literate .
Digital Cameras:	1. Portable . 2. Fast upload speed. 3. Accurate . 4. Environmentally friendly.	1.Easy to loose/get stolen . 2. Need to know how to upload pics. 3.Pictures often need compression.
Web Cams:	1.No need to charge. 2.Connected at all times.	1.Needs a USB port to connect. 2.Often poor quality .
Joysticks:	1. Realistic controls. 2.Easy Navigation.	1. Difficult to use for people with RSI . 2. Not portable.
Scanners:	1. Accurate . 2.Scans can be converted to any file type .	1.Big - Takes up desk space . 2. Slow . 3.Not portable. 4.Needs accurate positioning .
Microphones:	1.Enhances voice quality . 2. Can use it for dictating texts rather than typing.	1.Voice can echo . 2.Cannot detect different dialects of languages.

Input Devices ADV – DIADV Series:



	Advantages:	Disadvantages:
Sensors:	1. Accurate readings taken. 2. Continious readings taken. 3. Cost saving – no need people .	1. Job loss . 2. Expensive maintenance .
Role Of Microprocessor in Robots:	1. Data form the sensors are compared to pre – set values . 2. The Pre-set value is set to show (_____) (Depends on Question & Sensor). 3. If the Values are Same or Lower: It Signals the actuator (What happens _____). 4. If the Values are Higher: (What happens _____). 5. The process keeps continuing .	

Type of Sensor:	Function:
Temperature:	Do detect temperature – room temp, outside temp, etc.
Pressure:	Used to in washing machines, robots, etc.
Light:	Used in streetlight control, Solar lights, etc.
Sound:	Used in burglar alarm systems, fire alarms etc.
Humidity:	Used to detect level of humidity.
pH:	Used to detect pH level, soils, greenhouses, etc.
Proximity:	Sensor to detect movement. Used in Auto – Cars.
Motion:	Functions when motion is detected. Example light automatically opens when a motion is detected.
Infra – Red:	Emits and detects IR radiation in order to find out certain objects/obstacles in its range.
CO2:	Detects levels of air pollution in the air.

Output Devices:

Monitors:	Advantages:	Disadvantages:
CRT:	1. Curved screen gives better angle for viewing . 2. Cheap . 3. Usable with light pens .	1. Extreme Heat Generation . 2. Extreme Power Consumption . 3. Gives headaches and eyestrains. 4. Needs a lot of desk space.
TFT:	1. Lightweight . 2. Less Power Consumption . 3. Less desk space needed.	1. Poor angle of viewing . 2. Expensive . 3. Generates heat .
LCD & LED:	1. Good display quality. 2. Low power consumption . 3. Less heat generation . 4. Less desk space needed.	1. Expensive . 2. Hard to maintain .
Printers:	Advantages:	Disadvantages:
Ink jet:	1. Good quality printouts. 2. Cheap. 3. Lightweight. 4. Produces Coloured printouts.	1. Slow. 2. Expensive cartridges. 3. Can't do large printing operations.
Laser:	1. Fast printing. 2. Cheap Cartridges. 3. Long lasting cartridges. 4. Can do large printing operations.	1. Expensive coloured laser printers. 2. Heavy. 3. Health and environment hazard.
Dot Matrix:	1. Can produce carbon copies . 2. Cheap maintenance .	1. Very Noisy. 2. Very slow.
3D:	1. Can create customizable items . 2. Mass production reduces material waste. 3. Often material can be used reused .	1. Expensive device. 2. Expensive materials . 3. Can be used for illegal production .
Graph plotters:	1. Extremely high-quality printing. 2. Can produce huge printouts .	1. Expensive price and maintenance. 2. Slow.
Multimedia projectors:	1. Many people can see instead of crowding around at one computer. 2. Saves money . 3. No trailing wires .	1. Expensive. 2. Needs smooth surface for display. 3. Needs distance for large display . 4. Poor quality display.
Speakers:	1. Many people can hear at once. 2. Enhances sound quality.	1. Disturbs people around. 2. Expensive installation & maintenance.
Actuators.	Output Devices ADV – DIADV Series:	

Most Common:

ADVANTAGES:

Cheap: Initial & Maintenance.

Less **power** consumption
Less **heat** generation.

Small – Less space needed/**Portable**.

Fast.

Quality & Silent.

Friendly: User/Environment.

DISADVANTAGES:

Expensive: Initial & Maintenance.

More **power** consumption
More **heat** generation.

Big – More space needed/**Not Portable**.

Slow.

Poor Quality & Noisy.

Needs **Literacy/Not environmentally friendly**.

DDE (Direct Data Entry):

Magnetic Stripe Readers:

Least Common:

Steps:

1. User **looks for** magnetic card reader.
2. User then **swipes the card**.
3. **Terminal display will indicate** whether card has been read.

Advantages:

1. **Fast Data entry.**
2. **Secure.**
3. **Robust.**
4. Error free.

Disadvantages:

1. If magnetic stripe is **damaged, data is lost.**
2. **Doesn't work at a distance.**
3. Effected by **magnetic fields.**



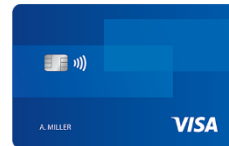
Information stored in Magnetic Stripe:

1. Account Number.
2. Sort Code.
3. Expiry Date.
4. Issue Date.

Contactless Card Readers:

Steps:

1. User **looks for** contactless card reader.
2. *Shopkeeper enters payment amount.*
3. User brings the card *near reader*.
4. Reader *picks up signal* and extracts data.
5. **Terminal display will indicate** whether card has been read.



Advantages:

1. **Fast Data entry/Transactions.**
2. **Secure.** (*Uses high level encryption and has an encrypted unique number*).
3. **Robust.**

Disadvantages:

1. **Expensive.**
2. **Limited Transaction Amount.** (*e.g.: up to \$25*).

