



**L-Università
ta' Malta**

**MATSEC
Examinations Board**



Examiners' Report

SEC Computing

Main Session 2023

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A. STATISTICAL INFORMATION

The total number of candidates who registered to sit for Computing was 699, which is 60 candidates more than in 2022. Of these registrations, 497 opted for Paper IIA and 202 opted for Paper IIB.

Table 1 shows the distribution of grades for the May 2023 Session of the examination.

GRADE	1	2	3	4	5	6	7	U	ABS	TOTAL
PAPER A	50	107	140	105	41	-	-	39	15	497
PAPER B	-	-	-	38	18	31	20	50	45	202
TOTAL	50	107	140	143	59	31	20	89	60	699
% OF TOTAL	7.2	15.3	20.0	20.5	8.4	4.4	2.9	12.7	8.6	100.0

Table 1: Distribution of grades for SEC Computing 2023, Main Session

B. GENERAL REMARKS

Coursework

The examiners moderated a total of 133 projects in eight state, church, and independent schools. The coursework mark of five candidates was deducted by three marks. In addition, 27 projects submitted by private candidates were corrected and interviewed.

The examiners pointed out that, in general, the work submitted by private candidates met the standards set by the SEC, and the grades attained were notably high. In fact, 91% of the projects received 80% or more of the maximum possible mark with the lowest scoring at 63%. Furthermore, many of these projects 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 the SEC.
- The moderated work was generally of the indicated quality, suggesting hard work by most educators and candidates.
- Most schools utilized a wide range of programming concepts and design features, such as GUIs, array data structures, and object-oriented programming. The projects were varied and covered a range of scenarios, including quizzes, games, and practical applications like calculators and restaurant menus.
- The marking scheme was generally used appropriately by the moderators, and marks were awarded fairly based on the quality of the programming work and documentation submitted. However, there were some instances where the marks awarded did not fully align with the official marking scheme, particularly with regards to the testing section and the completeness of the solution.
- The coursework projects submitted demonstrated average-to-good level of skill and competence in programming.

- The test data plan should be logically structured to assess different parts of the program, rather than focusing solely on one aspect, such as the main menu. This approach will aid in enhancing the program and making necessary adjustments to specific program segments when needed.

Written Examination

Candidates were expected to demonstrate proficiency in all areas covered by the syllabus. The papers encompassed a diverse set of questions, spanning from basic knowledge inquiries to comprehension, application, analysis, synthesis, and evaluation questions. In Paper 2, particularly, most questions were scenario-based, with formats ranging from identification and descriptive to fill in the blanks, multiple choice, problem-solving, and knowledge application.

C. COMMENTS ON PAPER I

Question		1	2	3	4	5	6	7	8	9	10	Total
Max Mark		6	7	10	8	8	14	8	11	5	8	/85
Paper 2A	Mean	4.5	5.9	7.7	4.5	6.7	12.4	5.9	7.6	3.0	5.1	63.2
	Standard Deviation	1.1	1.6	1.8	2.1	1.9	1.8	1.7	2.2	1.3	1.8	11
	Facility Index	0.8	0.8	0.8	0.6	0.8	0.9	0.7	0.7	0.6	0.6	0.7
	Discrimination Index	0.4	0.6	0.7	0.7	0.6	0.7	0.7	0.7	0.6	0.6	-
Paper 2B	Mean	3.6	3.7	5.8	2.1	3.8	9.7	3.3	5.1	1.7	3.2	41.9
	Standard Deviation	1.3	2.5	2.4	2	2.9	3.1	2.2	2.4	1.4	1.7	15
	Facility Index	0.6	0.5	0.6	0.3	0.5	0.7	0.4	0.5	0.3	0.4	0.5
	Discrimination Index	0.4	0.6	0.7	0.7	0.7	0.8	0.8	0.7	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, denoted as S.D., measures how much the scores vary or how widely they are spread out. To illustrate, most candidates in Paper IIA scored between approximately -1.1 and +1.1 relative to the mean, falling within the range of around 3.4 to 5.6 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, questions 4, 9, and 10 in Paper I were found to be the most challenging. In the case of Paper IIB candidates, the most difficult questions were 4 and 9, followed by questions 7 and 10. Item discrimination refers to the ability of a question to effectively distinguish between different candidates. A value closer to 1 indicates better discrimination.

Question 1

Both paper A and paper B candidates generally performed well on the multiple-choice questions, with most attempting all six sub-questions. Responses indicate good knowledge of computer architecture. However, the attempt in ensuring consistent accuracy across all sub-questions was insufficient.

Question 2

Candidates showed strong performance in identifying correct logic gates and understanding digital logic concepts, with most excelling in parts (a), (b), and (c). However, challenges arose in translating this understanding into a logic circuit in the final section (d), indicating room for improvement in implementation.

