ITS

NOTES BY

ASSAM POLY HUB

FOLLOW ON INSTAGRAM

@ASSAMPOLYHUB

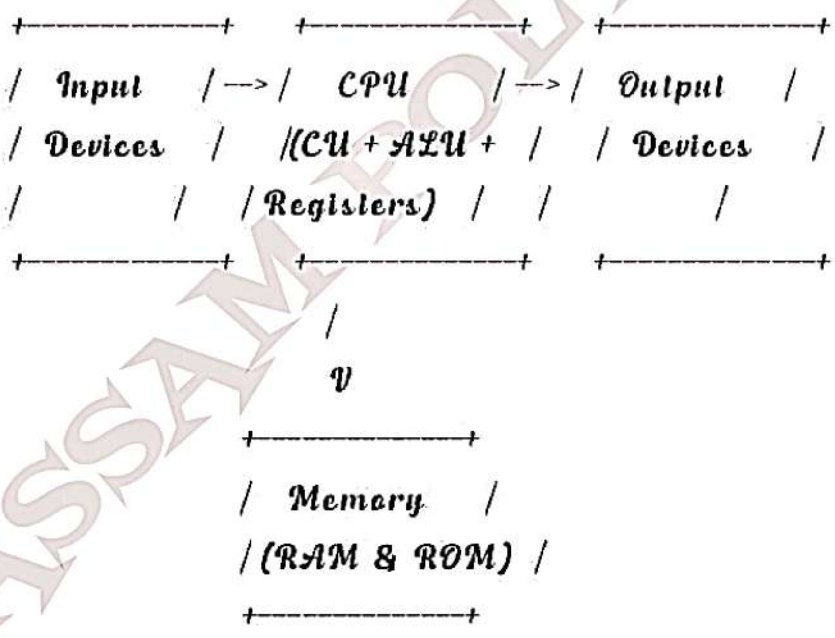
1. Definition of Computer System

A Computer System is a combination of hardware and software components that work together to perform data processing tasks. It takes input, processes it, stores it, and produces output.

---

2. Block Diagram of Computer System

Copy code



🧩 3. Components of Computer System

A. Hardware

Physical parts of a computer system.

i. Central Processing Unit (CPU)

- **Control Unit (CU):** *Directs operations.*
- **Arithmetic Logic Unit (ALU):** *Performs calculations and logic operations.*
- **Registers:** *Small storage units inside CPU for fast data access.*

ii. Memory

- **Primary Memory:**
  - **RAM (Random Access Memory):** *Temporary, volatile.*
  - **ROM (Read Only Memory):** *Permanent, non-volatile.*

- **Secondary Memory:**
  - **HDD (Hard Disk Drive):** *Magnetic, large capacity.*
  - **SSD (Solid State Drive):** *Faster, no moving parts.*

iii. Input Devices

Used to enter data.

- **Keyboard**
- **Mouse**
- **Scanner**
- **Microphone**

iv. Output Devices

Used to show results.

- **Monitor (Display Unit):**
  - **CRT**
  - **LCD/LED**
- **Printers**
- **Speakers**

v. Peripheral Devices

Additional devices connected to enhance functionality.

- External drives
- Webcams
- Joysticks
- USB devices

💾 4. Software

Programs that run on hardware and perform specific tasks.

A. Types of Software

i. System Software

- Manages and controls hardware.
- Examples: Operating System, Device Drivers.

ii. Application Software

- User-oriented software.
- Examples: MS Word, Excel, VLC Media Player.

iii. Utility Software

- Maintains and optimizes system performance.
- Examples: Antivirus, Disk Cleanup, Backup tools.

💻 5. Overview of Operating System (OS)

A. What is an OS?

An Operating System is a system software that acts as an interface between user and hardware. It manages resources and controls execution of programs.

B. Functions of OS

1. Process Management
2. Memory Management
3. File System Management

4. Device Management

5. User Interface

6. Security & Access Control

 6. Brief History on Evolution of OS

1. **1950s:** No OS, programs executed manually.

2. **1960s:** Batch Processing Systems.

3. **1970s:** Time Sharing & Multi-user OS.

4. **1980s:** Personal Computers & GUI-based OS.

5. **1990s – Present:** Multitasking, real-time, mobile & cloud OS.

