COMPUTER SCIENCE

> **Paper 0478/11**
> **Paper 11 Theory**

Key messages

Candidates often gave appropriate responses to the questions and justified their responses when required. Candidates continue to show a strong ability in logic questions. Candidates showed an increasing understanding of the command words and their requirements for their answer.

General comments

Candidates need to carefully read the questions to make sure they are giving answers that are appropriate in the context. Their answers should also take these contexts into account, making sure that the points they make are relevant to the context.

Comments on specific questions

Question 1

(a) (i) Most candidates provided the correct response. The most common incorrect response was video.

(ii) Most candidates provided the correct response. The most common incorrect response was that it is not a compressed file.

Question 2

(a) (i) Many candidates gave the correct response. It would be beneficial for candidates to be accurate with their response. Some candidates gave a response that was not accurate enough such as memory unit.

(ii) Many candidates gave the correct response. Most candidates were able to provide the execute stage.

(iii) Many candidates were able to provide at least two correct components.

Question 3

(a) Many candidates provided the correct response. It would be beneficial for candidates to be accurate with their response. Some candidates gave a response that was not accurate enough such as USB. This is too vague as this could refer to several things such as a cable, a connection or a transmission method, as well as a storage device.

(b) Some candidates were able to provide a correct response. Most candidates were able to gain a mark for understanding a laser it shone at the disk. It would be beneficial for candidates to have a more accurate and detailed understanding of the operation of optical storage.

(c) (i) Many candidates were able to provide a correct response. The most common correct answers were relating to size and durability.

(ii) Many candidates were able to provide a correct response. It would be beneficial for candidates to understand that if brand names are given for software they cannot be considered.

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Question 4

(a) Some candidates were able to give a correct response. Many candidates stated that a computer only understands binary. It would be beneficial for candidates to know and demonstrate the use of logic gates in a computer and how this relates to binary data.

(b) Most candidates gave the correct response.

(c) Most candidates gave the correct response.

Question 5

Many candidates were able to gain marks for some correct working, but few candidates were able to provide a correct answer.

Question 6

(a) (i) Many candidates recognised that they both checked for errors. It would be beneficial for candidate to understand that the translators check for errors, but they do not debug the errors. Some candidates stated that they both debug errors.

(ii) Many candidates were able to provide a correct response. The most common correct answers related to the translation of the code and the reporting of errors.

Question 7

(a) Some candidates were able to provide a correct response. Some candidates provided examples of a biometric device, this was not enough detail for a correct response.

(b) Many candidates provided a correct response. The most common correct answer was that a biometric password cannot be guessed.

(c) Some candidates were able to provide a correct response. It would be beneficial for candidates to understand that if they are given context in a question, they should apply their answer to the context. Many candidates did not apply their answer to the context given.

(d) Many candidates were able to provide a correct response. It would be beneficial for candidates to understand that it will not stop the data being stolen.

Question 8

(a) Many candidates were able to provide a correct response. The most common incorrect response was the incorrect placement of the NOT gate before the NOR gate.

(b) Many candidates were able to provide a correct response.

Question 9

Some candidates were able to provide a correct response. The most common incorrect responses were IP addresses containing the domain name and URL not given as a type of address.

Question 10

Many candidates gave a correct response with a wide range of answers seen from candidates.

Question 11

(a) Most candidates gave a correct response. The most common incorrect responses were for buffer.

(b) Most candidates gave a correct response. It would be beneficial for candidates to make sure that they have read all the information in the question as some candidates gave printer as their response.

(c)   Most candidates gave a correct response.

Question 12

Most candidates were able to name three ethical issues. Some candidates went on to provide a suitable description.

COMPUTER SCIENCE

> **Paper 0478/12**
> **Paper 12 Theory**

Key messages

Candidates often gave appropriate responses to the questions and justified their responses when required. Candidates continue to show a strong ability in calculations and logic questions. Candidates showed and increasing understanding of the command words and their requirements for their answer.

General comments

Candidates need to carefully read the questions to make sure they are giving answers that are appropriate in the context. Their answers should also take these contexts into account, making sure that the points they make are relevant to the context.

Comments on specific questions

Question 1

(a) Most candidates were able to provide a correct response.

(b) Most candidates were able to provide a correct response. Some candidates did not show their working.

