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Nuture your dreams

A-level ICT

SENIOR Six term 1

TOPIC 1/2: The Internet and Digital Communications

Competency: The learner utilises the internet and digital communication tools to ethically access and exchange information.

Electronic means of data sharing/transfer

- (i) **Email** – sends documents, images, and messages instantly across the internet.
- (ii) **Bluetooth & NFC** – short-range wireless technologies for quick file sharing between devices.
- (iii) **USB drives & external storage:** Physical transfer using flash drives or external hard disks. Reliable for large files without internet.
- (iv) **Social media platforms** – Facebook, LinkedIn, and Twitter allow sharing of information and multimedia.
- (v) **Instant messaging apps** – WhatsApp, Teams, Slack, and Messenger support text, images, and file sharing.
- (vi) **Intranets & extranets** – secure internal networks for organizational data exchange.
- (vii) **Video conferencing tools** – Zoom, Teams, and Meet allow sharing of presentations and documents during meetings.
- (viii) **Cloud storage services** – platforms like Google Drive, OneDrive, and Dropbox allow file sharing and collaboration.
- (ix) **File Transfer Protocol (FTP)** – used to upload and download files between computers and servers.
- (x) **Shared databases** – organizations use centralized databases accessible by multiple users.
- (xi) **Collaboration tools** – Google Docs, Microsoft 365, and Trello enable real-time editing and teamwork.

Risk/challenges in sharing electronic data

Sharing electronic data carries risks such as data breaches, privacy violations, intellectual property theft, and human error. These risks can expose sensitive information, damage trust, and cause financial or legal consequences if not managed properly

- (i) **Data breaches:** Unauthorized access to sensitive information by hackers or malicious insiders.
- (ii) **Privacy violations:** Personal data shared without consent, leading to identity theft or misuse.
- (iii) **Intellectual property theft:** Proprietary information stolen or misused by competitors.
- (iv) **Human error:** Mistakes such as sending files to the wrong recipient or misconfiguring access rights.
- (v) **Malware and phishing attacks:** Shared files may contain malicious software that compromises systems.
- (vi) **Legal and compliance risks:** Failure to comply with data protection laws (e.g., GDPR) can result in fines.
- (vii) **Loss of control:** Once data is shared externally, organizations may lose control over how it is used.

Means of safeguarding safety of electronic data

Protecting electronic data is essential to prevent **loss, theft, or unauthorized access**. ICT provides multiple strategies to ensure data remains secure and reliable.

Technical Safeguards

- (i) **Encryption** – converts data into unreadable code during storage or transfer.
- (ii) **Firewalls** – block unauthorized access to networks.
- (iii) **Antivirus & anti-malware software** – detect and remove malicious programs.
- (iv) **Access controls** – use passwords, biometrics, and multi-factor authentication (MFA).
- (v) **Regular backups** – store copies of data on external drives or cloud services.
- (vi) **Secure file transfer protocols** – use SFTP, HTTPS, or VPNs for safe communication.

Organizational Safeguards

- (i) **Data classification** – categorize data based on sensitivity and apply appropriate protection.
- (ii) **User training** – educate staff on phishing, safe password practices, and handling sensitive data.
- (iii) **Policies & compliance** – follow laws like GDPR, HIPAA, or local data protection acts.
- (iv) **Audit trails** – monitor and log access to detect suspicious activity.
- (v) **Least privilege principle** – give users only the access they need.

Physical Safeguards

- (i) **Secure hardware storage** – lock servers and devices in restricted areas.
- (ii) **Surveillance systems** – monitor access to data centers.
- (iii) **Disaster recovery plans** – protect against fire, floods, or power outages.
- (iv) **Device management** – ensure laptops, phones, and USB drives are secured and tracked.

Communication

Data communication, **the process of transferring data over a transmission medium between two or more devices, systems, or places.**

Elements of data communication

- **Sender.** The device that starts the transmission of data. Sending devices code information to be sent
- **Receiver.** The device that receives the data sent by the sender. Receiving device decodes information.
- **Message or data.** This is the information transmitted from one device to another, including text, images, audio, video, or any other form of content.
- **Protocol.** A set of rules governing the format, timing, and sequencing of data transmission
- **Medium.** The physical path or channel through which data is transmitted, such as an optical cable or wireless transmission.

Examples of wireless transmission media

- **Radio waves** e.g. Bluetooth, mobile phones
- **Microwaves** e.g. satellites, radars
- **Infrared e.g.** short-range communications like remote controls, optical fibres, security systems and thermal imaging cameras which detect people in the dark.

Limitations of wireless transmission media

- Transmission **speed is comparably less.**
- **it has a limited amount of bandwidth for communication**
- As communication is done through open space, it is less secure.
- More open to interference.
- Has high chance of jamming.
- Unreliability
- **Wireless networks can be easily hacked.**

Types of communication

(a) Manual communication methods

These include:

- sign language
- gestures
- touch
- Manual English Signed Systems

(b) Chemical communications

- Use perfumes
- Pheromones

(c) Electronic communication

- **Email** refers to the exchange of computer-stored messages from **one** user to one or more recipients via the internet.
- **Instant messaging**: refers to the real-time or instantaneous transmission of messages via the internet or an internal network or server.
- **Video conferencing** is a technology that allows users in different locations to hold real-time face-to-face meetings, often at little to no cost
- **Social media** refers to websites and applications that enable users to create and share content or to participate in social networking.
- Text messaging
- Phone and voicemail
- Videos: short explainer videos are being used in marketing

Internet

The Internet is a **global network of interconnected computers and networks that enables communication and data services.**

Terminologies of the internet connection

1. **World Wide Web (WWW)** refers to all the public websites or pages that users can access on their local computers and other devices through the internet.
2. A **domain name** is web address that helps users find your website.
3. A **home page** is a webpage that serves as the starting point of website.
4. **Hyperlink** is a group of words, shape, or image, when clicked allows movement between documents, presentation slides or redirects computer user to a specified URL.
5. An **Internet Protocol (IP) address** is the unique identifying number assigned to every device connected to the internet.