Chip and PIN Readers:



Steps:

1. User **looks out for** Chip and Pin reader.
2. User **inserts card** into the reader slot.
3. User **enters PIN** using keypad.
4. Reader **deducts the payment amount.**
5. **Screen indicates** card has been read.
6. A **receipt** is produced after card is taken out.

Advantages:

1. **Faster** *than paying manual cash.*
2. **Secure.** (*Uses unique PIN*).
3. **Robust.**

Disadvantages:

1. Doesn't work at a **distance**.
2. **Slower** *than contactless cards.*
3. **PIN can be read** by people around.

MICR (Magnetic Ink Character Recognition):

Steps:

1. Cheque is scanned using MICR.
2. Each character produces a unique signal.
3. The signals are read by the MICR.

Advantages:

1. Secure.
2. Readable characters.
3. No manual input, reduced errors.

Cheque Clearance:

1. Cheque is scanned using MICR.
2. **Signature** gets checked.
3. **Date** on the cheque is checked.
4. Amount of **money** is checked.
5. **User** is checked.

Disadvantages:

1. Expensive.
2. Effected by magnetic fields.



Information stored in the Magnetic Ink:

1. Account Number.
2. Cheque Number.
3. Sort code.

RFID (Radio Frequency Identification):

Steps:

1. The chip is **brought near** the RF scanner.
2. The scanner **emits RF waves** to read data from the antenna.
3. The **antenna reads data from the tag**.
4. The **antenna transmit** data to the **scanner**.
5. The **scanner transmits** data to the **computer**.

Advantages:

1. **Fast** Reading rate.
2. **Robust**.
3. Can be read from a **Distance**.
4. **Larger storage** capacity.
5. Can be **updated easily**.

Disadvantages:

1. **Tag collisions**.
2. **Expensive**.
3. **Not secure**. Hack-able.

Barcode Readers:

Steps:

1. The Barcode is **brought near** the scanner.
2. The scanner uses **laser light to read** the code.
3. **Information** in bar code is **transmitted to** the **scanner**.
4. The **scanner transmits information** to **computer**/terminal display.

Advantages:

1. **Fast** Reading Rate.
2. Reliable.
3. Uses a unique number.
4. Cheap.

Disadvantages:

1. **Not Robust**. (Easily Damaged)
2. **Not secure**.
3. **Barcode is fragile**. (If barcode is damaged the reader will not be able to read).

QR code Readers:

Advantages:

1. **Secure.**
2. **More storage capacity** compared to Barcode. Holds up to 7000 digits.
3. **Effective** way of **advertising.**

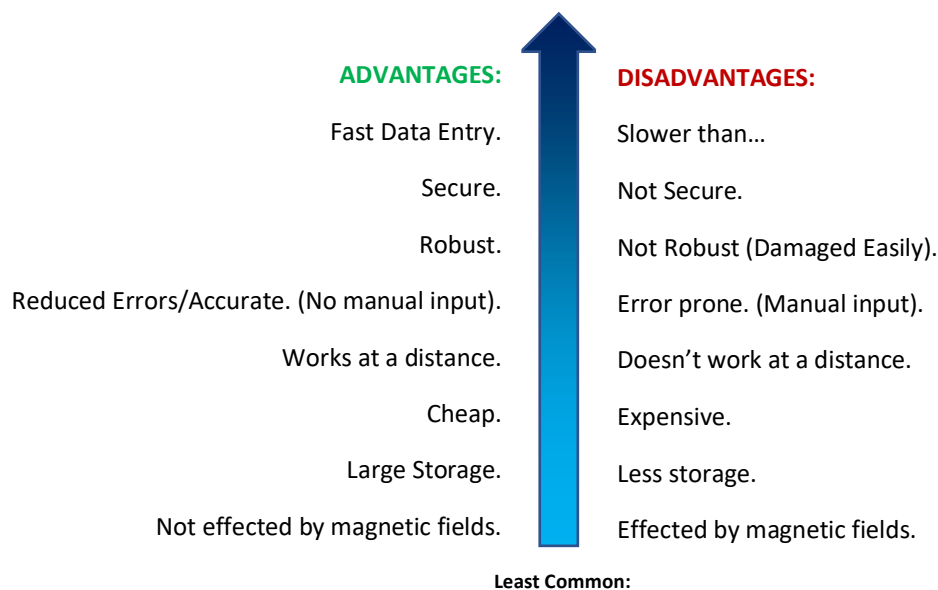
Disadvantages:

1. **Slow.**
2. **Not Robust.** (*Easily Damaged*).
3. **QR code is fragile.** (*If QR code is damaged the QR scanner will not be able to read*).

	Advantages:	Disadvantages:
<u>OMR (Optical mark reader):</u> Reads the positions of marked Lozenges	1. Faster than keying in data. 2. Accurate than keying in data.	1. Forms need to be carefully designed. 2. Prone to errors.
<u>OCR (Optical character reader):</u> Reads characters /writings.	1. Faster than keying in data. 2. Reduced Errors since no manual input.	1. Not Accurate. 2. System has difficulties reading handwritings.

Direct Data Entry Devices ADV – DIADV Series:

Most Common:



Chapter 3:

Serial Access:	Direct Access:
In this method data is accessed step by step until required data is found.	In this method data is accessed randomly and to the point.
Used: Old magnetic tapes, Video Cassettes.	Used: HDD, CD, DVD, Blu Ray.

Magnetic Storage Devices:

	Uses:	Advantages:	Disadvantages:
Fixed/Internal HDD:	1.To store OS's. 2.To store application software's.	1.Fast data transfer rate. 2.Large memory capacities.	1.Not Robust. 2.Have many moving parts. 3.Noisy read/write operations.
Portable HDD:	1.Backup data. 2.Transfer data between computers.	1.Fast data transfer rate. 2. Large memory capacities. 3.Cheap.	1.Not Robust. 2.Effected by magnetic fields.
Magnetic Tapes:	1.Batch processing apps. 2.Large organizations.	1.Fast data transfer rate. 2. Large memory capacities. 3.Cheap. 4.Robust.	1.Effected by magnetic fields. 2.Slow data ACCESS TIME.

