L-Università ta' Malta

MATSEC
Examinations Board

Marking Scheme

IM Information Technology

Main Session 2024

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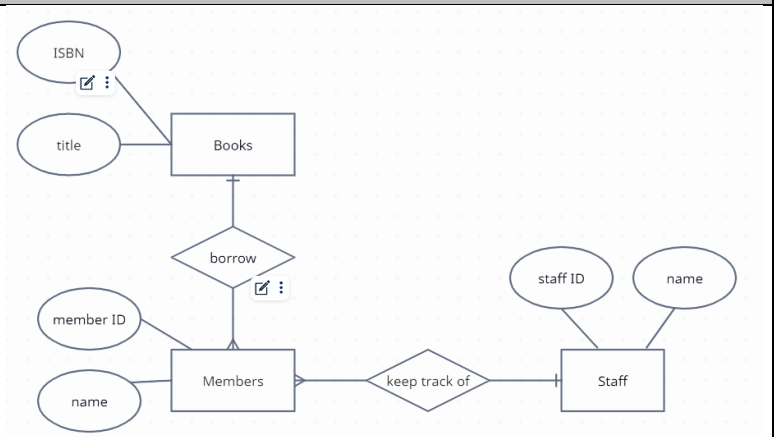
In the case of marking schemes that include model solutions or answers, it should be noted that these are not intended to be exhaustive. Variations and alternatives may also be acceptable. Examiners must consider all answers on their merits, and will have consulted with the MATSEC Examinations Board when in doubt.

PAPER I

Question No			Suggested Answers	Marks	Marks Distribution
1	a			7	1 mark for each entity 0.5 marks for each attribute 0.5 marks for each relationship
	b		A foreign key is a field in a relational database table that establishes a link between the data in two tables. It acts as a reference to a unique identifier (usually a primary key) in another table, creating a relationship between the two tables. The purpose of a foreign key is to enforce referential integrity, ensuring that data in the referencing table corresponds to existing data in the referenced table.	1	
	c		Foreign Key: ISBN in Members (references Book ISBN).	1	
	d		Test under HTML validator. Printouts in at least two different browsers.	2	1 mark for each correct aspect
	e		System evaluation (what was implemented vs. scope of project). Future enhancements. Skills acquired.	2	1 mark for each correct aspect
	f		Problem Definition. Client Requirements. Selection and Design. Implementation.	3	1 mark for each correct section
	g		Screenshots of pages in the testing phase serve to visually document and verify the appearance, layout, and functionality of web pages. They provide a clear reference for comparing design elements before and after testing, aiding in effective communication and issue reporting.	2	2 marks for correct answer
Total:				**18**	

2	a	i	**Objective is** to identify and document the specific needs and requirements of the school library system for managing book loans. **Gather information:** Conduct interviews with library staff, students, and teachers to understand their current processes and pain points. **Analyse existing systems:** Review the existing paper-based system to identify its limitations and opportunities for improvement. **Define functional requirements:** Determine the specific features and functions required for the new computer system, such as creating and managing borrower profiles, tracking book availability, and processing loan transactions. **Define non-functional requirements:** Specify non-functional aspects of the system, such as performance, security, and user interface requirements. **Document requirements:** Prepare a comprehensive requirements document that clearly outlines the needs and expectations for the new system.	2	Award 1 mark for each correct requirement.
		ii	**Objective:** To create a detailed design of the new computer system that meets the identified requirements. **Data modeling:** Define the data structure of the system, including tables, fields, and relationships, to represent the information about borrowers, books, and book loans. **User interface (UI) design:** Design the user interface of the system, ensuring it is intuitive, user-friendly, and accessible to library staff and students. **System architecture:** Design the overall architecture of the system, including the hardware, software, and network infrastructure required for its operation. **Database design:** Develop the database schema, specifying the tables, relationships, and data types required to store and manage the system's data. **Process design:** Define the detailed processes and procedures for each system function, such as borrower registration, book issuance, and loan returns.	2	Award 1 mark for each correct requirement.
	b		**Parallel Conversion** In parallel conversion, the new computer system is implemented alongside the existing paper-based system, allowing for a smooth transition. Both systems operate	2	Award 1 mark for each correct changeover approach.