6. A **protocol** is a set of rules and guidelines for communicating data. These rules define how computer or devices should interact during communication, ensuring successful data transmissions.

Example of internet protocols

- (i) **Simple Mail Transfer Protocol (SMTP)** is a set of rules and guidelines for transmitting electronic mail (email) over a network.
 - (ii) **Post Office Protocol (POP)** is a network server by which client-based e-mail programs are connected to access a user's e-mail on a central server.
 - (iii) **Hypertext Transfer Protocol (HTTP)** is a set of rules and guidelines for transmitting hypermedia documents, such as HTML
7. A **modem** is a hardware component that allows a computer or another device to connect to the computer.
 8. **Bandwidth** is the amount of information that something, like a connection to the internet, can handle at a given time.
 9. **Processor speed** is the number of cycles per second in which a CPU can process instructions.
 10. **Fetching** is the **retrieval** of information from a source, such as a database, network, or storage medium. After being retrieved, the data is moved to an alternate location or displayed on a screen.
 11. **Decoding** is a process of interpretation and translation of coded information into an understandable form.
 12. **Hyperlink** is a group of words, shape, or image, when clicked allows movement between documents, presentation slides or redirects computer user to a specified URL.
 13. A **search engine** is a software program that helps people find the information they are looking for online using keywords or phrases.
Examples of search engine include Google, Yahoo!, and MSN Search.
 14. **Wi-Fi** is a technology that allows an electronic devices to exchange data wirelessly (using radio waves) over a computer network, including high-speed internet connections.
 15. **Bluetooth** is a wireless technology that lets devices connect and share data over short distances.
 16. **Website** is a collection of publicly accessible, interlinked web pages that share a single domain name.

Components of a website

- (i) **Web Pages:** These are digital files written using HTML (HyperText Markup Language). Each web page has a unique URL within the domain.

- (ii) **Web Server:** This is the backend technology that stores and serves the web pages that make up a website.
- (iii) **Navigation:** This includes elements like the main menu, breadcrumb trails, and optional search bars that help users navigate the site.
- (iv) **Design:** This encompasses the layout, color scheme, and typography of the website.
- (v) **Content:** This includes both static and dynamic content displayed on the web pages.
- (vi) **Functionality:** This includes forms, buttons, sliders, and interactive media.

Advantages of having institutional website

- Enhances your brand image. When it comes to corporate digital presence, the company's image grows stronger as it dominates new channels.
- Serves as information bank about the institution
- Increases visibility and accessibility because information is available to globe 24/7 online
- Markets institution's goods and services.
- Facilitates communication between the institution and its clients
- A well-designed website enhances the institution's credibility and professionalism, helping to build trust among stakeholders.
- It may act as resource centre by hosting a variety of resource such as research publication, online courses and digital libraries.
- Facilitates interaction between the institution and its clients through features like forum, contact us, comments.

17. **Website address/URI (Uniform Resource Locator)** is a digital address for a website's server and web content. It is used to find a specific resource on internet, and it specifies the location of that resource on a computer network

18. **E-mail address** is a unique identifier used to send and receive electronic messages over the internet. It is written as **local part/users name @ domain name .high-level domain name**, for example



Examples of domain name: gmail, yahoo, hotmail

Requirements for internet connection

- A **computer or device** to send and receive information
- An **Internet Service Provider (ISP)** is any company that provides Internet access to consumers and businesses.
- **Cable lines or wireless media** to transmit messages between computers
- A **modem or a network card**: **Modem** stands for Modulator/Demodulator, it is networking device that is used to connect devices connected in the network to the internet.
- **Communication Software (Web browser)** that enable users to send and access information over the internet.

Uses communication software

- Instant messaging
- Video conferencing
- File sharing
- Entertainment

Examples of web browsers

Google chrome, opera, Internet Explorer, Mozilla Firefox

Uses of internet in an organization

- Online Businesses (E-commerce)
- E-marketing
- Cashless Transactions
- Education
- Social Networking
- Entertainment

Advantages of internet connectivity

- Faster communication
- Access to information
- Transfer of research papers
- Advertising
- Marketing
- Easy banking
- Access to a global audience
- A search engine is a software program that helps people find the information they are looking for online using keywords or phrases.

Disadvantages of electronic/internet communication

- Lacks non-verbal cues such as body language and facial expression that enhance understanding
- Information overload caused by constant influx of messages, emails and notifications.
- Risks to security and privacy concerns to cyber-attack vulnerability.
- Impersonal nature
- Technical issues such as lack of internet connection disrupts communication
- Prolonged use of electronic devices can lead to physical health problems such as headaches and poor postures.
- Distractions and interruptions: popup sounds associated to electronic communication can lead to frequent distractions and interruptions, affecting productivity and focus.