Question 3

In general, responses indicate competence in identifying advantages and disadvantages associated with internet use and understanding the benefits and limitations of wireless networks. Moreover, responses exhibited proficiency in recognizing peripheral devices and software designed to aid customers with special needs. However, the attempt of some candidates to identify disadvantages of internet use or in data encryption with passwords, was poor. Most candidates correctly identified the necessary services related to the internet.

Question 4

In section (a), the attempt to distinguish the purpose and application of antivirus software was inadequate, leading to incorrect answers. For section (b), there was generally a strong recognition of the importance of backups in data recovery, with most candidates providing appropriate responses. In sections (c) and (d), the responses were varied. While many correctly identified the laws, the attempt of some candidates to articulate the specific principles associated with them was inadequate. In section (e), candidates were asked to identify peripherals required for teleworking. The performance in this question was average, as some candidates encountered difficulties in naming two additional peripherals.

Question 5

Overall, candidates performed well in the assessment of data representation. Candidates generally excelled in making conversions and showcasing their knowledge of binary and hexadecimal forms, with most responses being accurate. Common errors were noted in section (d). For instance, many candidates incorrectly asserted that the hour part of the digital clock is 60 and not 24, thus deducing that 5 bits were insufficient. Nevertheless, these difficulties in section (d) did not significantly impact the overall performance.

Question 6

In section (a), candidates generally demonstrated a commendable understanding of the concept of a dedicated system. In section (b)(i), candidates encountered difficulties when defining an algorithm, often referring to it as a program instructing a computer. In section (b)(ii), candidates were notably proficient in completing the missing parts of flowcharts. In section (b)(iii), candidates generally performed well in filling in the blanks with the correct terms. In section (b)(iv), candidates exhibited varying degrees of success in distinguishing between the terms data and information, with some instances of confusion. In section (b)(v), determining whether the loop in the flowcharts terminates presented challenges for some candidates, resulting in varied responses.

Question 7

It is evident that the candidates' understanding of database concepts exhibited significant variation. In section (a), responses generally demonstrated competence in identifying the correct primary keys for certain entities, particularly the Products and Customer tables. Section (b) highlighted a need for improvement in the comprehension of the meaning of relationships between entities. Similarly, in section (f), a significant number of candidates provided incorrect responses, indicating misconceptions about data validation methods. The performance in parts (c), (d), and (e) was generally adequate, and most candidates successfully identified field names, relationships between tables, and fields with specific data types.

Question 8

In section (a), candidates generally performed well by delivering accurate responses, especially in identifying the advantages of running 'TourApp' on smartphones in contrast to desktop PCs. In section (b), responses indicate a solid understanding of user interfaces, with the majority providing precise explanations. Section (c) exhibited a diverse range of performances. While many candidates effectively explained the concept of raster images and their associated reasons, and a substantial number correctly responded to questions (ii) and (iii), achieving full marks was less common in this part. In section (d), candidates occasionally encountered challenges in distinguishing between input and output devices or in providing a scenario-relevant application, resulting in mixed responses.

Question 9

Candidates' performance in understanding different IT roles exhibited mixed results. While some candidates correctly identified the roles, many responses' attempt to differentiate between them was insufficient. Sections (a) and (b) saw a high percentage of candidates correctly identifying the roles of a programmer or software developer. However, in sections (c), (d), and (e), responses varied between correct and incorrect answers.

Question 10

In section (a), there was a common misunderstanding regarding the purpose of the 'studentAttendance' array, with many candidates incorrectly associating it solely with keeping students' attendance rather than its actual usage for tracking daily attendance for each student from Monday to Friday. Despite this, candidates generally performed well in answering parts (b), (c), (d), and (e), with many providing correct responses regarding data types, maximum recordable days, and code execution. However, the performance in sections (f) and (g) was poor.

D. COMMENTS ON PAPER 2

Question		1	2	3	4	5	Total
Paper 2A	Max Mark	15	14	16	21	19	/85
	Mean	7.4	6.4	7.5	14.6	10.1	45.9
	Standard Deviation	3.8	3.9	4.4	3.7	4.9	17.2
	Facility Index	0.5	0.5	0.5	0.7	0.5	0.5
	Discrimination Index	0.7	0.8	0.9	0.8	0.9	-
Paper 2B	Max Mark	16	14	18	23	14	/85
	Mean	7.6	6.2	6.0	12.0	3.6	35.3
	Standard Deviation	3.7	2.8	4.2	4.1	3.1	14.3
	Facility Index	0.5	0.4	0.3	0.5	0.3	0.4
	Discrimination Index	0.8	0.8	0.9	0.8	0.8	

*Table 3: Analysis of raw scores for Paper IIA and Paper IIB questions***Paper 2A***Question 1*

Sections (a), (b), and (c) were generally well-answered, showcasing a good understanding of machine logic concepts. However, sections (d) (i) to (v) revealed significant challenges. Responses indicate that attempt to comprehend key concepts related to computer architecture, including instruction sets, formats, opcodes, operands, and addressing modes was inadequate. This resulted in incorrect or incomplete responses in these sections.