🧠 7. Types of Operating Systems

Type	Description
Batch OS	Executes batches of jobs without interaction
Multiprogramming	Multiple programs in memory simultaneously
Multitasking	Run several tasks at once for single user
Real-Time OS	Responds to input instantly, used in critical systems
Time-Sharing	CPU time is divided among users; supports multiple users

8. Operating System Structures

1. **Monolithic Kernel** – All OS services in one large block (e.g. Unix).

2. **Microkernel** – Only essential services in kernel, rest in user space (e.g. QNX).

3. **Layered Structure** – OS is divided into layers for modularity (e.g. THE OS).

4. **Modular OS** – Core kernel with dynamically loadable modules (e.g. Linux).

5. **Client-Server Model** – OS services treated as separate server processes.

🔢 1. Number Systems

A **Number System** is a way to represent numbers using a base (radix). The commonly used number systems in digital electronics and computing are:

A. Decimal Number System (Base-10)

- Digits: 0–9
- Most commonly used by humans
- Each digit's position represents a power of 10

Example: $254 = 2\times10^2 + 5\times10^1 + 4\times10^0$

B. Binary Number System (Base-2)

- Digits: 0 and 1
- Used in digital computers
- Each digit (bit) represents a power of 2

Example: $1011 = 1\times2^3 + 0\times2^2 + 1\times2^1 + 1\times2^0 = 11$ (Decimal)

C. Octal Number System (Base-8)

- Digits: 0–7
- Short representation of binary (each octal digit = 3 binary bits)

Example: 127 (Octal) = $1\times8^2 + 2\times8^1 + 7\times8^0 = 87$ (Decimal)

D. Hexadecimal Number System (Base-16)

- Digits: 0–9 and A–F (A=10, B=11, ..., F=15)
- Compact representation of binary (each hex digit = 4 binary bits)

Example: 2F (Hex) = $2\times16^1 + 15\times16^0 = 47$ (Decimal)

🔄 2. Interconversion Between Number Systems

A. Decimal to Binary

- Divide the number by 2
- Write remainders in reverse

Example: 13 → Binary: 1101

B. Binary to Decimal

- Multiply each bit by 2^n and add

Example: 1010 = 1×8 + 0×4 + 1×2 + 0×1 = 10

C. Decimal to Octal

- Divide the number by 8
- Reverse the remainders

Example: 65 → Octal: 101

D. Octal to Decimal

- Mulliply each digil by 8^n and add

Example: 127 = 1×64 + 2×8 + 7 = 87

E. Decimal to Hexadecimal

- Divide the number by 16
- Reverse the remainders

Example: 100 → Hex: 64

F. Hexadecimal to Decimal

- Mulliply each digil by 16^n and add

Example: 2A = 2×16 + 10 = 42

G. Binary to Octal

- Group bits in 3 (from right), convert each group

Example: 101011 → 000 101 011 → 2 3 → Octal: 53

H. Binary to Hexadecimal

- Group bits in 4 (from right), convert each group

Example: 111101 → 0011 1101 → 3D

🔠 3. Types of Codes

A. BCD (Binary Coded Decimal)

- Each decimal digit is stored using 4 bits
- Range: 0000 (0) to 1001 (9)

Example: 59 → BCD = 0101 1001

B. Gray Code

- Only one bit changes between consecutive numbers
- Reduces error in digital communication

Binary to Gray Conversion Rule:

- First bit remains same, rest: previous bit XOR current bit

Example: Binary 1001 → Gray: 1101

C. ASCII (American Standard Code for Information Interchange)

- 7-bit code to represent text
- 128 characters (A=65, a=97, space=32)

Example: 'A' → 1000001

D. EBCDIC (Extended Binary Coded Decimal Interchange Code)

- 8-bit code by IBM
- Supports 256 characters
- Used in mainframes

E. Unicode

- Universal character set
- Supports all world languages
- 8, 16, or 32-bit encoding
- UTF-8 is most common

D. EBCDIC (Extended Binary Coded Decimal Interchange Code)

- 8-bit code by IBM
- Supports 256 characters
- Used in mainframes

E. Unicode

- Universal character set
- Supports all world languages
- 8, 16, or 32-bit encoding
- UTF-8 is most common

F. ISCII (Indian Script Code for Information Interchange)

- Developed in India
- Represents Indian scripts (Devanagari, Bengali, etc.)

🌐 1. Understanding Browser

A web browser is an application software used to access and view websites or web applications.

