L-Università ta' Malta

MATSEC
Examinations Board

Marking Scheme

IM Information Technology

Main Session 2025

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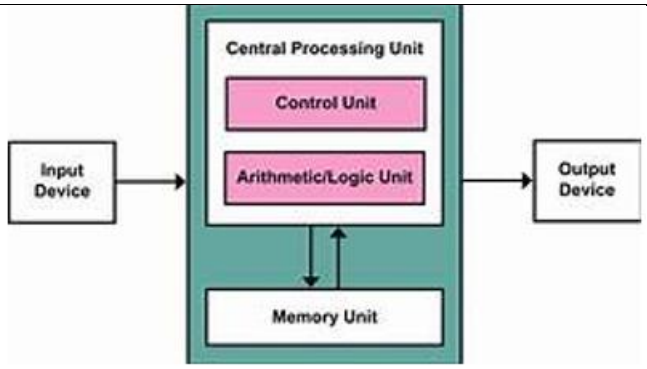
Paper 1

Question No			Suggested Answers	Distribution of marks	Marks
1	a		EduLearn functions as an Information System by collecting, processing, storing, and disseminating information related to education. It gathers data on Candidates, courses, instructors, and academic progress. This information is then processed to generate reports, track student performance, facilitate communication, and support various educational activities	1 mark: Correctly identifies key components of an IS 1 mark: Applies these components to the EduLearn scenario with specific examples	2
	b		**Internal Sources:** • Student enrolment records • Course completion data • Instructor feedback • Student performance assessments • Financial transactions within the platform **External Sources:** • Educational news and research • Industry trends and best practices • Government regulations and policies related to education • Competitor analysis • Social media trends and student preferences	1 mark for each valid internal source 1 mark for each valid external source	2
	c	i	**School Administrators:** • **Resource Allocation:** MIS can help administrators analyse student enrolment data to allocate resources effectively, such as staffing, budget, and infrastructure. • **Performance Monitoring:** Tracking student performance trends can help administrators identify areas for improvement in curriculum, teaching methods, and overall school performance. • **Strategic Planning:** MIS can provide insights into student demographics, learning styles, and technology usage patterns to inform strategic planning decisions.	**2 Marks for School Administrators:** 1 mark for each relevant point	2
		ii	**Educators:** • **Personalised Learning:** MIS can help educators analyse student performance data to identify individual learning needs and tailor instruction accordingly.	**2 Marks for Educators:** 1 mark for each relevant point	2

			• **Assessment and Feedback:** Automated grading and feedback systems can streamline the assessment process and provide timely insights into student progress. • **Curriculum Development:** Data on student performance and learning outcomes can be used to inform curriculum development and identify areas for improvement.		
	d		EduLearn could use data warehousing to gather and store large volumes of data from various sources, such as student records, course completion data, instructor feedback, and learning analytics. This centralised storage would enable: • **Improved Data Analysis:** More comprehensive and insightful analysis of student performance, learning trends, and system usage patterns. • **Enhanced Decision-Making:** Support more informed decision-making by providing historical data and trends for analysis. • **Personalised Learning Experiences:** Develop more personalised learning paths and recommendations for individual Candidates based on their learning history and preferences. • **Improved Operational Efficiency:** Streamline administrative tasks, such as student enrolment, course scheduling, and resource allocation.	1 mark for each benefit	2
	e		**QR Codes:** • **Attendance Tracking:** Candidates can scan QR codes at the beginning and end of class to record attendance. • **Resource Access:** QR codes can be used to access online learning materials, assignments, and interactive exercises. • **Assessment:** QR codes can be used to link physical assignments to online submission platforms. **RFID:** • **Asset Tracking:** Track the location and usage of educational resources, such as laptops, tablets, and learning materials. • **Attendance Tracking:** RFID-enabled student ID cards can be used to automatically record attendance. • **Access Control:** Control access to restricted areas within the educational institution.	QR Codes: 1 mark for each relevant use case RFID: 1 mark for each relevant use case	2 2

