



L-Università
ta' Malta

MATSEC
Examinations Board



Examiners' Report
SEC Computing

Main Session 2024

TABLE OF CONTENTS

A.	STATISTICAL INFORMATION	1
B.	GENERAL REMARKS	1
	Coursework.....	1
	Written Examination	2
C.	COMMENTS ON PAPER I	2
D.	COMMENTS ON PAPER 2	5
	Paper 2A	5
	Paper 2B.....	6

A. STATISTICAL INFORMATION

A total of 741 candidates registered for Computing, an increase of 42 compared to 2023. Among them, 510 chose Paper IIA, while 231 selected Paper IIB.

Table 1 shows the distribution of grades for the May 2024 Session of the examination.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	48	106	144	103	51	/	/	49	9	510
PAPER B	/	/	/	45	36	27	16	66	41	231
TOTAL	48	106	144	148	87	27	16	115	50	741
% OF TOTAL	6.5	14.3	19.4	20	11.7	3.6	2.2	15.5	6.7	100

Table 1: Distribution of grades for SEC Computing 2024, Main Session

B. GENERAL REMARKS

Coursework

The examiners moderated a total of 170 projects in 12 state, church, and independent schools. In addition, 19 projects submitted by private candidates were corrected and, each, conducted an interview.

The examiners pointed out that, in general, the work submitted by the candidates met the standards set by MATSEC, and the grades attained were notably high. 74% of the projects received 80% or more of the maximum possible mark and the lowest scoring at 53%. Additionally, many of these projects, particularly those by private candidates, incorporated elements that exceeded the syllabus requirements and candidates were able to explain and discuss these additional features confidently during their interviews.

The following remarks reflect comments made by the moderators:

- Overall, the quality of the projects submitted was satisfactory and met the expectations set by MATSEC.
- The moderated work was generally of the indicated quality, suggesting hard work by most educators and candidates.
- Many schools focused on common themes like quizzes and calculators, with fewer innovative projects, though some schools did stand out with unique topics like games and practical applications.
- While some projects were well-organized and documented, others lacked consistency in presentation and formatting, highlighting the need for improved presentation skills.
- A reliance on static methods and limited use of object-oriented programming (OOP) was noted. There seemed to be more emphasis on concepts beyond SEC level, such as the use of Array Lists and GUI, but there is a need for more training in OOP principles.
- The marking scheme was mostly applied fairly, but some discrepancies, especially in grading for special design features, were identified and adjusted.

Written Examination

Candidates in the SEC 2024 examination were expected to show proficiency across all syllabus areas. The papers included a wide range of questions, from basic knowledge to comprehension, application, analysis, synthesis, and evaluation. Paper 2 featured predominantly scenario-based questions, presented in various formats such as identification, descriptive, fill in the blanks, multiple choice, problem-solving, and knowledge application.

The SEC 2024 papers maintained a comparable level of difficulty and format to those of 2023. This consistency favoured candidates' recall and comprehension skills, especially in theoretical questions. Nevertheless, challenges arose in applying knowledge, particularly evident in the scenario-based questions presented in Paper 2B. This difficulty might stem from inadequate exposure to real-world applications, or from language barriers hindering candidates' comprehension of the scenarios.

C. COMMENTS ON PAPER I

Question	1	2	3	4	5	6	7	8	9	10	Total	
Max Mark	9	10	9	9	10	9	8	7	8	6	/85	
Paper 2A	Mean	5.8	5.1	7.3	7.4	5.6	5.7	3.8	3.1	4.5	3.2	51.6
	Standard Deviation	2.4	2.7	1.6	2.1	2	2.2	2.1	1.9	1.8	2	14.4
	Facility Index	0.6	0.5	0.8	0.8	0.6	0.6	0.5	0.4	0.6	0.5	0.6
	Discrimination Index	0.7	0.7	0.7	0.7	0.6	0.8	0.7	0.7	0.6	0.7	-
Paper 2B	Mean	3.2	2.8	5.1	4.8	3.8	3.1	1.7	1.2	3.2	1.4	30.3
	Standard Deviation	2	2.4	2.4	2.9	2	2	1.4	1.3	1.8	1.7	13.2
	Facility Index	0.4	0.3	0.6	0.5	0.4	0.3	0.2	0.2	0.4	0.2	0.4
	Discrimination Index	0.6	0.6	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	-