Advantages of sending documents using ordinary post over email

- It is tangible creating stronger impression
- Carry physical parcels that e-mail can't
- Proof of existence of receiver and residence
- Post offices are not prone to hacking
- Personal touch: Handwritten letters or cards carry a sentimental value that email can't replicate

Ways in which a student can use the Internet.

- **Access to knowledge:** the internet provides students with a wealth of knowledge from all over the world.
- Students access online tutorials and classes
- Research Work Becomes Easier
- Internet facilitates communication of students with teachers and peers through emails and chatrooms.
- Internet provides a platform for students to express their creativity.
- It is convenient to access libraries and database resources.

Why students should be discouraged to own a phone

- Addition leading to poor time management when excess time is spent on the internet
- High cost of data
- Inaccurate information
- Exposure to pornography leading to early sex and unplanned pregnancy
- May contract gambling habits

- Information overload

Electronic payment (E-payment)

It is a process of conducting financial transactions electronically without the use of physical cash or paper checks.

Application of e-payment

- Online bank transfer
- payment of utilities
- payment for airtime
- payment of school fees and tuitions
- online shopping

Advantages of using E-payment over traditional methods

- reliable
- fast
- secure: reduces risk of theft
- low cost
- convenient because it can be done anywhere at any time

Forms of e-payment system

- **Credit/debit cards:** Electronic payments made using a consumer's credit or debit card.
- **E-wallets:** Digital wallets that allow consumers to store credit/debit card information and other personal data securely online.
- **Online banking:** Transferring money between bank accounts electronically.
- **QR code payments:** Scanning QR codes to make payments.
- **Contactless payments:** Using NFC technology for quick transactions.

Use advanced search techniques

Refining searches with **Boolean operators, filters, and quotation marks** helps you find **more accurate and relevant information** quickly. Here's a practical guide:

Boolean Operators

Boolean operators are special words or symbols that control how search terms are combined.

- **AND** → narrows results by including all specified terms.
 - Example: education AND technology → results must include both words.

- **OR** → broadens results by including either term.
 - Example: college OR university → results include either word.
- **NOT / - (minus sign)** → excludes unwanted terms.
 - Example: cats NOT dogs or cats -dogs → results about cats but not dogs.
- **Parentheses ()** → group terms for complex searches.
 - Example: (AI OR machine learning) AND healthcare.

Quotation Marks

Quotation marks force the search engine to look for the **exact phrase**.

- Example: "climate change effects" → only results with that exact phrase, not just the words separately.

Filters

Filters help narrow results by **time, type, or source**.

- **Date filter** → find recent or historical information.
 - Example: limit results to the past year for current research.
- **File type filter** → search for specific formats.
 - Example: education technology filetype:pdf.
- **Site filter** → restrict results to a specific domain.
 - Example: renewable energy site:.edu → only from educational institutions.
- **Region/language filter** → focus on results from a particular country or language.

Summary Table

Technique	How It Works	Example
AND	Includes all terms	ICT AND hearing impaired
OR	Includes either term	tablet OR laptop
NOT / -	Excludes terms	Excel -tutorial
Quotation marks	Exact phrase search	"electronic data sharing risks"
Filetype filter	Specific document type	cybersecurity filetype:pdf
Site filter	Restrict to domain	data privacy site:.gov
Date filter	Limit by time	AI trends past year

In short: **combine Boolean operators, quotation marks, and filters to make searches precise, targeted, and efficient.**

e-mail signature

An **email signature** is a block of text automatically added at the end of your emails. It usually contains your **name, contact information, job title, and sometimes a logo or social media links**. It makes your emails look professional and provides recipients with quick reference details.

Purpose of an Email Signature

- (i) **Professional identity** – shows who you are and your role.
- (ii) **Contact details** – provides phone number, website, or address.
- (iii) **Branding** – reinforces company or personal brand with logos or taglines.
- (iv) **Consistency** – ensures all emails have a uniform closing.

How to create an e-mail account with personal signature

Step 1: Create an Email Account

1. **Choose an email provider** – Popular options include Gmail, Outlook, Yahoo Mail, or ProtonMail.
2. **Go to the provider's website** – e.g., Gmail.com or Outlook.com.
3. **Click "Create Account" or "Sign Up."**
4. **Fill in personal details** – name, desired email address, password, phone number, and recovery email.
5. **Verify your identity** – usually via SMS or email confirmation.
6. **Log in** – once verified, you can access your new inbox.

Step 2: Create a Personal Signature

A signature is automatically added at the end of your emails.

For Gmail

1. Log in to Gmail.
2. Click the **gear icon** (⚙️) → **See all settings**.
3. Go to the **"General" tab**.
4. Scroll down to **"Signature."**
5. Click **"Create new"** and type your signature (e.g., name, job title, phone number, website).
6. Format text (bold, italics, links, images if needed).
7. Choose whether the signature appears in new emails, replies, or both.
8. Scroll down and click **"Save Changes."**

For Outlook (Web)

1. Log in to Outlook.
2. Click the **gear icon** (⚙️) → **View all Outlook settings**.
3. Select **Mail** → **Compose and reply**.
4. Under **Email signature**, type your signature.
5. Format text and add links/images if desired.
6. Check the box to **automatically include signature** in new messages and replies.
7. Click **Save**.

Example of a Professional Signature

Code

Best regards,
Dr. Bbosa Science
Team leader (digitalteachers.co.ug)
+256 778 633682
www.digitalteachers.co.ug

Quick Tips for a Good Signature

- Keep it **short and professional**.
- Include **name, role, and contact info**.
- Add a **website or social profile** if relevant.
- Avoid too many colors or fonts—keep it clean.