	f		• **Smart Classrooms:** IoT sensors can monitor environmental factors like temperature, lighting, and air quality to optimize the learning environment. • **Interactive Learning:** IoT devices can be integrated into interactive learning experiences, such as virtual labs, simulations, and robotics projects. • **Personalised Learning:** Wearable IoT devices can track student activity levels, sleep patterns, and other health metrics to provide personalized feedback and support.	1 mark for each relevant example	2
	g		**Data breaches** could have significant consequences for the EduLearn platform, including: • **Loss of Student Trust:** Exposure of sensitive student data (e.g., personal information, academic records) can erode trust in the platform and the institution. • **Reputational Damage:** Negative publicity and legal repercussions can damage the institution's reputation and credibility. • **Financial Losses:** Data breaches can result in financial losses due to legal penalties, remediation costs, and potential loss of revenue. • **Disruption of Services:** Data breaches can disrupt normal operations, impacting student learning and administrative functions. To mitigate these risks, EduLearn should implement robust security measures, such as: **Data encryption:** To protect sensitive data in transit and at rest. **Access controls:** To restrict access to sensitive data based on user roles and permissions. **Regular security audits and penetration testing:** To identify and address potential vulnerabilities. **Incident response plans:** To quickly contain and mitigate the impact of a data breach.	1 mark for each relevant impact 1 mark for mentioning at least one mitigation strategy	4
Total:					**20**
2	a		i)problem definition; ii) feasibility study; iii) requirements elicitation. iv)analysis and design. v)testing; vi) implementation; vii) maintenance; viii) retirement	Award ½ mark to each correct stage	4

	b		The purpose of requirements elicitation is to gather detailed and accurate information about the client's needs and expectations for the mobile application. This stage is crucial to ensure that the final product meets the client's requirements and delivers the desired value.	1 1	2
	c		**Black Box Testing:** **Definition:** Tests the application from a user's perspective, focusing on its functionality and behaviour without examining the internal code. **Example:** Testing the login functionality to ensure that users can successfully log in with valid credentials and that invalid login attempts are rejected. **White Box Testing:** **Definition:** Tests the internal structure and logic of the application code. **Example:** Testing the code that handles user input to ensure that it correctly validates data and prevents invalid input from causing errors.	1 mark: Correctly defining Black Box Testing. 1 mark: Providing a relevant Black Box Testing. 1 mark: Correctly defining White Box Testing. 1 mark: Providing a relevant White Box Testing example.	4
	d		• **Strong Communication Skills:** Effective communication with clients, developers, and stakeholders is crucial for ensuring project clarity, addressing concerns, and maintaining project momentum. • **Problem-solving and Decision-making Skills:** The ability to identify and resolve issues, make critical decisions, and adapt to changing circumstances is essential for the success of any software development project. • **Leadership and Motivation:** Motivating the development team, fostering collaboration, and creating a positive and productive work p	1 mark for each correctly identified and briefly explained characteristic: Strong Communication Skills Problem-solving and Decision-making Skills Leadership and Motivation	3
	e		• Resource Management: • Impact on Quality: Proper allocation of resources (human, financial, technological) ensures that the development team has the necessary tools and support to deliver a high-quality product. • Impact on Success: Effective resource management helps to: • Control project costs and stay within budget. • Ensure the project is completed on time. • Maintain team morale and productivity. • Minimize risks and potential delays.	1 mark for mentioning the impact on quality 1 mark for mentioning the impact on success	2
Total:					**15**

3	a			1 mark for correctly identifies and labels the CPU, Main Memory, and Input/Output devices on the diagram. 1 mark for accurately depicts the flow of data between the CPU, Memory, and I/O devices. 1 mark for overall clarity and neatness of the diagram.	3
	b		**Example 1: Refrigerator:** Embedded systems control temperature, defrost cycles, and sometimes even features like ice makers and water dispensers. **Example 2: Washing Machine:** Embedded systems control the washing cycle (wash, rinse, spin), water temperature, and detergent dispensing.	1 mark for each correct and relevant example	2
	c		**SSDs:** **Advantages:** Faster read/write speeds, quieter operation, lower power consumption, higher durability. **Disadvantages:** Generally, more expensive per gigabyte than HDDs, typically lower storage capacities compared to high-end HDDs. **HDDs:** **Advantages:** Lower cost per gigabyte, typically higher storage capacities. **Disadvantages:** Slower read/write speeds, noisier operation, more susceptible to physical shock.	1 mark for correctly states that SSDs have faster read/write speeds than HDDs. 1 mark for correctly states that HDDs generally have higher storage capacities than SSDs. 1 mark for correctly stating that SSDs are more reliable and durable than HDDs. 1 mark for correctly states that SSDs are generally more expensive per gigabyte than HDDs.	4