Optical Storage Media/Devices:

- **ROM** = Read Only. (Once)
- **R=** Write Only. (Once)
- **RW**= Read & Write. (Multiple times)
- **RAM** = Written Only. (Multiple times)

CD: - **Less Storage** capacity compared to DVD.

DVD: - **Higher Storage** capacity compared to CD.





	Uses:	Advantages:	Disadvantages:
CD ROM :	1.Light storage. 2.Audio files.	1.Cheap. 2.Holds more data than floppy disks.	1.Not Robust. 2.Slow data transfer rate.
DVD ROM :	1.Large storage. 2.Movie files.	1.Cheap. 2.Holds more data than CD ROM. 3.HD Videos.	1.Not Robust. 2.Slow data transfer rate. 3.Needs a sperate DVD player.
DVD RAM :	1.Recording equipment.	1.Holds more data. 2.Robust. 3.Rewritten many times.	1.Expensive. 2.Not compatible with all play back formats.

	Uses:	Advantages:	Disadvantages:
CD R, DVD R:	Backup data.	1. Cheap. 2. Portable.	1. Not compatible with all play back formats. 2. Cannot be reused if has an error.
CD RW, DVD RW:	Record Programs.	1. Can be reused many times. 2. Portable.	1. Expensive. 2. Data can be overwritten.
Blu Ray:	HD Movies. Large Software's.	1. Fast data transfer rate. 2. Large storage capacity.	1. Expensive. 2. Rare.

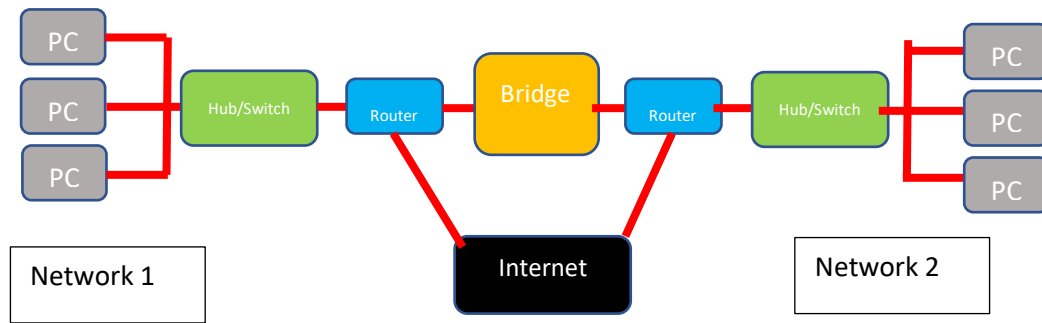
Solid State Storage:

	Advantages:	Disadvantages:
SSD:	1. No Moving Parts. 2. Light weight. 3. Less power consumption. 4. Fast.	1. Expensive. 2. Rare. 3. Less storage.
USB (Memory Sticks):	1. Portable. 2. Robust. 3. Large Storage Capacity. 4. Fast.	1. Easy to lose. 2. Gets damaged if no ejected properly.
Flash Memory Cards:	1. Portable. 2. Robust. 3. Fast.	1. Less storage capacity. 2. Expensive.

Storage Devices Comparison:

Speed:		Storage	
	All Solid-State Storage Devices. Fixed HDD. Portable HDD. Blu – Ray. All CD & DVD's. Magnetic Tape.		Fixed HDD. Portable HDD. Magnetic Tape. USB & Flash memory cards. Blu – Ray. DVD-ROM. DVD – R & RW. DVD-RAM. All CD's.
Portability:		Cost:	
	Flash memory cards. USB. All CD's, DVD's & Blu-Ray. Portable HDD. Magnetic Tape. Fixed HDD/SSD.		Magnetic Tape. Portable & Fixed HDD. Flash Memory Cards. USB. Blu-Ray. DVD – RAM. DVD's. CD's.

Chapter 4:



Transfer of Data from One Network to Another:

1. Starting computer first detects location of designated computer through the router. Router finds IP address that is stored on a routing table.
2. Then data is sent from senders' computer to the **sender's hub/switch**.
3. Sender's hub/switch sends data to the **router**. Then router forwards data to the designated network's router.
4. Router forwards data to the designated **hub/switch**.
5. Hub/switch send data to **designated computer**.

How a Router Forwards Data Packets:

1. Router **reads address on the data packet**.
2. Router **obtains IP Address** of the designated **computer** from **routing table**.
3. Router **checks the internet traffic** on each path.
4. Router uses the **quickest path**.

Network Security:

→ How security can be improved in a wi-fi network?

1. Use a strong password.
2. Use WPA Encryption.
3. Uses a wireless network security software.

→ What is ISP?

1. Internet service provider.
2. Provides Web space.
3. Provides Storage space on cloud.
4. Provides Internet from a Router.

→ What are the advantages and disadvantages of policing the internet?

Advantages:

1. Reduced illegal businesses.
2. Remove Dark web.
3. Reduced cyber bullying/bad words/cyber racism.
4. Copy right laws are reinforced.

Disadvantages:

1. Expensive.
2. Hard.
3. Restricted freedom of speech.

IP Address vs Mac Address:

IP address **gives the location** of a device on the internet.

Mac address **identifies the device** connected to the internet.

IP address of a device **can change**.

Mac address of a device **can't change**.

Wi-Fi vs Bluetooth:

Feature/Comparison:	Bluetooth:	Wi-Fi:
Data Transfer Rate:	25Mbps.	250Mbps – Faster.
Signal Range:	10m.	100m – Further.
Security:	128 bits.	256 Bit – Secure.
Max no. of connected devices:	7.	255 – More Devices.
Power Consumption:	Less – Less Power.	More.
Signal Reliability:	Not interrupted as much – Reliable Signals.	Can be interrupted.
Cost:	Cheaper.	Expensive.

Internet vs Intranet:

Intranet:

1. Restricted **Access**/Limited **users**.
2. Restricted/Limited **Information**.
3. **Private**- Within Organization.
4. **Policed**/Managed.
5. **Has rules**.