Question 2

(a) Many candidates were able to provide a correct response. Some candidates converted 15 as though it were a denary value, rather than a hexadecimal value.

(b) Many candidates were able to provide a correct response. Candidates are reminded to read all the information given in the question. Some candidates gave HTML colour codes and MAC address as their response. These could not be considered as they were given in the question.

(c) Many candidates were able to describe presentation and provide a suitable example. Few candidates were able to describe structure and provide a suitable example.

(d) Few candidates were able to provide accurate reasons for the separation of the two parts. Many candidates gave a vague response about it being easier to create the web page if they are separated. It would be beneficial for candidates to have a greater understanding of the reasons for the separation of structure and presentation.

Question 3

(a) Many candidates provided a suitable response for ISP and HTTP. Some candidates were able to provide a suitable response for browser. It would be beneficial for candidates to understand that a web browser is a piece of software. This information was missing from many candidates' responses. Few candidates were able to provide a suitable response for cookie. Many stated what a cookie stores, but few referred to it being a file.

(b) Many candidates were able to provide a correct response. The most common incorrect response was that a firewall is software based only.

(c)   Few candidates were able to provide a fully correct answer. Candidates are reminded that if they are given context in a question that this should be applied to their response. Many candidates gave a generic description of the operation of a firewall and did not apply this to the context given.

Question 4

(a)   Some candidates were able to provide a correct response. Many candidates gave advantages of a high-level language rather than a description of what it is.

(b)(i) and (b)(ii) Many candidates were able to provide a correct response. The most common errors were confusing the two types of software.

Question 5

(a)   Many candidates were able to provide a correct response. The most common incorrect response was the incorrect placement of the NOT gate before the XOR gate.

(b)   Many candidates were able to provide a correct response.

Question 6

(a)   Many candidates were able to name two suitable methods. The most common two methods given were phishing and pharming. Some candidates were able to provide a suitable description. It would be beneficial for candidates to understand that a user needs to click on a link or an attachment to open the fake web page or trigger a download of malicious code, and not just open the email.

(b)   Many candidates were able to provide a correct response.

(c)   Many candidates were able to provide three correct issues. Some candidates were able to give a prevention for each. It would be beneficial for candidates to understand that a back-up of data is not a method to help prevent the data being damaged. It can server to replace the data if it is damaged, but it does not stop the data being damaged.

Question 7

(a)   Many candidates were able to provide a correct response.

(b)   Few candidates were able to provide a fully correct response. It would be beneficial for candidates to have a greater understanding of the operation of the different types of storage.

Question 8

(a)   Many candidates were able to provide a correct response.

(b)   Many candidates were able to provide a correct response. Some candidates did not apply their response to the context given in the question and did not relate their response to software development.

COMPUTER SCIENCE

**Paper 0478/13
Paper 13 Theory**

Key messages

Candidates often gave appropriate responses to the questions and justified their responses when required. Candidates continue to show a strong ability in calculations and logic questions. Candidates showed an increasing understanding of the command words and their requirements for their answer.

General comments

Candidates need to carefully read the questions to make sure they are giving answers that are appropriate in the context. Their answers should also take these contexts into account, making sure that the points they make are relevant to the context.

Comments on specific questions

Question 1

(a)   Most candidates were able to provide a correct response. The most common incorrect answer was microphone identified as an output device.

(b)   Some candidates provided a correct response. Many candidates named storage devices, rather than the two other types of storage.

Question 2

(a)   Most candidates were able to provide a correct response.

(b)   Many candidates were able to provide a correct response. The most common correct answers were low power consumption and compact size.

(c)   Most candidates were able to provide a correct response.

Question 3

(a)   Many candidates were able to provide a correct response.

(b)   Many candidates were able to provide a correct response. The most common error was candidates who named correct logic gates but confused the logic tables for the gates.

Question 4

(a)   Most candidates were able to give domain name and file name, few were able to provide protocol.

(b)   Some candidates were able to provide a correct response. It would be beneficial for candidates to understand how a URL is concerted to an IP address.

(c) (i)   Most candidates were able to provide a correct response.

   (ii)   Many candidates were able to provide a correct response.

Question 5

(a)   Many candidates were able to name the three stages of the cycle. Few candidates were able to give a detailed description of the purpose of the CPU. It would be beneficial for candidates to have a greater understanding of the purpose of the CPU.