Popular Browsers:

- Google Chrome
- Mozilla Firefox
- Microsoft Edge
- Safari
- Opera

Functions of a Browser:

- Rendering HTML pages
- Handling cookies and cache
- Managing tabs, bookmarks, and history
- Secure browsing via HTTPS

🧭 2. Types of Browsers

Type	Description	Exam
Text-based	Only display text, no images	Lynx
Graphical	Show text, images, video, etc.	Chro
Mobile	Optimized for phones/tablets	Chro
Proprietary	Made for specific devices/ platforms	Ama

🔍 3. Efficient Use of Search Engines

A search engine helps locate information on the internet.

Popular Search Engines:

- Google
- Bing
- DuckDuckGo
- Yahoo

Tips for Efficient Searching:

- Use quotes: "computer system" for exact match
- Use site: to search within a site: site:wikipedia.org CPU
- Use - to exclude terms: apple -fruit
- Use filetype: to find files: notes filetype:pdf

4. IP Address

An IP Address (Internet Protocol Address) is a unique number assigned to each device on a network.

Types:

- IPv4: e.g., 192.168.0.1 (32-bit)
- IPv6: e.g., 2001:0db8:85a3::8a2e:0370:7334 (128-bit)

🌐 5. HTTP and HTTPS

- **HTTP (HyperText Transfer Protocol):**
  Protocol used to transfer data between web servers and browsers.
- **HTTPS (HTTP Secure):**
  Secure version of HTTP that encrypts data using SSL/TLS.

Key Difference:
HTTP is not secure, while HTTPS is encrypted and secure (padlock icon).

🍪 6. Cookies

- **Cookies** are small files stored on your browser by websites.
- They help in:
  - Remembering login details
  - Personalizing user experience
  - Tracking user activity (for ads, analytics)

🗑️ 7. How to Delete Browser Data

Steps (Example: Google Chrome):

1. Open Chrome
2. Go to **Menu > History > Clear browsing data**
3. Choose:
    - Browsing history
    - Cookies and other site data
    - Cached images and files
4. Click **Clear data**

Shortcut: Ctrl + Shift + Delete

📥 8. Downloads

- Files from the internet can be downloaded using browsers.
- Download managers can speed up and organize downloads.
- Downloads folder is usually the default storage location.

📧 9. Emails

- A method to send digital messages over the internet.
- Requires an email address (e.g., yourname@gmail.com)

Common Email Services:

- Gmail
- Outlook
- Yahoo Mail

Key Features:

- Inbox, Sent, Drafts, Spam
- Attachments
- Labels and filters

🇮🇳 10. Awareness about Digital India Portals

A. National Portals

- **www.india.gov.in** – National Portal of India
- **www.digilocker.gov.in** – For storing official documents
- **www.bharat.gov.in** – Digital India platform
- **www.ekalavyaindia.com** – Digital learning resources

B. State Portals (Example: West Bengal)

- **wb.gov.in** – West Bengal Govt Portal
- **banglarbhumi.gov.in** – Land Records
- **wbregistration.gov.in** – Property registration

🎓 11. College Portals

- Used for student login, fee payments, results, notices, etc.
- Include LMS (Learning Management Systems)
- Example features:
  - Online Attendance
  - Exam Registration
  - Digital Notice Board

🔵 HTML (HyperText Markup Language)

🔹 Introduction

HTML is the standard markup language used to create web pages. It structures content using **tags** and **elements**.

🔹 HTML Tags

- Tags are used to define elements.
- Examples: <html>, <head>, <body>, , <a>, etc.
- Tags usually come in pairs: <tagname>content</tagname>

🔹 HTML Elements

- An HTML element includes the start tag, content, and end tag.
- Example: This is a paragraph.

HTML Text & Formatting

- **Bold:** <b> or
- **Italic:** <i> or
- **Underline:** <u>
- **Preformatted text:** <pre>

HTML Attributes

- Provide additional information about elements.
- Example: <img src="image.jpg" alt="Description">

HTML Fonts (Deprecated in HTML5)

- Old method: Text
- Modern way: Use CSS

HTML Lists

- **Ordered list:** `<ol><li>Item</li></ol>`
- **Unordered list:** `<ul><li>Item</li></ul>`
- **Definition list:** `<dl><dl>Term</dl><dd>Definition</dd></dl>`

HTML Images

- `<img src="url" all="description">`

HTML Links

- **Text links:** `<a href="https://example.com">Visit</a>`
- **Image links:** `<a href="url"><img src="image.jpg"></a>`

HTML Comments

- **Syntax:** `<!-- This is a comment -->`

HTML Tables

Html

Copy code

```
<table>
  <tr><th>Header</th></tr>
  <tr><td>Data</td></tr>
</table>
```