	d		**Manufacturing:** 3D printing can be used to create prototypes, custom-made parts, and even entire products. **Healthcare:** 3D printing can be used to create personalized medical implants, prosthetics, and surgical models.	1 mark for each correct and relevant example.	2
	e		**Batch Processing:** Processes large amounts of data in batches. Example: Payroll processing, where employee data is collected and processed at the end of the month. **Real-time Processing:** Requires immediate processing and response. Example: An aircraft autopilot system, where the system must constantly monitor and adjust flight controls in real-time to maintain stability.	1 mark for defining batch processing (processing data in batches). 1 mark for providing a relevant example of batch processing. 1 mark for defining real-time processing (immediate processing and response). 1 mark for providing a relevant example of real-time processing.	4
Total:					**15**
4	a		**Definition:** A network is a group of two or more interconnected devices (such as computers, smartphones, or servers) that can communicate and share resources. **Example:** A home Wi-Fi network connects devices like smartphones, laptops, and smart home appliances, allowing them to access the internet and share files.	1 mark for correct definition of a network 1 mark for relevant example	2

	b		**Advantages:** • **Resource Sharing:** Sharing of resources like printers, scanners, and files among multiple users. • **Communication:** Enables easy communication and collaboration among users through email, instant messaging, and video conferencing. • **Centralized Management:** Allows for centralized administration and security management of network devices and resources. • **Cost-Effectiveness:** Can be more cost-effective than providing individual resources to each user. **Disadvantages:** • **Security Risks:** Networks are vulnerable to security threats like viruses, malware, and hacking attempts. • **Maintenance and Support:** Requires ongoing maintenance and support to ensure network stability and performance. • **Single Point of Failure:** In some network topologies (e.g., star), a failure in the central device can disrupt the entire network. • **Complexity:** Managing and troubleshooting complex networks can be challenging.	1 mark for each correctly listed advantage 1 mark for each correctly listed disadvantage	4
	c		**LAN (Local Area Network):** **Scope:** Covers a small geographical area, such as a home, office building, or school. **Typical Uses:** • Sharing files and printers within an office. • Connecting devices in a home network for internet access. • Creating a gaming network for local multiplayer games. • **WAN (Wide Area Network):** **Scope:** Covers a large geographical area, such as a city, country, or even the entire globe. **Typical Uses:** • Connecting different offices of a company located in different cities. • The internet itself is a vast and complex WAN.	1 mark for correctly defining the geographical scope of a LAN 1 mark for providing relevant examples of LAN uses 1 mark for correctly defining the geographical scope of a WAN 1 mark for providing relevant examples of WAN uses	4

	d		**Characteristics:** • Central hub (often a switch) connects all devices. • Devices communicate through the central hub. **Advantages:** • Easy to add or remove devices. • Centralized management and troubleshooting. • Fault isolation is relatively easy. **Disadvantages:** • Single point of failure (if the central hub fails, the entire network is disrupted). • Performance can be affected if the central hub becomes overloaded.	1 mark for describing the central hub characteristic 1 mark for mentioning one advantage 1 mark for mentioning another advantage 1 mark for mentioning one disadvantage	4
	e		**Example:** **Cloud Storage:** Businesses use cloud services (e.g., Google Drive, Dropbox) to store and share files, enabling employees to access data from anywhere with an internet connection.	1 mark for providing a relevant example	1
Total:					**15**

Section B

Question No			Suggested Answers	Distribution of marks	Marks
1	a		Candidates are expected to define the terms 'e-Commerce' and 'e-Business'. e-Commerce - refers to the buying and selling of goods and services over the internet. e-Business - refers to all business processes conducted online, including e-Commerce, as well as other activities like supply chain management, customer service, and collaboration with business partners.	1 mark for correct definition of 'e-commerce' 1 mark for correct definition of 'e-business'	2

	b	i	Candidates are expected to list **TWO** advantages and **TWO** disadvantages of e-Business for businesses. The following are possible answers: **Advantages** 1. E-Business reduces operational costs, such as renting physical stores and employing sales staff. 2. It allows businesses to access a wider audience across geographic boundaries. **Disadvantages** 1. Increased vulnerability to hacking, data breaches, and fraud. 2. Businesses rely heavily on technology, which can be costly to maintain and upgrade.	1 mark for each correct advantage 1 mark for each correct disadvantage	4
		ii	Candidates are expected to list **TWO** advantages and **TWO** disadvantages of e-Business for customers. The following are possible answers: **Advantages** 1. Customers can shop or access services anytime, anywhere. 2. They have access to a wide range of products and services online. **Disadvantages** 1. Customers may worry about how their personal data is used or shared. 2. Customers cannot physically inspect products before purchase, leading to potential dissatisfaction.	1 mark for each correct advantage 1 mark for each correct disadvantage	4
	c	i	Candidates are expected to compare and contrast the functionality and applications of the B2B and B2C models by providing **ONE** similarity and **ONE** difference. The following are possible answers: **Similarity** Both B2B (Business-to-Business) and B2C (Business-to-Consumer) models involve online platforms to facilitate transactions, whether between businesses or between businesses and individual consumers. **Difference** B2B Model primarily focuses on selling products or services between businesses, often involving bulk orders, long-term	1 mark for correct similarity 1 mark for correct difference	2