(b)(i) Many candidates were able to provide a correct response. The most common correct answers were memory data register and arithmetic logic unit.

(ii)   Some candidates were able to provide a correct response. It would be beneficial for candidates to have a more accurate understanding that a register storing data. It would be beneficial for candidates to understand that the storage is only temporary.

(c)(i) Many candidates were able to provide a correct response. Most stated that it was RAM and ROM, that RAM is volatile, and ROM is not volatile.

(ii)   Few candidates were able to provide a correct response. Most candidates listed things that could be stored in secondary storage, rather than the need for it.

Question 6

(a)   Most candidates were able to provide a correct response.

(b)   Most candidates were able to provide a correct response.

(c)   Few candidates were able to provide an accurate description of the operation of a scanner. It would be beneficial for candidates to have an increased understanding of this.

(d)   Most candidates were able to provide a correct response.

Question 7

(a)   Many candidates were able to provide a correct response. Candidates are reminded of the need for accuracy in their answer, so stated that multiple bits were sent, but they did not state that this happened at the same time.

(b)   Many candidates referred to long distance, and some stated the issue this could cause.

(c)   Few candidates were able to give a fully correct response. Many gave a vague response about them both being used to detect errors. Candidates are reminded of the need for accuracy in their response.

Question 8

Many candidates were able to provide a correct response.

COMPUTER SCIENCE

Paper 0478/21

Paper 21 Problem-solving and Programming

Key messages

Candidates who had previously worked through the pre-release material (Friends of Seaview Pier) and who completed the tasks by producing their own programming code were able to demonstrate appropriate techniques for solving this problem.

Candidates who took care to ensure that they fully answered the questions that were asked, taking care to ensure their responses matched the context of the questions, scored higher marks than those who gave generic responses. Examples included: candidates who described how their program achieved certain tasks; candidates who supplied detailed annotations to their program code; candidates who took care to name or describe variables, constants, and arrays appropriately to match their purpose.

Candidates are advised to answer algorithm questions as stated so that pseudocode questions are answered using pseudocode, program code questions are answered using program code and flowchart questions are answered using a flowchart.

Candidates are advised to make sure that any answers they provide are appropriate for the command word used in the question. For example, questions beginning with explain will require more detail than those beginning with state. In addition, explain-type questions usually require an explanation of how something was done, rather than a simple description of what was done.

General comments

Candidates demonstrated a good overall understanding of the requirements of the paper with very few questions left unanswered.

Candidates demonstrated a good understanding of how data could be stored and validated during the completion of the pre-release tasks; however, candidates should be aware that data structures, in the context of these tasks, refers to arrays, variables, and constants, not data types.

Candidates are reminded that they should avoid using punctuation marks and spaces in variable, constant, and array names.

Candidates are advised to make themselves fully aware of the concept of test data and how it is used to test programs during development; including the different types of test data and how the purpose of each of these is defined.

Comments on specific questions

Section A

Question 1

(a) Candidates who fully identified and described the data structures they used when completing **Task 1** scored high marks. Various arrays, variables, and constants could have been used in this context. Some candidates lost marks by naming data types instead of data structures.

(b) Candidates demonstrated a good understanding of the concept of either counting or totalling, depending on how they chose to answer this question. Both solutions are appropriate with many candidates recognising the need for a variable that was initialised to zero and then incremented to either find the number of new members who had paid or the total amount of money that was collected. Candidates who opted for the former approach also needed to multiply the number of new members by the membership fee at the end.

(c) Many candidates identified appropriate validation checks that could be used to validate data entry that was intended to find out if a new member wanted to work as a volunteer. Other candidates took an approach that checked if the data entered matched a set of required inputs, and if it did not, measures were taken to issue an error message and enable a re-input.

(d) The vast majority of candidates made a good effort to provide a programmed solution to complete **Task 3**, with many high-scoring responses seen. Candidates either inputted the names of the sponsors, along with the message they required on their plaque, while other candidates transferred the names of sponsors from other parts of their program. Both solutions were equally acceptable. Solutions written in code often achieved higher marks than those supplied using flowcharts, because the coded answers were more precise and better matched the requirements of the task.