Evaluation of Popular E-Commerce Platforms

Platform	Strengths	Weaknesses	Best Use Case
Amazon	Huge product range, fast delivery (Prime), strong customer service	Higher prices than some competitors	Everyday shopping, electronics, books
eBay	Auction system, rare/second-hand items, global reach	Buyer protection weaker than Amazon	Collectibles, used goods, niche products
Jumia	Africa-focused, cash-on-delivery, localized logistics	Limited product range vs. Amazon	Affordable shopping in Uganda & Africa
Alibaba	Wholesale/B2B focus, bulk orders, direct from manufacturers	Longer shipping times, minimum order quantities	Business sourcing, bulk imports

Steps in Purchasing Products or Services Online

1. Search for product/service
 - Use search bar or browse categories.
 - Apply filters (price, brand, ratings).
2. Compare options
 - Check product descriptions, specifications, and seller ratings.
 - Read customer reviews.
3. Add to cart
 - Select desired quantity, size, or variation.
 - Place item in shopping cart.
4. Proceed to checkout
 - Review cart items and total cost.
 - Enter shipping details.
5. Choose payment method
 - Options include credit/debit card, PayPal, mobile money (MTN, Airtel in Uganda), or cash-on-delivery (Jumia).
6. Confirm order
 - Verify details and submit order.
 - Receive confirmation email or SMS.
7. Track shipment
 - Use order tracking tools provided by the platform.
8. Receive delivery
 - Product arrives at your address or pickup station.
9. Post-purchase actions
 - Leave reviews, request returns/refunds if needed.

Risks & Considerations for on-line purchasing service

- **Fraud/scams:** Always buy from verified sellers.
- **Hidden costs:** Shipping, customs duties (especially on Alibaba).
- **Delivery delays:** More common in cross-border purchases.
- **Returns/refunds:** Policies vary; Amazon is strong, Jumia less flexible.

In short: **Amazon is best for reliability, eBay for auctions, Jumia for African convenience, and Alibaba for wholesale. The online purchase process is universal: search, compare, add to cart, checkout, pay, track, and receive.**

How to Use Video Conferencing

Video conferencing allows people in different locations to meet virtually using audio, video, and collaboration tools. Here's a **step-by-step guide** to help you use it effectively:

Step 1: Choose a Platform

Popular options include:

- **Zoom** – widely used for business and education.
- **Microsoft Teams** – integrates with Office 365.
- **Google Meet** – simple and browser-based.
- **Cisco Webex** – secure enterprise solution.

Step 2: Set Up Your Account

- Sign up with your email address.
- Download the app or use the web version.
- Log in and configure your profile (name, photo, settings).

Step 3: Schedule or Join a Meeting

- **Schedule:** Use the platform's calendar integration to set date, time, and agenda.
- **Join:** Click the meeting link or enter the meeting ID provided by the host.

Step 4: Prepare Your Equipment

- **Check internet connection** – stable Wi-Fi or wired connection.
- **Test audio/video** – microphone, speakers, and camera.
- **Lighting** – ensure your face is visible (avoid backlight).
- **Background** – use a clean space or virtual background.

Step 5: During the Meeting

- **Mute/unmute** – mute when not speaking to reduce noise.
- **Use chat** – share links, questions, or comments without interrupting.
- **Screen sharing** – present slides, documents, or applications.
- **Engage** – participate actively, use reactions or polls if available.
- **Record (if allowed)** – for future reference or absent participants.

Step 6: After the Meeting

- **Save notes or recordings.**
- **Follow up** – send minutes, action items, or thank-you messages.
- **Evaluate** – check what worked well and what can improve.

Quick Checklist

Stage	Key Actions
Before	Choose platform, set up account, test equipment
Joining	Use link/ID, check audio/video
During	Mute when not speaking, use chat, share screen
After	Save notes, send follow-up, evaluate

How to Initiate and Manage Virtual Meetings

Virtual meetings have become essential for business, education, and collaboration. To run them effectively, you need both **technical setup** and **management skills**.

Steps to Initiate a Virtual Meeting

- (i) **Choose a platform**
 - Popular options: Zoom, Microsoft Teams, Google Meet, Webex.
 - Consider features like screen sharing, recording, breakout rooms.
- (ii) **Schedule the meeting**
 - Use the platform's calendar integration or send invites via email.
 - Include agenda, date, time, and meeting link.
- (iii) **Prepare the agenda**
 - Define objectives and topics to be covered.
 - Share agenda with participants beforehand.
- (iv) **Test technology**
 - Check internet connection, microphone, camera, and software updates.
 - Ensure participants have access to the platform.
- (v) **Send reminders**
 - Share meeting link and instructions at least 24 hours before.
 - Provide alternative dial-in options if available.

Steps to Manage a Virtual Meeting

- (vi) **Start with introductions** – greet participants, outline objectives, and review agenda.
- (vii) **Assign roles** – designate a facilitator, note-taker, and timekeeper.
- (viii) **Encourage participation** – use polls, chat, or breakout rooms to engage attendees.
- (ix) **Manage time** – stick to the agenda, avoid long digressions.
- (x) **Use collaboration tools** – share screens, documents, or whiteboards.
- (xi) **Handle disruptions** – mute noisy participants, manage technical issues quickly.
- (xii) **Record the meeting** – for absent participants or future reference.
- (xiii) **Summarize key points** – recap decisions and action items before closing.