			contracts, and negotiated pricing (e.g., a wholesaler selling goods to a retailer). B2C Model targets individual consumers, typically offering products in smaller quantities with fixed pricing through e-commerce platforms (e.g., an online store selling clothes to individual shoppers).		
		ii	Candidates are expected to provide **ONE** example for **each** model (B2B and B2C) that could be used by TECHNO SOLUTIONS. The following is a possible answer: **B2B Example -** TECHNO SOLUTIONS supplying software solutions to corporate clients for managing their operations. **B2C Example -** TECHNO SOLUTIONS offering an online platform where individual customers can purchase antivirus software.	1 mark for each correct example	2
	d	i	Candidates are expected to define 'e-marketing' and explain how it can be beneficial to TECHNO SOLUTIONS. **e-Marketing -** Refers to the use of digital channels, such as social media, email, and websites, to promote a company's products or services. It can help TECHNO SOLUTIONS reach a larger audience, build brand awareness, and engage with customers through targeted campaigns.	1 mark for correct definition of 'e-marketing' 1 mark for how it can be beneficial	2
		ii	Candidates are expected to explain the concept of 'e-Markets' and provide **ONE** example to illustrate their answer. The following is a possible answer: **e-Markets -** Online platforms where buyers and sellers interact to trade goods, services, or information. **Example -** Amazon Marketplace, where TECHNO SOLUTIONS could list and sell its software products to a global audience.	1 mark for correct explanation of 'e-markets' 1 mark for correct example	2
		iii	Candidates are expected to define 'web portals' and explain how TECHNO SOLUTIONS could use a web portal to centralise its services and improve customer experience.	1 mark for correct definition	2

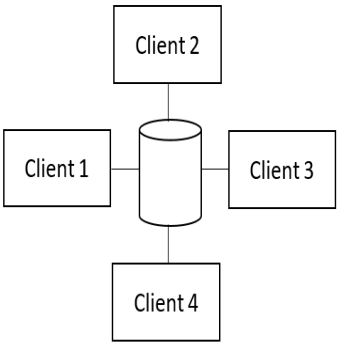
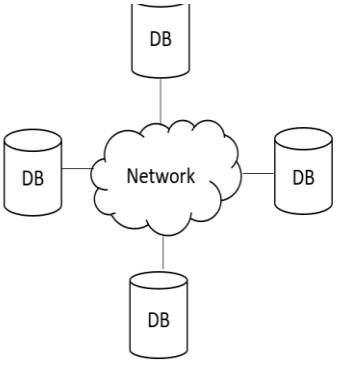
			A **web portal** is a centralised platform that provides access to a variety of information and services, often customized for user needs. TECHNO SOLUTIONS could use a web portal to integrate customer support, product catalogues, user accounts, and payment options in one place, improving convenience and efficiency.	1 mark for correct explanation	
Total:					**20**
2	a		Candidates are expected to explain what sustainability in ICT mean. Sustainability in ICT refers to the design, development, and use of technology in ways that minimize environmental impact, conserve resources, and reduce energy consumption throughout the lifecycle of the technology.	2 marks for correct definition	2
	b		Candidates are expected to explain why it is important for IT companies to adopt sustainable practices. The following is a possible answer: **Environmental Protection** - Sustainable practices reduce carbon footprints, e-waste, and energy consumption. 1. **Economic Benefits** - Sustainability lowers operational costs by using energy-efficient technologies and prolonging device lifespans. 2. **Corporate Responsibility** - Adopting sustainable practices enhances the company's reputation and meets societal expectations for environmentally friendly operations.	2 marks for explaining why it is important	2
	c		Candidates are expected to outline how storage techniques can contribute to sustainability and provide **ONE** example of how this could be applied at ECO-TECH INNOVATIONS. The following is a possible answer: Modern storage techniques, such as cloud storage, reduce the need for physical hardware, thereby conserving energy and reducing e-waste. **Example** - ECO-TECH INNOVATIONS could use cloud-based storage systems instead of local servers to minimize energy consumption and hardware waste.	1 mark for correct outline 1 mark for correct example	2
	d		Candidates are expected to explain how the Internet of Things (IoT) can promote sustainability and provide **ONE**		2