Internet:

1. Unlimited **users**.
2. Unlimited **Information**.
3. **Public**- World Wide.
4. **Not Monitored**.
5. **No rules**.

Email vs Fax:

Email:

Advantages:

1. Secure.(Password Protected)
2. No need to print. (Env Friendly)
3. Easier.
4. Faster.

Disadvantages:

1. Needs Internet.
2. Needs Device.
3. Can be modified and copied easily over the internet.

Fax:

Advantages:

1. No need Internet.
2. Signatures are legally accepted.
3. Can't be modified or copied as its not connected to internet.

Disadvantages:

1. Slow. (Sometimes telephone line gets busy)
2. Poor Quality.
3. Not secure. (Confidential info can be read by person behind)
4. Need to be literate to use Fax.
5. Not Env Friendly. (Needs paper)

Key Terms:

Blog:

1. Website/Webpage.
2. Editable by owner only.
3. Written informally.

Wiki:

1. Website or database.
2. Editable by everybody.

VOIP:

1. Voice Over Internet Protocol.
2. Communication method through online telephone calls.

Chapter 5:





Part Time:	Hired for less time than a normal employee.
Job Sharing:	Doing the same job at different times.
Flexible Time:	Work full hours at any time they want.
Compressed Hours:	Working full hours in a shorter duration.

Micro processing Devices:

Advantages:	Disadvantages:
1. More leisure/free time. 2. Easier. No need to do manual tasks. 3. Faster. 4. Safer.	1. Laziness. 2. Expensive. 3. Loss of skill. 4. Fatigue.

Role Of Microprocessor in Robots:	1. Data from the sensors are compared to pre – set values . 2. The Pre-set value is set to show (_____) (<i>Depends on Question & Sensor</i>). 3. If the Values are Same or Lower: It Signals the actuator (<i>What happens</i> _____). 4. If the Values are Higher: (<i>What happens</i> _____). 5. The process keeps continuing .
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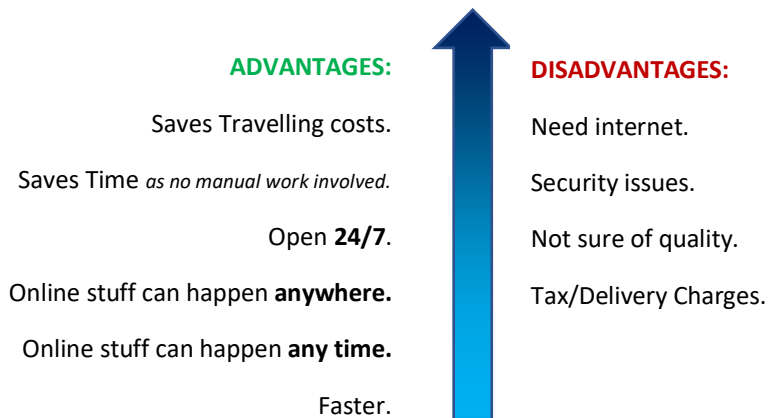
ICT Problems & Solutions:

Image:	Problem:	Solution:
	Trailing Wires	Organize Cables. Use wireless technology. Use Cable Ducts:
	Electrocution	No liquids near computers. Use an RCB. Check equipment regularly.
	Fire by Socket Overload	Use RCB. Use One Plug Per Socket.
	Fire by Overheating	Keep a CO2 Extinguisher. Use keyboard covers. Use Fans.
	RSI	Use Ergonomic Keyboard & mouse. Use Hand Rest.
	Back & Neck Problems	Use Adjustable Chairs. Use Back Rests.
	Eyestrain & Headaches	Use Antiglare Screens. Take Regular Breaks. Ensure Correct Lightings.

Chapter 6:

Online Systems vs Manual: (Online Banking, Booking, Shopping, etc.)

➔ ADV & DI-ADV Series:



Effect of online facilities on companies:

- Reduced wage bills. (No need staff).
- Internet is global so customers can increase quickly.
- Costs apply to maintain online services.
- Decreased street robberies.

Expert Systems:

➔ How to set up an expert system?

1. Experts are **interviewed**.
2. **Knowledge base** is designed.
3. **Rule base** is designed.
4. **Explanation form/system** is designed.
5. Expert system is **tested**.

➔ Using an Expert System (Basic Steps):

1. An interactive user interface is used.
2. User interface asks questions.
3. User answers questions.
4. The **inference engine** compares answers to questions with the facts stored in the **knowledge base** using the **rules base**.
5. The system suggests possible solutions.

Robots:

Advantages:

1. Accurate/consistent.
2. Can work in hazardous conditions.
3. Work 24/7.
4. Reduced Wage bills.

Disadvantages:

1. Expensive Initial cost.
2. Expensive Maintenance cost.
3. Loss of job for labor.

Measurement Applications:

Steps of how Sensors Take Readings in Measurement Applications:

1. Sensor takes readings.
2. Data collected (in analogue form) from sensor is converted to digital form using ADC.
3. Digital Data is sent to microprocessor.
4. Microprocessor compares data with pre-set values and simply reviews is.

Microprocessors and computers only understand digital data.

Measurement application Uses:

1. Weather Stations.
2. Measuring Patients vital signs.
3. Measuring pollution in rivers.

Advantages:

1. Accurate readings.
2. Reduced wage bills.(less staff)
3. Faster response time.
4. Operates 24/7.

Disadvantages:

1. Expensive Initial cost.
2. Expensive Maintenance cost.
3. Unable to respond to unusual situations.

Control Applications:

Steps of how Sensors Take Readings in Measurement Applications:

1. Sensor takes readings.
2. Data collected (in analogue form) from sensor is converted to digital form using ADC.
3. Digital Data is sent to microprocessor.
4. Microprocessor compares data with pre-set values.
5. **Microprocessor checks weather it is in given parameters... if not, computer will signal actuators to do the necessary.**

Control application Uses:

1. Automatic washing machines & ovens/cookers.
2. Central heating systems.
3. Chemical plants.
4. Glasshouse environment.