Question 2

Responses indicate a mixed understanding of CAD/CAM software, batch processing, and operating systems. In sections (a) and (b), responses indicate a good understanding of CAD/CAM but the attempt to linking it to 3D printing was inadequate. The performance in section (c) was inadequate. In section (d), the performance in identifying batch processing advantages and disadvantages for 3D printing was adequate. However, the performance in section (e) was very poor.

Question 3

In section (a), some responses were irrelevant, such as 'IT manager.' However, many candidates performed very well in this section. Section (b) received positive responses, with numerous candidates accurately identifying three methods for analysing the current system. Responses in section (c) indicate poor performance in defining phased changeover. Section (d) involved Java programming-related queries, showcasing varying levels of knowledge among candidates. While most answered correctly, some struggled with class and loop naming.

Question 4

In section (a), responses indicate difficulties in identifying accurate examples of secondary storage devices, often mentioning incorrect options such as pen drives, floppy disks, and DVD ROMs. In section (b), several candidates correctly associated formatting with system software and provided well-defined explanations of disk filing systems and the purpose of formatting. In section (c), most candidates successfully identified the suitable network for connecting digital kiosks within the museum. In section (d), candidates generally performed satisfactorily, with the majority delivering clear explanations of the distinctions between 8-bit and 10-bit color depth touchscreens and their effects on image quality. In section (e) the performance was average, with some responses incorrectly selecting dot matrix printers. However, correct responses were given for other aspects, such as naming alternative printer types and elucidating the role of I/O buffering in printing. In section (f), responses indicate good knowledge of OCR software. However, the attempt to explain how OCR scans and digitally converts tickets was insufficient, although many effectively constructed the requested flowchart.

Question 5

In section (a), some responses included accurate explanations regarding the utility of assembly language, exposing a prevalent knowledge gap among the majority. In section (b), most responses adequately included the disparities between assembly language and Java. In section (c), responses indicate familiarity with IDEs and their functionalities. The performance in section (d) was adequate. Nonetheless, in section (e), the attempt in recognizing the assembler as the requisite language translator was poor, leading to subsequent inaccuracies in parts (f) and (g). In section (h), a subset of responses confused the term "variable" with "mnemonic," yielding erroneous responses in part (i). Still, the performance in parts (ii) through (vi) was adequate.

Paper 2B

Question 1

In sections (a) and (b), most candidates attempted the question. However, some answered parts of the question correctly, while other responses confused OR and AND gates. In sections (c) and (d), responses indicate poor comprehension. This was particularly noticeable in areas related to CPU specifications, computer architecture, and assembly language, leading to confusion and incorrect responses in subsequent parts of the questions.

Question 2

In sections (a), (b), and (c), many responses recognized the term's abbreviation and its general utility but encountered challenges when asked to specify practical applications. In section (d), numerous responses included vague definitions. The performance in sections (e) through (h) was adequate. However, in section (i), where the location of the laptop OS's storage was queried, a considerable number of candidates provided inaccurate answers. In the context of data backup in section (j), the majority of responses were satisfactory.

Question 3

In section (a), responses indicate that several candidates misinterpreted the question and provided inaccurate responses, frequently citing roles such as 'computer designer' or 'data entry clerk' instead.

Additionally, in section (c), several responses demonstrated a lack of familiarity with this type of changeover. The performance in Java programming section in (d) was insufficient, as difficulties in various facets of Java programming and logical reasoning were encountered.

Question 4

Sections (a) and (b) included a range of responses, with some responses providing explanations and functions related to DVD storage and hard disk formatting, though more specificity and detail were needed in the responses. Responses indicate poor performance in section (c), resulting in incorrect answers. In section (d), the performance in the responses when discussing the operating system's role in handling storage device formatting was average. General responses in section (e) were adequate. Similarly, in section (f), responses demonstrated a sound understanding of printer types and their potential applications. The performance in section (g) was average, with the attempt to identify additional output devices suitable for museum use was poor. In section (h), responses indicate difficulties with the acronym OCR and its function, although most effectively created flowcharts illustrating the ticket scanning process.

Question 5

Many responses indicate a difficulty regarding the differentiation between low-level and high-level languages, leading to instances of misclassification, such as erroneously categorizing Java as a low-level language. Essential terms like source code, executable code, and language translators often lacked clarity. In section (c), responses frequently included only one distinction. Similarly, in section (d), responses frequently omitted references to an Integrated Development Environment (IDE) and neglected to explain its use. Although responses indicate a reasonable grasp of the various types of language translators in sections (f) to (i), it was evident that challenges were encountered in relating these translators to their appropriate applications.