			simultaneously, and data is frequently synchronized. This approach minimizes disruption to library operations and provides a backup in case of any issues with the new system. **Phased Conversion** In phased conversion, the new computer system is implemented in phases, gradually replacing specific aspects of the existing paper-based system. This approach allows for a more controlled transition, enabling staff and users to adapt to the new system at a manageable pace.		
	c		**User Manual:** Provides step-by-step instructions for using the system's features and functions. **Technical Documentation:** Outlines the detailed procedures and workflows for system operations.	2	Award 1 mark for each type.
Total:				**8**	
3	a		Three Different Levels of an Organizational Information System 1. Operational Level. 2. Management Level. 3. Strategic Level.	3	Award 1 for each correct level.
	b	i	Security Risks Local area networks (LANs) are susceptible to various security threats due to their interconnected nature and the potential for unauthorized access: 1. Unauthorized Access. 2. Data Modification. 3. Data Disclosure.	2	
		ii	Implementing Data Security in LANs To mitigate these security risks, Birku Services should implement comprehensive data security measures: 1. Strong Password Policies. 2. Access Control Mechanisms. 3. Data Encryption. 4. Firewall Protection. 5. Regular Security Audits. 6. Employee Training: Train employees on cybersecurity best practices to prevent human error and phishing attacks. 7. Regular Software Updates.	2	
		iii	Data Backup for Client-Server Networks	1	

			In a client-server network, data backups can be achieved using various methods: 1. Centralized Backup Server. 2. Distributed Backup Systems. 3. Offline Backups. 4. Continuous Data Protection (CDP).		
Total:					**8**
4	a		Transforming Data into Information Example: Malta Airways collects data on customer flight preferences, such as preferred destinations, travel dates, and cabin classes. By analysing this data, the airline can identify trends and patterns in customer behavior. This information can then be used to tailor marketing campaigns and improve customer service. For instance, if the data indicates that a significant portion of customers prefer flights to sunny destinations during the winter months, Malta Airways could target these customers with promotions for holidays in warmer climates during those periods. Additionally, understanding customer cabin class preferences can help the airline optimize seating arrangements and maximize revenue.	2	Award 2 marks for each correct answer.
	b		Direct Sources: 1. Accuracy: Data directly collected from customers is more accurate and reliable, as it is not subject to third-party interpretations or biases. 2. Personalisation: Direct data collection allows Malta Airways to personalize customer experiences, such as targeted marketing campaigns and tailored service offerings. Indirect Sources: 1. Broader Reach: Indirect data sources, such as social media and public records, can provide insights into a wider audience, allowing Malta Airways to identify untapped market segments. 2. Unbiased Insights: Indirect data is often less influenced by the airline's marketing efforts, providing more objective insights into customer preferences.	4	Award 1 mark for each correct advantage.

	c		The internet offers a more comprehensive, up-to-date, and personalised experience for customers seeking information about airlines and flights. Holiday brochures, on the other hand, can provide a general overview but may lack specific details and personalisation.	2	Award 2 marks for correct comparison.
Total:				**8**	
5	a		Allow sensible descriptions of OMR, OCR, bar coding keyboard entry or paper based collection. Descriptions must be relevant to the technique chosen and the situation.	2 2	Award 1 mark for each technique 1 mark for advantage and disadvantage
	b	i	Use of the computer/software to detect data, which is incomplete or unreasonable.	1	
		ii	Allow, Check digits for catalogue numbers or agent's ID code. Range check on quantities. Presence check on agent's code/name or quantity. Format or character check on catalogue number/agent's code. Hash total for catalogue numbers. Lookup on agent's code or catalogue number.	3	Award 1 mark for correct validation check.
Total:				**8**	
6	a		Application software is software that directly interacts with the user to perform specific tasks, such as word processing, web browsing, or playing games. It is designed for a specific purpose and is typically developed by independent software vendors (ISVs). System software is software that controls the computer system's hardware and software resources. It provides a platform for application software to run and ensures that the system operates efficiently and reliably. Examples of system software include operating systems, device drivers, and utilities.	2	Award 1 mark for each.
	b		Process Management, Memory Management, File Management (Storage), Kernel, Error Handling, Input/Output (I/O) Management, etc.	3	Award 1 mark for each correct component.
	c		1. Process Management: The CPU is the system's central processing unit, responsible for executing instructions. The operating system schedules tasks, ensuring that each application receives a fair share of the CPU's processing power. It also handles multitasking,	3	Award 1 mark for each correct description.