Measurement applications do nothing while control applications act.

Advantages:

1. Accurate readings.
2. Reduced wage bills.(less staff)
3. Faster response time.
4. Operates 24/7.

Disadvantages:

1. Expensive Initial cost.
2. Expensive Maintenance cost.
3. Unable to respond to unusual situations.
4. Loss of job for labor.

Banking Applications:

Steps for Cash Width drawl:	Behind The Scenes:
Card is first inserted, and PIN is entered.	Computer is contacted and PIN is checked.
Many Options Appear – Customer chooses cash width drawl, and many cash amount options are shown.	
Customer chooses amount of money.	Card and account are checked (Expiry date, weather reported stolen and amount of cash available)
With drawl is proceeded and asked for receipt.	
Card returned, money and receipt given.	Account is updates.

Traffic light simulation:

How it works using sensors:

1. Sensors in the roads gather data and count the number of vehicles at the junction.
2. Data is converted to digital for using ADC.
3. Data is then sent to a computer.
4. Data is then compared to pre-set values.
5. The computer decides what action need to be taken.
6. Actuators are signaled accordingly.

Computers in Medicine:

Use of 3D printers in medicine:

1. Surgical and Diagnostic Aids.
2. Prosthetics.
3. Tissue Engineering.
4. Design of medical tools and equipment.

How a 3D printer can create a prosthetic hand:

1. Hand is scanned by CT, MRI Scanner or X-ray.
2. The digital copy of the hand is loaded into the software.
3. Software divides digital copy into 100 layers.
4. 3D printer prints layer by layer using Plastic/Resin.

Computerised Timetabling Systems:

Advantages:

1. Less error prone.
2. Quicker to find clashes.
3. Quicker to find needed data.
4. Quicker to make changes.

Computers in Libraries:

Computer Processing involved when a book is borrowed:

1. Barcode on the book is first scanned & book details are found in the book file.
2. System then calculates return date for book.
3. Then the barcode on the borrowers ID Card is scanned. (Sometimes Biometric information also).
4. Return date for book is saved in the borrower's file.

Computer Processing involved when a book is returned:

1. The books accession number is checked.
2. Borrowers ID is checked.
3. Computer verifies return date.

Computers in Retail Industries:

How barcodes are used to automatically control stock in supermarkets:

1. customer looks out for EPOS terminal.
2. Cashier scans the barcodes on all items.
3. The barcode then gets searched for in the stock file record.
4. Once the barcode has been found and read, the price and description are sent to the EPOS.



If the number in stock of the item is less than the minimum value, the computer automatically orders a batch of that item from suppliers.

5. Process continues until the customer's basket is empty.
6. An itemised bill is then produced showing the item description with prices.

ANPR (Automatic Number Plate Recognition):

How ANPR systems are used in car parks:

1. Proximity sensor detects vehicle and signals the microprocessor which then signals the actuator (camera) to take a picture of the front of the vehicle.
2. An algorithm is then used to isolate the number plate from the image. (The algorithm involves cropping, enhancing renders (brightness, color, contrast) and segmentation of each number).

3. The car park barrier is then raised, and a ticket is given.
4. At time of leaving the car park, the ANPR system again reads the number plate and checks whether it matches the one stored in the database.

Call Monitoring:

Types of Call Monitoring:

1. **Monitor:** This allows the manager/boss to listen to discussion between the employee and customer. (In this case the call is muted so neither of them will be able to know of their presence)
2. **Whisper:** This allows the boss to help the employee speak (Only employee can hear the voice).
3. **Barge:** This allows both the employee and customer to be heard by the boss/manager.

Satellite Systems:

GPS (Global Positioning Satellite):

→ How does satellite navigation system work?

1. Destination is input by driver.
2. 3 to 4 satellites detect exact location of vehicle and destination.
3. Algorithm calculates quickest route and considers traffic.
4. GPS determines shortest distance.

Advantages:

1. Safer (System warns driver about speeding cameras & street closures)
2. System can estimate arrival time.
3. System can tell fastest route.

Disadvantages:

1. If the maps are not updated, they can give incorrect information.
2. Loss of satellite signals can cause problems.

GIS (Geographic Information System):

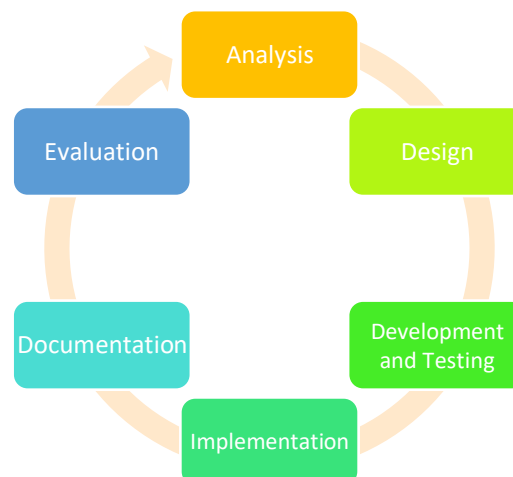
→ How GIS can be used:

1. It can be used with GPS.
2. It can layer a map with other data.
3. It can combine maps, graphics, and databases.
4. It allows users to create interactive queries.

→ Where GIS is used:

1. Protection of animal life in certain areas.
2. Teachers use it in geography, engineering, or science lessons.
3. Prospecting minerals.
4. To map landmarks.