			example of its potential use at ECO-TECH INNOVATIONS. The following is a possible answer: IoT enables real-time monitoring and optimization of energy usage, reducing waste and improving efficiency. It supports predictive maintenance, reducing equipment failures and unnecessary resource use. **Example** - ECO-TECH INNOVATIONS could implement IoT-enabled sensors in their manufacturing plants to monitor and optimize energy usage in real time.	1 mark for correct outline 1 mark for correct example	
	e	i	Candidates are expected to discuss how automation can promote sustainability in the manufacturing department, giving **ONE** example. The following are possible answers: Automation can optimise production processes, reducing material waste and energy usage while improving efficiency. **Example -** Robots can be used for precision assembly, ensuring minimal material wastage and faster production times.	1 mark for correct discussion 1 mark for correct example	2
		ii	Candidates are expected to discuss how automation can promote sustainability in the transport department, giving ONE example. The following are possible answers: Automated systems in logistics, such as route optimization, can reduce fuel consumption and carbon emissions. Example - Using AI-based software to plan delivery routes for transport vehicles, minimising travel distances and fuel use.	1 mark for correct discussion 1 mark for correct example	2
	f	i	Candidates are expected to define the concept of 'techno stress'. Techno stress refers to the stress experienced by individuals due to overuse or difficulty in adapting to new technologies.	1 mark for correct definition	1
		ii	Candidates are expected to explain the idea of a 'digital detox' and how it can help mitigate the effects of 'techno stress'.	1 mark for correct explanation	2

			A digital detox involves taking a break from digital devices such as computers, smartphones, and tablets to reduce stress and improve mental well-being. It helps individuals manage techno stress by providing time to relax, disconnect, and recharge.	1 mark for explaining how digital detox can help mitigate techno stress	
		iii	Candidates are expected to define the concept of 'RSI'. **Repetitive Strain Injury (RSI)** refers to musculoskeletal disorders caused by repetitive movements, prolonged use of devices, or poor posture, often associated with computer use.	1 mark for correct definition	1
		iv	Candidates are expected to list **TWO** health risks or health issues related to ICT which might be present in ECO-TECH INNOVATIONS. The following are possible answers: 1. **Eyestrain -** Caused by prolonged screen time. 2. **Back or Neck Pain -** Due to poor ergonomics and improper seating arrangements.	1 mark for each health risk	2
		v	Candidates are expected to suggest **TWO** ways how the issues specified in part (iv) can be avoided. The following are possible answers 1. **Eyestrain -** Encourage regular breaks using the 20-20-20 rule (looking at an object 20 feet away for 20 seconds every 20 minutes) and provide screens with adjustable brightness. 2. **Back or Neck Pain -** Ensure ergonomic furniture, such as adjustable chairs and desks, and promote proper posture training.	1 mark for each method/way	2
Total:					**20**

SECTION C

Question No			Suggested Answers	Distribution of marks	Marks
1	a		Candidates are expected to define four terms. i. File - A file is a collection of related data stored as a single unit on a storage medium, such as a text document or spreadsheet. ii. Database - A database is an organized collection of data that is stored electronically and can be easily accessed, managed, and updated. iii. Entity - An entity is a distinct object or concept, such as a person, place, or item, represented by a table, where its characteristics are captured as attributes (columns). Tuple - A tuple, also known as a record, is a single row in a database **table that contains data about one specific entity.**	1 mark for each correct definition	4
	b		Candidates are expected to explain why databases are important in terms of usability and data organisation. The following is a possible answer: **Usability -** Databases make data retrieval and management more efficient by allowing users to query and filter information as needed. **Data Organization -** Databases structure data logically, reducing redundancy and ensuring data consistency, which simplifies storage and analysis.	1 mark for each correct definition	2
	c		Candidates are expected to mention and describe **TWO** types of database systems. **1. Centralised Database System -** All data is stored in a single central location, and users access it remotely via a network. **2. Distributed Database System -** Data is stored across multiple locations or servers, and users access the relevant portion of the database from their location.	1 mark for correct mentioning 1 mark for correct description	2