			allowing multiple applications to run simultaneously without interfering with each other. 2. Memory Management : Memory is where data is stored temporarily for processing. The operating system manages the allocation of memory to applications, ensuring that they have access to the resources they need without causing conflicts. It also handles memory management, optimizing memory usage and preventing memory leaks. 3. File Management (Storage): Storage devices, such as hard drives and solid-state drives (SSDs), store data permanently. The operating system manages the interaction with storage devices, ensuring efficient data retrieval and storage. It also handles file systems, organizing and managing files and folders for easy access by applications and users. 4. Input/Output (I/O) Management: I/O devices, such as keyboards, mice, printers, and scanners, allow users to interact with the computer and exchange data. The operating system manages the communication between applications and I/O devices, handling data transfer, error detection, and device drivers to ensure applications can interact with I/O devices efficiently.		
Total:				**8**	
7	a		CPU Registers and Units 1. Instruction Register (IR): The instruction register stores the current instruction being executed by the CPU. It holds the opcode (operation code) and operands that the CPU needs to decode and execute the instruction. 2. Memory Address Register (MAR): The memory address register holds the address of the memory location where the CPU wants to read or write data. It provides the address information to the memory controller, which enables the CPU to access the desired memory location. 3. Arithmetic Logic Unit (ALU): The arithmetic logic unit performs arithmetic and logic operations on data. It is the central processing unit's workhorse, handling calculations, comparisons, and logical operations. 4. Control Unit (CU): The control unit is responsible for orchestrating the entire CPU operation. It fetches	4	Award 1 mark for each correct description of a register and correct description of a unit.

			instructions from memory, decodes them, and sends control signals to the various units of the CPU to execute the instructions correctly.		
	b	i	Byte-addressable: Has an address bus that is 8 bits wide.	1	
		ii	Address Bus: The address bus is a group of wires that carries binary address information to the memory. The width of the address bus determines the maximum memory capacity the system can address. In Toast's computer, with an 8-bit address bus, the maximum memory size is 256 bytes.	1	
		iii	Data Bus: The data bus is a group of wires that carries data between the CPU and memory. The width of the data bus determines the maximum amount of data that can be transferred at a time. In Toast's byte-addressable memory system, the data bus width must be at least 8 bits to transfer one byte of data.	1	
	c	i	SRAM: Static RAM stores data in flip-flops, which maintain their state without requiring constant refreshing. It is faster and more expensive than DRAM. SRAM is typically used to make up cache memories, which store frequently accessed data, improving CPU performance.	1/2	
		ii	DRAM: Dynamic RAM stores data in capacitors, which require periodic refreshing to maintain their state. It is cheaper than SRAM but slower. DRAM is typically used for main memory in modern computers.	1/2	
Total:				**8**	