(xiv) **Follow up** – send minutes, recordings, and assigned tasks after the meeting.

Quick Checklist

Stage	Key Actions
Before meeting	Choose platform, schedule, prepare agenda, test tech
During meeting	Introduce, facilitate, engage, manage time, record
After meeting	Share minutes, recordings, assign tasks, follow up

In short: **successful virtual meetings require careful preparation, active facilitation, and clear follow-up.**

Way in which the internet can be a danger to:

(a) Molarity (01 mark)

- Use of vulgar language on social media
- Cyber bullying
- Cyber Predators such as sexual and other predators often stalk children on the internet, taking advantage of their innocence, lack of adult supervision and abusing their trust.
- Watching pornography, bestiality

(b) Labour (01 mark)

- Fraud through fake Job advertisement
- Internet addictions reducing effective labor
- Increased unemployment
- threats to decent work and fair competition from digital labour platforms
- reduced job satisfaction due to unfair comparisons among jobs and countries

(c) System security (01 mark)

- Hacking, where unauthorized users gain access to computer systems, email accounts, or websites.
- Viruses or malicious software (known as malware) which can damage data or make systems vulnerable to other threats.
- Identity theft, where criminals can steal personal and financial information.

(d) Human security (01mark)

- Abuses on social media causing psychological harm
- Addition to malicious information and behavior.
- Cyber rimes

(e) Information

- Hacking, where unauthorized users gain access to computer systems, email accounts, or websites.

- Spread of false information
- Identity theft.
- Data breaches.
- Malware and viruses.
- Phishing and scam emails.
- Fake websites.

Netiquette guidelines while using the internet

Netiquette, short for “Internet etiquette” refers to guidelines and rules for courteous communication and behavior online. They include

- empathy
- use friendly tone
- use respectful language
- Send messages if appropriate
- Check for grammar mistakes
- Respect people’s privacy
- Respond to e-mails on time
- Create clear and accurate posts

Violations of computer ethic usage by computer user

- Illegally downloading movies, music, software, etc., from the internet.
- Internet fraud/theft
- Duplicating copyrighted content without the author's approval
- Accessing personal information of others
- Hacking is an unethical practice that involves unauthorized access to computer systems, networks, or data, often with malicious intent.
- Cutting and pasting a paper together using online materials without appropriate citations.

Measures that should be put in place to guard against information piracy in an organization

- protect data with password
- restrict access to company computers
- Use of watermarking to make pirate content traceable.
- Report pirated content to marketplaces
- Educating work that information piracy is illegal
- Use of Legal & Enforcement to punish those involved in information piracy

Digital forensic specialist

Digital forensic specialist is an expert in cybercrimes

Tasks that are performed by digital forensic specialists

- Gather sensitive data from electronic media such as computers, laptops and mobile phones to serve as evidence in cybercrimes
- Analyzes evidence from cybercrimes.
- Preserves electronic evidence for legal proceeding
- Identify the location and personnel involved a cybercrime.
- Reports cybercrimes
- Develops standard procedure to protect data
- Retrieves crime evidence from virtual networks and physical devices.
- Reconstructing events that led to a cyber-attack.
- Recovering data compromised in a hack.
- Reconstructing and restoring data damaged or erased from devices.

Factor that determine internet transmission speed

- **Network congestion** Occurs when a user sends data faster than the network resources can handle.
- **Network latency.** The time it takes for data to travel from one point to another can also affect transfer rates. High latency connections can result in slower transfer rates because data has to travel farther and may encounter more delays along the way.
- **Bandwidth** is the amount data that sent each second. Data can be transferred more swiftly over a link with more bandwidth than over one with less capacity. An example of bandwidth affecting data transfer rates would be downloading a large file over a slow internet connection versus a fast internet connection.
- **Type of connection.** For instance wired connections tend to be faster than wireless connections, and fiber optic cables can transmit data at much higher speeds than traditional copper cables.
- **Limited hardware and software resources.** A client or server with insufficient hardware resources (processing power, hard drive, input/output, and RAM) can affect the data transfer rate for the entire network.
- **Load balancing.** Load distribution is a technique used in certain devices to optimize performance and prevent overload. Nonetheless, when a high volume of data packets is involved, these devices may become overloaded or misconfigured, leading to issues such as disconnections, retransmissions, or packet loss.

Networking

A network is a connection of at least two computers either by cable or wireless connection in order to share resources. The biggest computer network is the internet connecting billions of communicating devices.

Types of computer networks

- **Personal area network** (single person network)
- **Local area network** (multiple computer network in a local area)
- **Campus network** (several building network)
- **Metropolitan area network** (city-wide network)
- **Wide area network** (Global network)
- **Wireless LAN**
- **Storage area network** (High-speed storage network)
- **Home network** (home-base network)
- **System area network** (High-performance network)

Factors to consider before choosing a network

- geographic and physical location
- bandwidth /the amount of information can handle at a given time
- network security
- scalability: a network that accommodate more users, business applications, new location, etc. is preferred
- IT maintenance costs
- Initial costs.