Chapter 7:

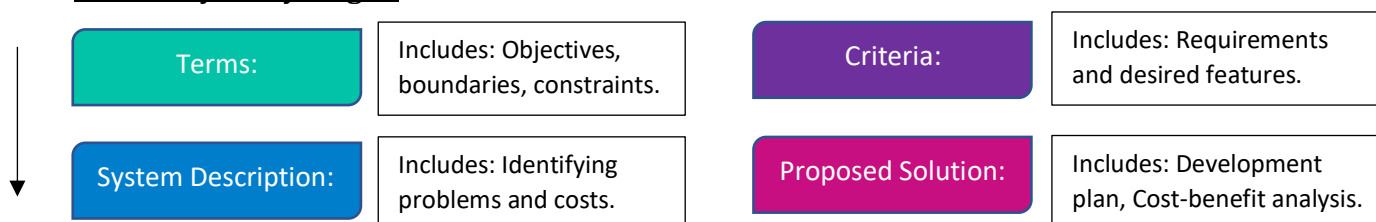


Analysis:

Basic Steps in Analysis stage:

1. **Research/collect data** from the existing system.
2. **Describing** the existing system.
3. **Identify the problems** with the current system.
4. **Agree** on the **objectives** with the client.
5. **Agree** to client's **requirements**.
6. **Interpret** requirements.
7. **Produce** a cost-benefit analysis.
8. **Identify** suitable hardware and software.
9. **Produce** a data flow diagram (DFD).

Feasibility Study Stages:



Methods of Research:

Method:	Advantages:	Disadvantages:
Observation:	1. Cheap. 2. Reliable.	1. People may feel uncomfortable and may act in a different way.
Questionnaires:	1. Cheap. 2. Quick. 3. Quick analysis.	1. Returned questionnaires are often low. 2. Can't clarify doubts. 3. Can't express yourself as much as you are limited to options in MCQ's.
Interviews:	1. Honest opinions. 2. Opportunities to express your answers. 3. Easier to extend and modify questions.	1. Slow. 2. Expensive. 3. Employee can't stay anonymous.
Looking at existing paperwork.	1. Can obtain all sorts of information. 2. Analyst gains a better idea of the system.	1. Slow. 2. Expensive.

Design:


Design Stage Tasks:

1. Design Data Capture Forms. (DFD)
2. Design **screen layouts**.
3. Design **Outputs** in the form of reports or screen displays.
4. Produce a Data Flow Chart or **pseudo code**.
5. Design **validation rules**.
6. Design and agree on **file structures**.
7. Design and produce **necessary algorithms**.
8. Design a **testing strategy/plan**.

Data Capture Forms:

Paper Based Forms:	Computer Based Forms:
Includes: Title, Text Boxes (Limiting Answers), Character Boxes, Tick Boxes (MCQ's), Readable font.	Includes: Text Boxes, on screen Help, drop down menus (MCQ's), control buttons (i.e., Save, next), auto validation, double data entry.


Verification:

 Verification is a way of preventing errors when data is copied from one medium to another.

2 Verification Methods:

1. Double Data Entry.
2. Visual Check.

Validation:

 Validation is a process where data is checked to see if it satisfies certain criteria's.

<i>Validation Check:</i>	<i>For what:</i>
Range Check:	Check weather data is in given range, e.g.: <10
Look – up Check:	Checks weather data entered, exists in a table.
Length Check:	Checks weather data has required number of characters, e.g., 3 no. and 2 words.
Type Check:	Check weather data contains valid characters.
Format Check:	Checks weather data is in correct format. E.g., Text, Numeric
Check Digit:	Checks numerical data validity.
Presence Check:	Checks weather data present hasn't been missed out.
Consistency Check:	Checks weather data relates to the field.

File Structures:

File Structures Take the Following into Account:

1. Field Length.
2. Field Name.
3. Data Type.

Development and Testing:

Development Stage Tasks:

1. File Structures are finalized and tested.
2. Validation & verification methods are used and tested.
3. How the hardware will function with the final system. Hardware is tested.

Testing strategies:

1. **Normal:** Reasonable data (E.g., Between 1 – 20 : If result is 2-19)
2. **Extreme:** Data at the boundaries (E.g., Between 1-20: If result is 1 or 20)
3. **Abnormal:** Data outside limits or wrong type of data. (If text is entered instead of numbers)
4. **Live:** Data with known outcomes.

Implementation:

Implementation Stage Tasks:

1. Staff is trained on the new system.
2. Files are transferred to new system. (By scanning, keying & downloading information).
3. Changeover to new system. (Direct, Parallel running, Pilot running, Phased implementation).

Changeover Methods:

<i>Method:</i>	<i>Advantages:</i>	<i>Disadvantages:</i>
Direct: New system is introduced immediately.	1. Cheap. 2. Quick Benefits.	1. If system fails, the whole method would be useless as old system is no longer available. 2. Staff have to work hard to learn new system.
Parallel: The old and new system run side by side until the new one takes over.	1. If new system fails, old system is still available for backup. 2. Staff can get gradual training.	1. Expensive. 2. Time consuming.
Pilot: New system is introduced to one area for trial and assessed before it gets introduced everywhere.	1. If new system fails, only part is affected, old system remains in other areas. 2. Cheap. 3. Possible to train staff in one area only (Cheaper, Quicker).	1. Time consuming.
Phased: New system is introduced in parts until the old system is fully replaced.	1. If latest part fails, you only have to go back to point of failure, remaining parts are unaffected.	1. Expensive. 2. Time consuming.

Documentation:

<i>User Documentation:</i>	<i>Technical Documentation:</i>
Helps users to learn how to use the system. Includes: <ol style="list-style-type: none">1. How to run the software.2. How to save files.3. How to search.4. How to print.5. Purpose of the system.6. Tutorials.	Helps analysts to maintain/improve the system. Includes: <ol style="list-style-type: none">1. Program codes.2. Program language.3. Program algorithms.4. System flowcharts.5. Purpose of the system.6. Requirements. (Hardware/Software/memory)

Evaluation:

Evaluation Stage Tasks:

1. Compare the final solution with original task.
2. Identify any limitation.
3. Identify necessary improvements.
4. Compare performance of old and new system.
5. Evaluate user's responses of new system.

Chapter 8:

Phishing:	<i>Fraudulent practice of sending emails.</i>
Smishing:	<i>Fraudulent practice of sending text messages.</i>
Vishing:	<i>Fraudulent practice of making phone calls.</i>
Pharming:	<i>Fraudulent practice of directing users to fake websites.</i>

Internet Safety:

E-Safety:

➔ E-Safety refers to the safety when using the internet & how to keep personal data safe.