Colors and Background

- **Text color:** style="color:red"
- **Background color:** style="background-color:yellow"
- **HTML Color Codes:** e.g., #FF5733, rgb(255,0,0)

Web Forms

- **Form tag:** <form action="" method="">
- **Text field:** <input type="text">
- **Password:** <input type="password">

- **Hidden field:** `<input type="hidden">`
- **Checkbox:** `<input type="checkbox">`
- **Radio:** `<input type="radio">`
- **Submit:** `<input type="submit">`
- **Reset:** `<input type="reset">`
- **Textarea:** `<textarea></textarea>`
- **Select/Dropdown:**

Html Copy code

```
<select>
  <option value="1">One</option>
</select>
```

- **File Upload:** `<input type="file">`

🔹 Special Tags

- `<body>`: Defines the body of the document
- `<meta>`: Provides metadata (e.g., charset, viewport)
- `<style>`: Used for internal CSS

- : Container for layout and styling
- <frameset>: Used for creating frames (obsolete in HTML5)

🔹 Formatting Tags Summary

- **Bold:** <b>,
- **Paragraphs:** <p>
- **Headings:** <h1> to <h6>
- **Line Break:**

🟢 CSS (Cascading Style Sheets)

🔹 CSS Introduction

CSS is used to style and layout HTML elements (colors, fonts, positioning, etc.)

CSS Syntax

Css

Copy code

```
selector {
  property: value;
}
```

Example:

Css

Copy code

```
p {
  color: blue;
}
```

🔹 CSS Selectors

- **Element Selector:** `p`
- **ID Selector:** `#idname`
- **Class Selector:** `.classname`

🔹 CSS Types

1. **Inline CSS:** `style="color: red;"`
2. **Internal CSS:** Within `<style>` tag in `<head>`
3. **External CSS:** Linked via `<link rel="stylesheet" href="style.css">`

🔹 Styling with CSS

✅ Text

- color, text-align, text-decoration, text-transform

✅ Lists

- list-style-type, list-style-position

✅ Background

- background-color, background-image, background-repeat

✅ Fonts

- font-family, font-size, font-weight

✅ Links

- a:link, a:visited, a:hover, a:active

✅ Tables

- border, padding, text-align, border-collapse

✅ Border & Margin

- border: 1px solid black;
- margin: 10px;

✅ Display

- display: block / inline / inline-block / none

✅ Positioning

- position: static / relative / absolute / fixed / sticky

✅ Aligning Elements

- text-align, vertical-align, margin: auto

📘 OpenOffice Writer (Word Processor)

1. Page Setup

- Found under Format > Page.
- Customize page size, orientation (Portrait/Landscape), margins, borders.

2. Tables

- Insert via Table > Insert > Table or toolbar.
- Set number of rows & columns.
- Features include: merge cells, adjust column width, apply border styles.

3. Insertion of Pictures

- Use Insert > Picture > From File.
- Resize, crop, wrap text around images.
- Picture toolbar gives alignment, transparency, and filters.

4. Page Layout

- Includes margins, columns, headers/footers, and sections.
- Found in Format > Page.

5. Bullets and Numbering

- Access from toolbar or Format > Bullets and Numbering.
- Customize bullet symbols, styles, indentation.

6. Insertion of Objects and Symbols

- Use Insert > Object for charts, OLE objects (like spreadsheets).
- Use Insert > Special Character for symbols like ©, π, etc.

7. Header, Footer, Page Number

- Enable via Insert > Header/Footer > Default.
- Page Numbers: Insert > Fields > Page Number.
- Useful for report and book formatting.

📗 OpenOffice Calc (Spreadsheet)

1. Format Cell Properties

- Right-click a cell → Format Cells.
- Change:
  - Number format (Currency, Date, Percent)
  - Font & font effects
  - Background color
  - Border style
  - Alignment (horizontal/vertical)

2. Formula

- All formulas start with =.
- Examples:
  - =SUM(A1:A10)
  - =AVERAGE(B2:B5)
  - =IF(A1>10, "Yes", "No")
- Use Function Wizard (Insert > Function) to find and insert formulas.

3. Sort and Filters

- **Sort:** Data > Sort. Sort by column (ascending/ descending).
- **Filter:**
  - AutoFilter: Data > Filter > AutoFilter
  - Standard Filter: Custom conditions for filtering data.