Requirements for setting up a computer network

- **Computers** to be networked
- **Software** to enable connected computers to operate

Examples of networking software

- Novel Netware
- Apple talk
- Digi card
- NanjaOne
- Intermapper. Useful Free Network Tools.
- Econet for acorn computers
- UNIX Windows for work groups

- **Router:** Connects your network to the internet and manages traffic between devices.
- **Modem:** Connects to your ISP (Internet Service Provider) and provides internet access.
- **Switch:** Expands the number of devices you can connect in a wired network and enables connected devices to share information and talk to each other.
- **Access Point:** Extends the range of your wireless network.
- **Cables:** Ethernet cables (Cat5, Cat5e, or Cat6) for wired connections.
- **Network Interface Cards (NICs):** Required for each device to connect to the network.
- A **bridge** is a network device that connects multiple sub-networks to create a single network

Server

A server is a computer that provides information to other computers called “clients” on a computer network

Uses/advantages of a server in a computer networking

- Store and manage and computes data on a network
- Enable sharing of printers by computers on the network
- Enables sharing of software by computers on the network
- Processes requests from clients
- Enable sharing of internet by the computers on the network
- Enable interactive activities like games be played by users on the network

Disadvantages of networking computer

- Has high initial cost to setup
- Encourages spread Virus and Malware to network computers
- Disruptions can occur frequently.
- Computer Networking can direct us to various types of distractions.
- It requires a specific type of setup.
- May lead to loss of information easily

Threats to data networked environment

- **Malwares** such viruses, worms and Trojans that infect systems, steal data or cause disruption
- **Phishing:** e-mail phishing are deceptive e-mails that trick user into revealing sensitive information and spear phishing or targeted attacks on specific individuals within an organization.
- **Network Hacking** or unauthorized access to network resources to steal data or disrupt services

- **Weak security control**
- **Insider threats** where employ or contractor misuse their access to harm the organization.

How to control data threats over network

- Install antivirus software
- Create strong password
- Use firewalls to block unauthorized access to the network
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- Regular Backups to store data in multiple location
- Train users about cyber security and to recognize phishing attempts and other social engineering attacks.
- Monitor Network activity using intrusion detection systems (IDS)

Some worked example

1. During a practical examination, student was required to open a blank file and save is as.
D:\STUDENT WORK\EOT PRACTICAL\safety.doc
 - (a) State the name of the immediate subfolder in which students must save the file
(01 marks)
EOT PRACTICAL
 - (b) Write the root directory onto which the file must be saved. (02 marks)
D:
 - (c) Suggest one example of a computer application the student can use to create the file.
(01 mark)
Word processing .
 - (d) State the name of the file represented by the above file path. (01 mark)
Safety.doc
2. Use the terms to complete the statements that follow: (05marks)
Virtual Reality, WIFI, Simulation, Bluetooth, Artificial intelligence
 - (a) The science of representing behavior of real life situation using a computerized mode is **simulation**.
 - (b) The technology that allows an electronic device to exchange data using radio waves of a computer network is **WIFI**
 - (c) The technology that allows users to transfer data for short distances between mobile devices is **Bluetooth**

- (d) The technique that rates images by a computer that appears to surround the person looking at them is **Virtual reality**
- (e) The science of computers that enable qualities of human being to be imitated is **Artificial intelligence**

3. (a) Explain the following terms giving examples in each case. (02 marks)

(i) Simplex (02 marks)

- Simplex mode is a transmission mode in which information is sent in one direction only, also known as unidirectional.
- Example: keyboard, Television, Mouse, Radio Broadcasts, and Monitor

(ii) Half duplex (02 marks)

- In half-duplex mode, each station can both transmit and receive, but not at the same time.
- Example: walkie-talkie - a two-way radio that has a push-to-talk button

(iii) Full duplex channel is where both the sender and receiver can send and receive information simultaneously.

4. State one function of each of the following utility programs (03marks)

(i) Diagnostic utility

A diagnostic utility is software used **to troubleshoot a problem on the computer system**. It provides clues about the causes of problematic computer symptoms.

(ii) File compression Utility

File compression Utility a program that compresses and decompresses various file types

(iii) Antivirus Utility

An antivirus is a program that helps to keep the computer virus-free.

NB. Utility software is a program or tool that performs specific tasks to enhance productivity, efficiency, functionality, or maintenance of a computer system.

(b) Outline two ways of reducing the spread of computer viruses.

- Install antivirus and anti-malware software.
- Avoid sharing flash disks
- Avoid installing programs and files unsecure sources
- Regularly update antivirus software.

- Do not open unsecure email attachments.
 - Back up your data.
5. (a) Give two reasons why file management is important in computer system (02marks)
- (i) Eases finding and accessing a file
 - (ii) Maintains **data integrity by preventing accidental deletion or alteration of files**
 - (iii) Ensures data security.
 - (iv) Ensure saving of related files in the same folder
 - (v) Standardized processes of files
- (b) List three operations which can be performed on a file (03 marks)
- Saving
 - opening
 - editing
 - copying
 - moving
 - renaming
 - deleting files.

6. (a) Explain the term troubleshooting as used in computers. (02marks)

Troubleshooting is a systematic process used to locate the cause of a fault in a computer system and correct the relevant hardware and software issues.

- (b) State three ways in which one can troubleshoot a computer that has failed to start.

- Try a different power source.
- Check your monitor connection.
- Listen for beeps.
- Let the battery charge
- Start your PC in safe mode.
- Restore your computer to previous settings.
- Unplug USB devices.

7. (a) Distinguish between utilities and application software (02marks)

Utility software is a program or tool that performs specific tasks to enhance productivity, efficiency, functionality, or maintenance of a computer system.

Application software is software designed to handle specific tasks for users.

- (b) Give three examples of utility programs. (03marks)

- (i) Antivirus software for virus protection.
- (ii) File management tools for managing files.
- (iii) Compression tools for reducing file size.