➔ **Personal Data:**

- Name.
- Address.
- DOB.
- Medical History.
- Bank details.

➔ **Sensitive Data:**

- Ethnic Origin.
- Nationality.
- Gender.
- Religion.
- Political Views.

Online Safety Rules:

1. Don't Give out **Personal Information.**
2. Don't Give out **Personal Photos.**
3. Maintain your **Privacy Settings.**
4. Visit (i.e., https) **Trusted Websites.**
5. Only open **Known Emails.**
6. You should **know how to block and report.**
7. Always use **Appropriate Languages.**

Gaming safety Rules:

1. Don't get **addicted to games.**
2. Don't play **violent games.**
3. Don't **Cyber Bully.**
4. Don't **Open your Camera.**
5. Use **Voice Masking Software.**

Security of Data:

Hacking:

What:

Gaining **unauthorized access** to a computer system.

Prevention:

1. Use **firewall.**
2. Use **strong passwords.**

Viruses:

What:

A **program code** that can **replicate itself** and **corrupt files.**

Prevention:

1. Use **Antivirus software.**
2. Always open known things.

Spam:

What:

Junk Email sent out to recipients by **spammers** to **obtain their personal details** and credentials.

Prevention:

1. Use **Junk Email Filter**.
2. Use **Spam Filter**.
3. Don't open unknown things.

Cookies:

Small files or codes that are stored on a user's computer.

Security Techniques:

Firewalls:

What:

A software (part of OS) or hardware (Gateway) that filters information coming in and out.

Tasks:

1. Examines Internet Traffic.
2. Filters Information.
3. Blocks Hackers from gaining access.
4. Blocks Unknown websites.

Security Protocols:

- > Sets of rules used by the computers to communicate with each other across a network.
 - **SSL** (Secure Sockets Layer): It is a **type of protocol** that allows **data** to be **sent** and **received securely** over the internet.
 - **TLS** (Transport Layer Security): It is a **type of recent protocol** that allows **data to be sent and received securely** between devices and users **while communicating** over the internet.
 - **TLS is formed in two layers:**
 - Record Protocol: Contains data being transferred over the internet.
 - Handshake Protocol: Secure session between user and website.

<i>Differences Between TLS & SSL</i>
<ol style="list-style-type: none">1. TLS can be extended.2. TLS uses session caching.3. TLS can separate Record Protocol and Handshake Protocol.

Encryption:

What:

1. Scrambling of data.
2. Has an encryption key.
3. Decryption key is needed.
4. Language can't be read by humans.

Usage:

1. Secures Data Transfer.
2. Protects sensitive and personal data.

Authentication:

1. **Passwords:** A readable scrambled code for the user to use to access his personal things.
2. **Digital Certificates:** They are a pair of files stored on a computer. Used for secure transfer of data over the internet. Each file is divided into (Public Key) & (Private Key).
3. **Biometrics:** An authentication Method which relies on unique human features.

Moderated and Unmoderated Forms:

	Online Discussion	Internet	Monitored	Prevent Spam	Filter Posts
Moderated:	✓	✗	✓	✓	✓
Unmoderated:	✓	✓	✗	✗	✗

Chapter 9:

Factors for Audience Appreciation:

Factors:

1. Age
2. Gender
3. Experiences
4. Job Profession
5. Expectation

Research Methods:

1. Interviews.
2. Questionnaires.
3. Surveys.
4. Market Research.

Software Copyright and Privacy:

Software Piracy:

What:

1. Illegal copying of software's.
2. Illegally downloading software's.
3. Illegally selling software's.

Prevention:

1. Keep **Product Key** safe.
2. Keep **Hologram** safe.
3. Use a **Dongle**.
4. Use **CD-ROM** or **DVD-ROM**.

Implications:

1. Legal
2. Morality
3. Ethics
4. Culture:

Chapter 10:

Netiquettes:

1. Don't Spam.
2. Don't plagiarize.
3. Don't be abusive.
4. Don't use Capital Letters.
5. Use correct spellings and grammar.

Internet vs World Wide Web:

The Internet: Allows users to:

1. Send & Receive Emails.
2. Chat online.
3. Transfer files.
4. Browse the world wide web.

The World Wide Web:

1. Accessed by a web browser.
2. Consists of many web pages.
3. Has been created based on http. (Hypertext Transfer Protocol).

General Internet Terms:

Protocols:

- **Http** (Hyper-Text Transfer Protocol): is a set of rules followed when transferring data across the internet that are agreed by the sender and receiver.
- **Https** (Hyper-Text Transfer Protocol *Secure*): is a set of rules followed when transferring data across the internet that are agreed by the sender and receiver. *This is when encryption, SSL or TLS is used, takes more time than http.*
- **Ftp** (File Transfer Protocol): Is a network protocol used when transferring files from one computer to another.
- **Smtp** (Simple Mail Transfer Protocol): Protocol used when transferring Emails.

Web Browsers and URLs:

Web Browser is a software that allows user to display web pages on their computer screen.

Features:

1. Have a home page.
2. Have hyperlinks (allow navigation)
3. Have search history.
4. Have ability to choose favorite web pages.
5. Have undo and redo options.

URL (Uniform Resource Locator) is a link that gives the address of a webpage.

Basic Format of an URL:

Protocol://Website Address/Path/File Name

Information on the Internet:

Advantages:

1. Most information is up to date.
2. Limitless amounts available.
3. Searching is Fast and Easy.
4. No need to go to a library for a book.
5. Have videos, animations, make learning fun.

Disadvantages:

1. Information may be wrong.
2. Filled with inappropriate advertisements.
3. Easy to get distracted (Games).
4. Information Overload.
5. Huge risk of plagiarism.
6. Research skills from books are lost.