4. Charts

- Insert via Insert > Chart.
- Chart types: Column, Line, Pie, Bar, Area, etc.
- Wizard allows selection of data range and chart customization.

📙 OpenOffice Impress (Presentation)

1. Addition and Deletion of Slides

- **New Slide:** Insert > Slide or press Ctrl + M.
- **Delete Slide:** Right-click on slide thumbnail > Delete Slide.

2. Design

- Choose a slide design from the Master Slide or Slide Design tab.
- Customize background, layout, font styles.

3. Animation

- Slide Show > Custom Animation:
  - Add effects to text/images.
  - Animation types: entrance, exit, emphasis, motion paths.
  - Control speed, delay, and order of animations.

4. Slide Show

- Start with Slide Show > Start from First Slide or F5.
- **Slide Transition:** Slide Show > Slide Transition to animate between slides.
- Set duration, sound, and auto-advance settings.

🔐 What is Information Security?

Information Security (InfoSec) refers to the **protection of information** from unauthorized access, disclosure, alteration, and destruction. It ensures that data remains **confidential**, **accurate**, and **available** to authorized users.

❓ Why Do You Need Information Security?

- To **protect sensitive data** (personal, financial, business).
- To **prevent cyber attacks** (e.g., malware, phishing).
- To maintain **customer trust** and comply with **legal regulations** (like GDPR, HIPAA).
- To ensure **business continuity** in case of security breaches.
- To avoid **financial losses** due to data theft or corruption.

🔑 Basic Principles of Information Security (CIA Triad)

1. Confidentiality

- Ensuring that information is **not accessed** by unauthorized persons.
- Examples: encryption, passwords, access control.

2. Integrity

- Ensuring information is **accurate and unaltered.**
- Examples: hashing, checksums, version control.

3. Availability

- Ensuring information is **accessible when needed.**
- Examples: backups, uptime monitoring, redundancy.

📄 Policies, Procedures, Guidelines, Standards

Term	Description
Policy	High-level rule set (e.g., password policy)
Procedure	Step-by-step instructions to implement a policy
Guideline	Recommended practices (not mandatory)
Standard	Specific requirements (e.g., ISO/IEC

Security Measures

Administrative Measures (People & Process)

- Security training for employees
- Risk assessment
- Incident response planning
- Background checks for new hires

Technical Measures (Technology)

- Firewalls
- Antivirus software
- Encryption
- Intrusion Detection Systems (IDS)

👥 People, Process, Technology (PPT Model)

A holistic approach to security:

Element	Role
People	Users, Admins, Security Staff – need awareness/training
Process	Policies, procedures – enforce rules and compliance
Technology	Tools and systems – firewalls, antivirus, encryption

⚠️ Threats to Cybersecurity

1. Viruses

- Malicious code that attaches to files/programs and spreads.

2. Worms

- Self-replicating malware that spreads across networks.

3. Phishing

- Fraudulent emails/websites trick users into giving up sensitive info.

4. Malware

- General term for malicious software (includes viruses, worms, etc.).

5. Trojans

- Malware disguised as legitimate software.

6. Spyware

- Secretly gathers user information without consent.

7. Adware

- Automatically displays unwanted ads, often bundled with freeware.

8. Rootkits

- Tools used to gain root access and hide other malware.

9. Email Hijacking

- Unauthorized control of email accounts used for scams or spam.

🧰 Methods to Protect Your Personal Computers

- Install and update Antivirus software
- Use Firewalls
- Regularly update OS and software
- Avoid clicking unknown links or downloading suspicious files
- Enable 2-Factor Authentication (2FA)
- Back up data regularly

 What is Antivirus?

Antivirus is software designed to **detect, prevent, and remove** malware and other malicious software.

🔍 Types of Antivirus:

1. **Signature-based:** Detects known malware using virus definitions.
2. **Heuristic-based:** Detects new or unknown malware by behavior.
3. **Cloud-based:** Uses real-time online databases.
4. **Real-time Antivirus:** Constantly monitors system activity.

Popular Antivirus Software: **Kaspersky, Bitdefender, Norton, McAfee, Avast.**

🔥 What is a Firewall?

A **firewall** is a network security device/software that monitors and controls **incoming and outgoing network traffic** based on predefined rules.

🔥 Types of Firewalls:

- **Software Firewall:** Installed on individual devices (e.g., Windows Firewall).
- **Hardware Firewall:** Physical device that filters traffic at the network level.
- **Cloud-based Firewall:** Hosted by security providers for cloud networks.