Table 2: Analysis of raw scores for Paper I

The mean represents the 'average' score achieved by candidates in response to a question. It is calculated by summing up the scores obtained by all candidates and then dividing that sum by the total number of candidates. The standard deviation measures how much the scores vary or how widely they are spread out. To illustrate, most candidates in Paper IIA scored between approximately -2.4 and +2.4 relative to the mean, falling within the range of around 3.4 to 8.2 in Question 1 of Paper 1. The Facility Index gauges the level of difficulty or ease associated with a question in an exam. For Paper IIA candidates, question 8 was found to be the most challenging, followed by questions 2, 7, and 10 in Paper I. In case of Paper IIB candidates, the most difficult questions were 7, 8 and 10, followed by questions 2 and 6. The Discrimination Index refers to the ability of a question to effectively distinguish between different candidates. A value closer to 1 indicates better discrimination.

Question 1

There were some areas where the candidates performed well, such as on the True or False questions, in part (b), and on most of the multiple-choice questions. Many candidates did not express themselves well in the written answer questions (parts (a), (d), and (e)). Additionally, performance indicated that many candidates lacked knowledge of databases and were unable to correctly identify tables or define data integrity and validation.

Question 2

While many could define clock speed, a fundamental concept in computing, many did not articulate well its implications. Similarly, candidates showed a lack of understanding of the interplay between components like RAM and CPU performance. The question on the fetch-execute cycle, revealed that candidates tended to memorize steps without comprehending the underlying logic. This superficial understanding hindered their ability to apply the knowledge effectively. Furthermore, while many candidates correctly explained the difference between opcode and operand, they did not accurately define the term "instruction set."

Question 3

Most candidates demonstrated a solid understanding of fundamental software concepts. Definitions of software and differentiation between system and application software were generally accurate. However, challenges arose when applying this knowledge to practical scenarios, often failing to relate software types to the scenario. In part (c), whilst most candidates understood the role of IT personnel, they did not apply their knowledge to the given context. Additionally, some responses incorrectly assumed that software developers and webmasters had the same role or assumed that technicians only handled hardware issues.

Question 4

In part a, many candidates did not define the term 'algorithm' correctly. However, parts (b), (c), and (d) were handled much better by most candidates, particularly those with a solid background in truth tables and logic. Many candidates completed the truth table correctly, although some forgot to label the logic gate properly.

Question 5

In part (a), most candidates provided correct answers, although a surprising number incorrectly identified a "barcode scanner." Part (b) was particularly difficult, with many candidates not naming the correct software for creating an editable digitized version of books, often giving "pdf" as their answer. In part (c), while most candidates correctly identified a laser printer as necessary for printing digitized books, their reasoning generally included 'printing speed' as the primary benefit. There was also confusion in identifying an appropriate assistive output device in part (d), where only a few correctly mentioned a Braille printer, while others incorrectly gave answers like 'braille' or 'braille keyboard'. Despite these challenges, part (e) was generally well-answered, especially the multiple-choice questions. However, some candidates did not explain correctly why raster is used to store images.

Question 6

In part (a), while some candidates answered correctly, the overall results were below expectations, with some not identifying the correct input component. In part (b), a considerable number of incorrect answers like "210" or "1024" were given instead of the correct value. In part (c), which consisted of multiple-choice questions, candidates either answered all questions correctly or entirely incorrectly. Part (d) proved to be particularly challenging, with very few candidates answering correctly. Many failed to use a composite

condition and instead provided incomplete or incorrect responses, such as only testing one condition (e.g., "lightIntensity < 300") and not including the necessary logical operations.

Question 7

While some basic understanding was evident in certain parts, the overall performance was notably poor. Poor performance was noted in most questions, including those requiring simple recall and application of knowledge, even though the topic is relevant to everyday life. It highlights a potential disconnect between theoretical knowledge and practical application which might indicate a need for a more hands-on and experiential learning approach.