- (iv) Disk management tools for managing storage.
- (v) Debuggers for examination and modifying data

8. Explain the following as applied to internet

(i) Hotspot (02 marks)

Wireless hotspots are wireless access points, typically in public location, that provides internet access to mobile devices such as your laptop or smartphone when you are away from the office or your home.

(ii) Internet Service provider (01mark)

An ISP is a company that provides web access to consumers and businesses through various channels, such as cable, DSL, fiber, or wireless.

(iii) Search Engine (02marks)

A search engine is software that searches a database of information according to the user's query.

9. (a) Give two reasons to justify ownership of institutional website (02 marks)

- Enhances your brand image. When it comes to corporate digital presence, the company's image grows stronger as it dominates new channels.
- Serves as information bank about the institution
- Increases visibility and accessibility because information is available to globe 24/7 online
- Markets institution's good and services.
- Facilitates communication between the institution and its clients
- A well-designed website enhances the institution's credibility and professionalism, helping to build trust among stakeholders.
- It may act as resource centre by hosting a variety of resource such as research publication, online courses and digital libraries.
- Facilitates interaction between the institution and its clients through features like forum, contact us, comments.

(b) (i) What is a web browser? (01 mark)

A web browser is a program used to access and view websites or website information.

(ii) Under what circumstances can someone use a Uniform Resource Locator (URL) in a web browser? (02marks)

A URL (Uniform Resource Locator) is an address of a website used to locate a resource on the internet.

10. (a) Give three disadvantages of electronic communication. (03marks)

- Lacks non-verbal cues such as body language and facial expression that enhance understanding
- Information overload caused by constant influx of messages, emails and notifications.
- Risks to security and privacy concerns to cyber-attack vulnerability.
- Impersonal nature
- Technical issues such as lack of internet connection disrupts communication
- Prolonged use of electronic devices can lead to physical health problems such as headaches and poor postures.
- Distractions and interruptions: popup sounds associated to electronic communication can lead to frequent distractions and interruptions, affecting productivity and focus.

(b) Name any two manual communication methods

- (i) sign language
- (ii) touch
- (iii) Manual English Signed Systems

11. (a) Differentiate between intranet and extranet. (02 marks)

An intranet is a **private network contained within** an enterprise that is used to securely share company information and computing resources among employees.

An Extranet is a **private network contained within** an enterprise shared by internal and selected, external parties, such as business partners, suppliers, key customers, etc.

(b) Define a Local Area Network (LAN) (02 marks)

A local area network (LAN) is a **collection of devices connected together in one physical location**, such as a building, office, or home.

(c) Suggest an area network which is restricted to connecting users in a city. (01mark)

Metropolitan area network (MAN) (city-wide network)

(b) Explain the function of a device driver in a computer system (02 marks)

- Operate and control a device attached to a computer.
- Provide an interface between the operating system (and application) and the device.
- To tell the operating system how to communicate with the hardware component.

- Translate requests between the device and the computer.
12. Write the following in full as used in Information and Communication Technology
- (a) CCTV stands for Closed-Circuit Television
 - (b) ROM stands for **Read-Only** Memory
 - (c) CAD stands for Computer Aided Design
 - (d) CPU stands for **Central Processing Unit**
 - (e) VDU stands for Visible Display Unit
13. (a) Identify one storage device that is resistant to virus attacks (01marks)

CD, DVD, DVDR

- (b) Describe the following terms as used in computer;
- (i) File (02marks)
A computer file is a collection of digital data(text, images, media etc.) stored as a single object on a disk.
 - (ii) Folder (02marks)
A folder is an **area on the computer containing other folders and files** and helps keep the computer organized
14. (a) State four categories of computer systems. (04marks)
- On the basis of size and capacity: Supercomputer, Mainframe, Mini, and Micro Computer.
 - On the basis of purposes: General and Special Purpose.
 - On the basis of hardware design and type: Analog, Digital, and Hybrid Computer.
 - Personal Computers (PCs)
 - Workstations

- (b) Give the function of any one category you have stated in 5(a). (01mark)

Personal computer is used to do and store personal data

15. (a) Name two examples of documents created using desktop publishing applications. (02marks)

- (i) Brochures
- (ii) News papers
- (iii) Magazines
- (iv) Greeting card
- (v) flayers

- (b) State any three desktop publishing features that can be enhance enhance the document you named in 10(a) (03 marks)

- **Text tools** that allow creation of documents with various fonts, text wrapping, drop caps and paragraph styles

- **Graphic tools** for easy insertions and edit of images
- **Page layout** tools such as grids and guides to align elements precisely on page and use of layers to organize different elements on separate layer to easier editing and complex designing.
- **Provision for master templates** with consistent headers, footers and other repeating elements
- **Interactive elements** such as hyperlinks and multimedia integration tools for audio and videos into a document.
- **Provision of stylish templates** for brand development and maintenance.