Section B

Question No			Example of expected answer	Marks	Marks Distribution
1	a		Communication is the process of exchanging information, ideas, thoughts, or feelings between individuals or groups using verbal, non-verbal, or written means.	1	
	b		i. Sender: The individual or entity initiating the communication by encoding and sending a message. ii. Receiver: The party receiving the message, who decodes and interprets the information sent by the sender.	2	
	c		Answers may include the description of the visual communication, written communication, electronic communication, etc..	2	
	d		Visual communication tools, such as video conferencing and collaborative visual platforms, are crucial for dispersed teams. They enhance understanding, foster a sense of connection, and facilitate more effective communication, especially when face-to-face interactions are limited.	1	
	e		Tele-working, refers to the practice of working remotely, often from home, using technology to connect to the workplace. In this company, it allows employees to perform their tasks without being physically present in the office. The impact on traditional office setups includes increased flexibility for employees, potential cost savings for the company, and the need for robust virtual communication tools to maintain collaboration.	2	
	f		E-Government, refers to the use of digital technology, such as the internet and information and communication technologies (ICTs), by government agencies to provide public services, information, and communication with citizens and businesses. Its significance lies in improving efficiency, transparency, and accessibility of government services, streamlining internal processes, and enhancing citizen engagement through digital platforms.	2	
Total:				**10**	

2	a		*Knowledge Base:* A knowledge base is a centralised repository of information, data, and expertise that is accessible to employees within an organisation. It includes documentation, guidelines, and best practices that serve as a reference for various tasks and problem-solving. The knowledge base in this accounts corporation can improve communication by providing a shared platform where employees can access accurate and up-to-date information. It facilitates better decision-making, reduces the chances of misinformation, and ensures a consistent understanding of key concepts and procedures.	2	1 mark for correct definition 1 mark for correct improvement
	b		*Upward communication* refers to the flow of information from lower levels of an organisational hierarchy to higher levels. It involves employees communicating with their supervisors, managers, or executives to provide feedback, share concerns, or relay information.	1	
	c		Employees providing feedback on the effectiveness of new communication strategies implemented during the restructuring. Staff reporting challenges or suggestions related to using the knowledge base to the management team.	2	1 mark for each correct example
	d		*Downward communication* is the transmission of information from higher levels of an organisation's hierarchy to lower levels. It involves the dissemination of directives, policies, and information from executives or managers to employees.	1	
	e		Issuing company-wide emails to inform employees about changes in organizational structure or policies. Conducting regular team meetings led by management to discuss updates, expectations, and goals.	2	1 mark for each correct example
	f		*Lateral communication* occurs between individuals or departments at the same hierarchical level within an organisation. It promotes collaboration, information sharing, and coordination among peers. In this restructuring scenario, lateral communication is crucial as it facilitates the exchange of insights and experiences among employees who may be facing similar challenges. It fosters a collaborative environment,	2	1 mark for correct definition 1 mark for correct explanation of importance

			enabling teams to work together efficiently and share knowledge gained from the restructuring process.		
Total:				**10**	
3	a		Sales Department: The sales department is responsible for promoting and selling the company's products or services. It involves building relationships with customers, understanding their needs, and ensuring the company's offerings meet those needs. Marketing Department: The marketing department focuses on creating awareness about the company's products or services. It involves strategic planning, advertising, market research, and developing campaigns to attract and retain customers.	2	1 mark for each correct definition
	b		*Finance Department:* The finance department manages the company's financial resources, including budgeting, accounting, financial reporting, and financial planning. *Production Department:* The production department oversees the manufacturing process, ensuring the timely and cost-effective production of goods according to quality standards. *Human Resources (HR) Department:* The HR department is responsible for managing personnel-related matters, including recruitment, employee relations, training and development, and ensuring compliance with laws. *Procurement/Purchasing Department:* This department handles the sourcing and acquisition of raw materials, goods, and services needed for production, ensuring cost-effectiveness and quality.	4	0.5 marks for each stating of functional area 0.5 marks for each definition of functional area
	c		*Finance Department:* Chief Financial Officer (CFO) *Production Department:* Production Manager *Human Resources (HR) Department:* HR Manager *Procurement/Purchasing Department:* Procurement Specialist	2	½ mark for each correct employee
	d		*Finance Department:* Chief Financial Officer (CFO) *Production Department:* Production Manager *Human Resources (HR) Department:* HR Manager *Procurement/Purchasing Department:* Procurement Specialist	2	½ mark for each description
Total:				**10**	