Question 8

This question assessed a combination of data representation and database concepts. While candidates demonstrated a reasonable understanding of data types, their ability to convert between number systems (binary and decimal) proved to be a significant weakness. Furthermore, the database-related questions revealed a lack of understanding of fundamental concepts. Many candidates confused databases with spreadsheets. Difficulties were noted with respect to core database principles like atomicity and data storage calculations.

Question 9

The question assessing algorithm understanding and flowchart creation revealed significant challenges for candidates. While the true or false component was answered reasonably well by some, most candidates demonstrated a significant lack of knowledge about algorithms and flowchart construction. Despite the information provided to help with drawing the flowchart, only a very few candidates successfully created an accurate flowchart. Many did not use flowchart symbols correctly, hence drawing incomplete or incorrect flowcharts. Specifically, candidates frequently omitted essential components such as loops, and failing to convert misused process symbols to the appropriate input/output symbols.

Question 10

This question focused on operating system concepts. In part (a), the expected understanding of the distinction between source code and executable code was not met, with many candidates mixing up these concepts. In part (b), most candidates did not correctly identify the primary function of an operating system, often giving inadequate answers like "providing an interface" without further detail. The performance in parts (c) and (d) varied, with candidates either answering both parts correctly or failing to address them adequately. Poor performance was noted in parts focusing on system utilities.

D. COMMENTS ON PAPER 2

Question		1	2	3	4	5	Total
Paper 2A	Max Mark	16	17	16	18	18	/85
	Mean	9.9	10.2	9.9	9.9	10.6	50.8
	Standard Deviation	3.1	3.5	3.9	3.7	4.3	15.2
	Facility Index	0.6	0.6	0.6	0.6	0.6	0.6
	Discrimination Index	0.8	0.9	0.8	0.8	0.9	-
Paper 2B	Max Mark	18	15	18	18	16	/85
	Mean	10.1	6	8.9	9.7	5.2	40
	Standard Deviation	3.5	2.9	3.5	4.4	3.1	14
	Facility Index	0.6	0.4	0.5	0.5	0.3	0.5
	Discrimination Index	0.8	0.7	0.8	0.9	0.8	

Table 3: Analysis of raw scores for Paper IIA and Paper IIB questions

Paper 2A*Question 1*

In this question on computer hardware and architecture, while the candidates showed reasonable comprehension of bus size and basic hardware components, there were significant knowledge gaps in other areas. A recurring theme was the confusion between related concepts, such as internal and external storage, data bus and address bus. With regards to pixels and the role of the operating system in a digital camera, most candidates could identify basic components but their ability to explain how these components interact and contribute to overall system functionality was limited.

Question 2

In this question on programming fundamentals and problem-solving, while candidates showed a good understanding of basic flowcharting and simple programming constructs, significant challenges arose in more complex areas. Most responses related to translation of a flowchart into equivalent Java code were inadequate. Additionally, the error identification and correction tasks showed a lack of ability in debugging and problem-solving skills. Many candidates did not identify the correct stage of the software development lifecycle where the error occurred and did not provide effective solutions. The concept of a dry run was unfamiliar to a significant number of candidates and hence hindered their ability to identify and rectify errors. It is suggested that candidates practice flowcharting, coding, debugging, and testing to develop proficiency in these essential skills.

Question 3

In this question about machine logic and programming demonstrated that candidates are well versed in basic concepts like binary representation and logic circuits but were challenged when it comes to programming and problem-solving. The ability to translate a Boolean expression into a logic circuit was a strength for many candidates but not in writing an equivalent Java code with difficulties being noted when using basic syntax and logical reasoning. The error identification and correction tasks within the programming part also revealed weaknesses in problem-solving and debugging abilities. Candidates often lacked the systematic approach necessary to effectively analyse and rectify errors.

Question 4

The question on databases and networking demonstrated a varied level of understanding among the candidates. Candidates seemed to excel in concepts like primary keys and data transfer methods, but lacked understanding when it comes to database relationships, security, and network protocols. A recurring theme was the difficulty in explaining concepts and providing practical examples. Candidates often demonstrated a superficial understanding of the subject matter, struggling to apply their knowledge to real-world scenarios. When it comes to the database design part, most candidates showed a lack of depth in understanding relationships between database tables. Many candidates did not identify appropriate relationships and explain how data is linked. In the networking part, while encryption concepts were generally understood, there was confusion regarding communication modes (serial vs. parallel) and a lack of clarity in explaining the rationale behind encryption.