	d		Candidates are expected to Compare and contrast the TWO database systems mentioned in part (c) by mentioning **TWO** similarities and **TWO** differences. The following are possible answers: **Similarities** 1. Both store and manage data systematically for easier access and organization. 2. Both support multi-user environments, allowing simultaneous access. **Differences** 1. Centralised databases are easier to maintain as all data is in one location, while distributed databases require more complex management to synchronize data across multiple locations. 2. Distributed databases offer better reliability and scalability compared to centralized systems, which may have a single point of failure.	1 mark for each correct similarity 1 mark for each correct difference	4
	e		Candidates are expected to draw a representation of both database systems mentioned in part (c) using block diagrams.  Centralised database  Distributed database	2 marks for each representation	4

	f		Candidates are expected to identify the most suitable data type for each attribute. Event name – text Number of guests – Integer Event date – date Is paid – Boolean	½ marks for each correct data type	2
	g		Candidates are expected to select **ONE** of the attributes to be the primary key and define what is a primary key. Event name The primary key is a unique identifier for a record in a database table, ensuring no two records have the same value for that attribute.	1 mark for correct selection 1 mark for correct definition	2
Total:					**20**
2	a		Candidates are expected to define the term 'software'. Software refers to a set of instructions, data, or programs used to operate computers and perform specific tasks. It is intangible and enables hardware to function effectively.	1 mark for correct definition	1
	b		Candidates are expected to distinguish between the following **THREE** types of software in terms of usage and licensing. The following are possible answers: **1. Open-Source Software:** • **Usage -** Open-source software allows users to view, modify, and distribute the source code. • **Licensing -** Typically uses group or individual licenses, ensuring modifications and redistribution remain open under similar licenses. **2. ii. Free Software:** • **Usage -** Free software can be downloaded and used without cost but may not permit modifications or redistribution. • **Licensing -** Individual or group licenses often limit rights to only usage without editing the source code.	½ marks for each correct usage description ½ marks for each correct licensing description	3

			3. Proprietary Software: • **Usage -** Proprietary software is owned by a company or individual, and users are granted limited rights to use it without accessing or modifying the source code. • **Licensing -** Requires payment for licenses, which can be individual (personal use) or group (business use).		
	c		Intellectual Property (IP) refers to the legal rights given to individuals or companies over their creations, such as inventions, designs, or software. Owning IP rights allows the company to protect its educational software from unauthorized use or duplication, maintain competitive advantage, and generate revenue through licensing or sales.	1 mark for correct definition 1 mark for importance	2
	d		**i. Software Portability** Software portability is the ability of a software application to run on different hardware platforms or operating systems with minimal modifications. **Importance -** For educational software, portability ensures that schools and universities using different devices (e.g., Windows, macOS, or tablets) can access and utilize the software without compatibility issues. **ii. Downward Compatibility** Downward compatibility refers to a software's ability to work with older versions of itself or older hardware systems. **Importance -** This is crucial for educational software because many institutions may not have the latest hardware or software updates. Downward compatibility ensures that even users with outdated systems can access and benefit from the software.	1 mark for each correct definition 1 mark for each correct justification	4
Total:					**10**

3	a		Candidates are expected to define the three terms provided: i. **World Wide Web (WWW)** The World Wide Web is a system of interlinked documents and multimedia content accessible via the internet using web browsers. ii. **Website** A website is a collection of related web pages hosted on a web server, accessible through a unique URL. iii. **Web Browser** A web browser is a software application that allows users to access, retrieve, and display content on the World Wide Web, such as web pages and multimedia files.	1 mark for each correct definition	3
	b		1. **Address Bar** Displays the URL of the webpage being visited and allows users to enter web addresses. 2. **Bookmarks** Allows users to save frequently visited web pages for quick access in the future. 3. **Browsing History** Records a list of websites visited, enabling users to revisit them without re-entering their URLs.	1 mark for each correct feature	3
	c		A URL serves as the unique address of a webpage, enabling browsers to locate and retrieve the specific content hosted on a web server.	1 mark for correct purpose	1
	d		Candidates are expected to identify and describe **THREE** parts of a URL. The following are possible examples: 1. **Protocol** Specifies the method used to transfer data between the browser and the web server (e.g., HTTP, HTTPS). 2. **Domain** Identifies the unique name of the website or server hosting the webpage (e.g., innovativewebtech.com). 3. **Top-Level Domain (TLD)** Indicates the type of organization or geographical area (e.g., .com, .org, .edu).	1 mark for each correct part	3
Total:					**10**