Reliability:

1. Observe final part of the URL.
2. Too many ads are unreliable.
3. Check website if it has links to other unreliable websites.
4. Check date of last update.
5. Check if elders recommend the website.
6. Check author credentials.

Cloud Storage:

Public Cloud: This is a storage environment in where the customer/client and provider are different companies.

Private Cloud: This is a storage environment in where the customer/client and provider operate as a single entity behind a firewall.

Hybrid Cloud: Combination of public and private cloud where some data is in public and some in private cloud.

Advantages:

1. Accessed anytime.
2. Accessed anywhere.
3. Accessed from any device.
4. Provides almost unlimited storage.

Disadvantages:

1. Unsecure.
2. Need internet to access.
3. Costly if more storage is needed.
4. Risk of losing all backup data.

Blogs, Wikis, Social Networking Sites:

Features of Blog:

1. Public, readable by anyone.
2. Not editable.
3. Entries only come from a single author.
4. It is a website/webpage.

Features of Wiki:

1. Public, readable by anyone.
2. Editable by anyone.
3. Entries come from many authors.
4. It is a website/webpage.

Features of Social Networking Sites:

1. Public, readable by anyone.
2. Everyone has their own web space/profile.
3. Possible to invite people to become friends.
4. Free Instant messaging.
5. You can control who visits your web space/comment.
6. It is a website/webpage/application.

Chapter 11:

Generic File Type: It is an accessible file format that allows your file to be opened on any platform.

Common Generic:

Image Files:

JPG: Joint Photographic Expert Group. *(Uses lossy compression)*

PNG: Portable Network Graphics. *(Uses lossless compression)*

GIF: Graphics Interchange Format. *(Limited to 256 colors)*

PDF: Portable Document Format.

MP4: Moving Picture Experts Group Layer 4.

Text Files:

CSV: Comma Separated Value.

TXT: Text File Extension.

RTF: Rich Text Format.

Compressed Files:

RAR: Roshal Archive.

ZIP: Zone Improvement Plan.

Audio Files:

MP3: Moving Picture Experts Group Layer 3.

Web Authoring Files:

CSS: Cascading Stylesheet.

HTML: Hyper Text Markup Language.

Chapter 15:

Validation Check:	For what:
Range Check:	Check weather data is in given range, e.g.: <10
Look – up Check:	Checks weather data entered, exists in a table.
Length Check:	Checks weather data has required number of characters, e.g., 3 no. and 2 words.
Character Check:	Check weather data contains valid characters.
Format Check:	Checks weather data is in correct format. E.g., Text, Numeric
Check Digit:	Checks numerical data validity.
Presence Check:	Checks weather data present hasn't been missed out.
Consistency Check:	Checks weather data relates to the field.

Chapter 18:

Flat-File Databases: A database that stores its data in one table organized in columns (fields) and rows (records).

Advantages:

1. Less time needed to set up.
2. Easier to make.
3. Cheap.

Disadvantages:

1. Takes up storage.
2. Inconsistent.

Relational Databases: A database that stores its data in more than one linked table. They are designed so that data is not stored many times.

Advantages:

1. Less storage Needed.
2. Better Security.
3. Consistency.

Disadvantages:

1. Takes Time to Set up.
2. Costly.

Query Searches:

1. If you want 2 or more values: **"ABC" Or "DEF"**
2. If you don't want to include: **Not "ABC"**
3. If it Includes ABC in its name: ***ABC***
4. Ranges:
 - Below: **<123**
 - Above: **>123**
 - And Below: **<=123**
 - And Above: **>=123**

Creating a New Field: (Basic Format)

New Name: [Existing Field name] **- or + or * or /** [Existing Field name]

Chapter 20:

Absolute referencing: **\$A\$12** (Before each value)

Basic Formulas	
+	Addition
-	Subtraction
*	Multiplication
/	Division
^	To the Power

Complex Formulas and Functions	
=SUM	Adds 2 or more numbers together.
=AVERAGE	Finds the average/mean.
=MAX	Finds the highest Value.
=MIN	Finds the lowest Value.
=INT	Rounds the number to nearest whole.
=ROUND	Round the number to whatever value.
=COUNT	Counts the number of numeric values.
=COUNTA	Counts the number of numeric & text values.
=COUNTIF	Counts the number of given condition.
=IF	To display something for a condition.

Nested Formulas and Functions	
=SUMIF	<p>Adds all values of a condition.</p> <p>Example: Add all the years of experiences for programmers only. <i>(There are a number of engineers, doctors, directors, programmers. All with their own experiences)</i></p>

Lookups	
=LOOKUP	Looks up a value from somewhere. (useless)
=HLOOKUP	Looks up a value from a horizontal table.
=VLOOKUP	Looks up a value from a vertical table.

Chapter 21:

Presentation Layer:

-Formatting Webpages or individual element. **Found in CSS.** *(Where coding is used, behind the scenes)*

- Tags/DIV tags.
- Text (using */ "")
- Table formatting.

Content Layer:

-To enter content. **Found in HTML.** *(Actual Page where info will be displayed)*

- Texts.
- Images/Videos.
- Audio.
- Hyperlinks.

Behaviour Layer:

-To enter **scripting language.**

- Image effects.
- Pop ups.

Commands:	
Name:	Tags Used:
Comment:	<i>Starts with: <!-- Ends with: --></i>
Heading:	<head> </head>
Title:	<Title> </Title>
Body:	<Body> </Body>
Paragraph Style:	<p> </p>
Heading Styles: (6)	<h1> </h1> All the way to <h6> </h6>
Bold:	
Italic:	<i> </i>
Superscript:	
Subscript:	
Lists:	
Bulleted Lists:	
Caption:	<caption> </caption>
Table:	<table> </table>
Table Row:	<tr> </tr>
Table Data in a row:	<td> </td>
Header in a Table:	<thead> </thead>
Body in a Table:	<tbody> </tbody>
Footer in a Table:	<tfoot> </tfoot>
Insert Video File:	<video> </video>
Insert Audio File:	<audio> </audio>
Source:	<source src= "" type="">