Question 5

This question on data validation, CPU architecture, and assembly language programming revealed significant challenges for most candidates. There seemed to be a lack of understanding of CPU architecture, particularly the role of the accumulator and the ALU. Additionally, lack of understanding of the concept of data validation was noted, often confused with verification. Also, the assembly language programming part demonstrated that candidates had difficulty to answer properly when it comes to addressing modes, instruction execution, and debugging techniques. This inability to effectively trace and analyse assembly code might be due to a lack of practice and hands-on experience.

Paper 2B

Question 1

The question on computer hardware and architecture revealed a mixed performance among candidates. While most candidates attempted the questions and answered several parts correctly, there were significant challenges in key areas that require deeper understanding and explanation. Many candidates did not correctly identify and explain internal storage types. Understanding of the RAM capacity differences between cameras and PCs was generally good, though explanations were often incomplete, and differentiating between camera RAM and internal storage proved challenging for most candidates, with many identifying only one distinguishing factor. Candidates demonstrated a poor understanding of CPU architecture, particularly regarding the data bus and its functions. Most candidates found it also difficult to properly outline and explain the differences between data and information. Overall, the candidates' responses demonstrate a lack of depth in understanding the role of different components and their interactions.

Question 2

The question on data validation and error checking revealed significant challenges for the candidates. While the basic concept of validation was understood by many and answered correctly, candidates did not identify correct validation checks, often confusing them with verification methods. Also, there was incorrect application of the terms in context, leading to frequent mistakes. Another issue was the inability to perform accurate calculations and follow precise instructions, when required to calculate the check digit, particularly with the algorithm for odd/even positions. Moreover, most candidates did not correctly convert the required logic into Java code, commonly confusing division with modulo operations.

Question 3

The question on programming fundamentals, including flowcharting, code analysis, and error correction, revealed significant challenges for the candidates. While basic flowcharting skills were evident and part (a) was generally well-answered, the ability to translate these into code and identify errors proved to be a major weakness. A recurring theme was the lack of understanding of fundamental programming concepts, such as data types, variables, and control flow. Across parts (b) to (e), which included a mix of identification questions, TRUE or FALSE questions, and practical tasks, the results were unsatisfactory. In addition, the inability to identify and correct errors in code as per part (f) indicates also a lack of debugging skills and a systematic approach to problem-solving.

Question 4

The question on digital systems and logic design elicited a mixed response from the candidates. While candidates showed competency in some areas, significant difficulties were observed in practical applications and detailed explanations, particularly related to digital logic and binary systems. This might indicate the need for more focused teaching and practical exposure to scenario-based applications.

A solid understanding of the binary system was evident among the candidates. In fact, candidates performed well in part (a), with accurate explanations of the binary system's operation. However, there were some challenges in explaining the system's operation in detail, especially in justifying why it qualifies as a dedicated system. In part (b) candidates generally demonstrated a strong understanding of the binary system, with difficulties noted when giving detailed explanations about binary processing. Performance in part (c) was varied, particularly in questions related to the seven-segment LED display. The responses to part (d) of several candidates indicate a lack of understanding of basic logic circuit principles. In fact, there were noticeable issues with the calculation of the number of AND gates required and in completing the truth table in part (e)

Question 5

This question on database design and management showed significant gaps in candidates' knowledge. While there was some understanding of basic concepts like primary keys, the overall performance was unsatisfactory. In part (a) many candidates did not correctly identify and assign data types, with only a few providing all correct answers. There was a mix of results in part (b) but identifying the primary key based on the description proved challenging for many candidates. The responses in part (c), showed that candidates have a poor understanding of the concept of table relationships. The question involving foreign keys, in part (d), was particularly difficult for candidates, with the majority either answering incorrectly or not at all. In addition, candidates did not formulate valid database queries as per part (e), resulting in mostly incorrect answers. Even in multiple-choice questions such as in part (f), candidates did not distinguish between software licenses, correctly identify authentication methods, and understand LAN functionality. In part (g), only a few candidates showed proper understanding in areas related to user guides, documentation content, and related IT concepts.

Chairperson

Examination Panel 2024