16. (a) Outline any three threats that a system Administrator may face as a result of networking (02marks)

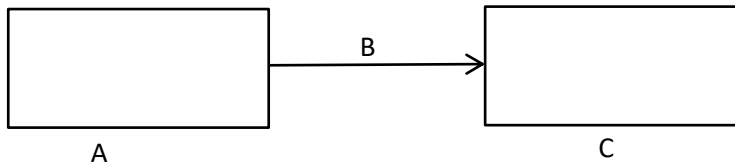
- **Malwares** such viruses, worms and Trojans that infect systems, steal data or cause disruption
- **Phishing:** e-mail phishing are deceptive e-mails that trick user into revealing sensitive information and spear phishing or targeted attacks on specific individuals within an organization.
- **Network Hacking** or unauthorized access to network resources to steal data or disrupt services
- **Insider threats** where employ or contractor misuse their access to harm the organization.
- **Distributed Denial of Services (DDoS)** that cause service disruption.
- **Social Engineering** or manipulating individuals into divulging confidential information
- **Advanced Persistent Threats (APTs)** or long-term targeted attacks aimed at stealing data or spying on the organization.
- **SQL Injection (SQLi) attacks** or exploiting vulnerabilities in web application to access or manipulate database
- **Man-in-the- middle (MitM) attack** or intercepting and altering communication between two parties without their knowledge.
- **Weak Security Control** or poorly configured systems and outdated software that can be easily exploited by attacks.

(b) Suggest two measures that the system administrator can employ to reduce the network threats. (03marks)

- Install antivirus software
- Create strong password
- Use firewalls to block unauthorized access to the network
- Encrypt Data to protect it from unauthorized access

- Regular Backups to store data in multiple location
- Train users about cyber security and to recognize phishing attempts and other social engineering attacks.
- Monitor Network activity using intrusion detection systems (IDS)
- Update and patch system to fix vulnerabilities that could be exploited by attackers
- Implement strict access control to sensitive information
- Develop a comprehensive security policy that covers aspects of network security and data handling.

17. Study the data communication below and answer the questions that follow



(a) Name the elements of data communication (02marks)

- A - sender /transmitter
- B – transmission medium
- C – receiver

(b) Suggest the device used to connect A to B (01 mark)

- Cable/wire/ transmission media
- wireless

(c) State the protocol used to uniquely identify A and C (01mark)

- A – Encodes/encrypts data
- C – Decodes data

18. The table below consist of some of the peripheral devices of a computer. Indicate Input or output (05 marks)

	PERIPHERAL DEVICES	INPUT/OUTPUT
(a)	Biometric reader	Input
(b)	Projector	output
(c)	Plotter	output
(d)	Scanner	input
(e)	Headphones	output

19. (a) Give two reasons why an electronic spreadsheet is suitable for preparing budgets. (02 marks)

- Offer limitless customization

- Handles vast amount of data
- Makes adjustment of figures easy
- Organizes and makes tracking of income and expenditure easy
- Makes calculation easy
- Provide flexibility in how to manage and analyze the budget
- Enhances visualization through use graphs
- Provides storage and easy accessibility options
- Cheap because most spread software like Google Sheets is free

(b) State one use of the following applications

(i) Presentation software (01 mark)

- Teaching
- Lectures
- Demonstration
- Project report
- Workshops
- Marketing reports
- training

(ii) Word processor (01marks)

- document creation: letters, report, resume, stories and essays
- edits and formats documents
- provides templates for documents like business letters, invoices etc.
- mail merge: automating the process of sending personalized letter or email to multiple recipients
- Creates academic papers and articles
- Creates tables charts and lists of organized information effectively
- Automatically checks and corrects spelling and grammatical errors

(iii) Communication software (01 marks)

- Instant massaging
- Video conferencing
- File sharing
- Entertainment
- Relaxation

20. (a) Name one example of presentation software (01marks)

- **Microsoft** PowerPoint

- Google Slides
- Prezi
- Pitch
- **Visme**
- **Keynote**
- Haiku Deck
- Canva

(b) Give the importance of each of the following features as used in electronic presentation

(i) Master slide

- Enhances presentation efficiency i.e. changes made on the master slide apply to all slides in the presentation saving time for individual slide manual editing
- Consistency i.e. all slides will carry the same log, color, fonts etc.
- Enhances visual effects.

(ii) Transition (02marks)

- Enhance appearance
- Control speed

21. (a) State three advantages of using e-mail service over sending mail by post. (03 marks)

- Reduce postage costs
- Fast
- It is environmentally friendly
- Convenient : letters are created and sent from anywhere.
- Improve document security.
- Mails can be sent and receive simultaneously to multitude of recipients at ago.

(b) State two advantages of post-mail over e-mail communication. (02marks)

- It tangible creating stronger impression
- Carry physical parcels that e-mail can't
- Proof of existence of receiver and residence
- Post office are not prone to hacking
- Personal touch: Handwritten letter or cards carry a sentimental value that email can't replicate

22. Give five examples of networking software (05marks)

- Novel Netware
- Apple talk
- Digi card

- NanjaOne
- InterMapper. Useful Free Network Tools.
- Econet for acorn computers
- UNIX Windows for work groups

23. Outline five ways in which a student can use the Internet. (05marks)

- Access To Knowledge: the internet provides students with a wealth of knowledge from all over the world.
- Students access online tutorials and classes
- Research Work Becomes Easier
- Internet facilitate communication of students with teachers and peers through emails and chatrooms.
- Internet provide platform for students to express their creativity.
- It is convenient to access libraries and database resources.

24. (a) (i) What is data transmission media (01marks)

Transmission media is the physical path between the transmitter and the receiver through which data is sent from one place to another.

(ii) Give two examples of data transmission media. (02marks)

- Cable/wired
- wireless

(b) Name two services offered by data communication tools. (02marks)

- mails
- video conferencing
- SMS
- Phone calls
- Tutorials
- entertainment

Thank You

Dr. Bbosa Science