(e) Candidates were required to explain how their program completed part of **Task 2** and enabled a user to output a list of names of members in a range of categories. Many candidates achieved marks by discussing the use of a menu structure that allowed a user to make a choice, with that choice then determining which list to print. However, some candidates incorrectly explained how the lists would initially be set up, which does not answer the question.

Section B

Question 2

The vast majority of candidates achieved some marks here, to demonstrate that they could identify descriptions related to a range of data types.

Question 3

Candidates were expected to give examples of normal and erroneous test data in relation to validating the input for an email address. They were also asked to give a reason for their choice of test data. Many good responses were seen, however, some candidates offered incorrect email addresses as their erroneous data, which does not answer that part of the question correctly. Some email addresses may be incorrect due to spelling mistakes, for example, but if they are valid email addresses, they would still be classed as normal data and accepted by the system.

A few candidates incorrectly named specific validation checks in response to this question.

Question 4

(a) Candidates were required to complete a flowchart for a given task, with the flowchart structure, variables, and arrays to be used, given in the question. Some candidates achieved high marks; however, marks were lost where candidates did not use the variables given and inserted their own variable names. Candidates also lost marks by not using the required array structure and array indexing.

(b) Candidates were required to write a range check in pseudocode for the input into the flowchart in **part (a)**. The best responses included a conditional loop structure which included an error message to advise of a data entry error and a reminder of the parameters for the data entry, along with a re-input. Candidates whose data entry checks looked for a correct input, rather than an incorrect one, found it more difficult to enable the data to be re-entered.

Question 5

(a) The vast majority of candidates achieved some marks for this trace table question, with many candidates achieving high marks. Candidates are advised to make sure that they follow the algorithm through to completion, rather than trying to insert values into columns by making assumptions as to what they think is happening.

(b)   Most candidates achieved at least one mark here, with many candidates recognising that the algorithm was finding 3-digit numbers whose first and last digits were the same. A small number of candidates gave the above level response that the algorithm was looking for 3-digit palindromes.

Question 6

(a)   The vast majority of candidates correctly identified the fact that the table GAMES had 8 fields. A typical incorrect answer was that it had 2 fields.

(b)   The vast majority of candidates recognised the fact that a primary key is a unique identifier.

(c)   Most candidates achieved at least one mark for this question. Some common errors for each of the marking points were that: some candidates did not include all the required fields in their query-by-example grid; some candidates did not enable the sort as ascending, in the GameName field; some candidates used incorrect search criteria in the NumberStock and/or OnOrder fields.

COMPUTER SCIENCE

> **Paper 0478/22**
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> **Paper 22 Problem-solving and Programming**

Key messages

Candidates who had completed the tasks for the pre-release (Wildlife Park) were able to provide answers for **Section A** that showed good understanding of the tasks undertaken. Candidates, who read each question carefully and answered the question, as set on the paper, performed better than those who had memorised their solution and used all of that information without considering what information needed to be included in their answer. For example, the algorithm required for **Question 1(d)** only required bookings for one day and the explanation for **Question 1(e)** was about a family ticket only.

Candidates should take care when identifying variables and constants to ensure that the identifier declared could be used in a program. Identifier names must not contain special characters including brackets and spaces. Once declared the same identifier name should be used throughout the answer.

Candidates should take care to read each question carefully to ensure they provide the type of answer asked for in the question. For example, candidates need to provide an explanation of the pseudocode or code for some parts of **Question 1**.

Trace tables should be clearly completed in ink, not in pencil with alterations made in ink, because both answers are visible when the answer is scanned.

General comments

Most candidates attempted all the questions on the paper.

Comments on specific questions

Section A

Question 1

(a) (i)   Many candidates correctly identified a constant used for **Task 1** and stated the value and use. Common errors included obvious spaces in the name of the constant, specifying a data type instead of a value, and not being specific enough in when identifying the constant, for example `AdultTicketPrice` rather than `AdultTicketPriceOneDay`.

   (ii)   Generally, well answered by most candidates.

(b)   Some candidates explained how their program showed the next seven days that were available for booking as specified in **Task 1**, either by displaying the next seven days or dates. Candidates that provided pseudocode or code for this part of **Task 1** needed to include an explanation of the code as well. Some responses incorrectly included an explanation checking for tickets available, this was not required as the instructions for **Task 1** stated, 'assume that there are tickets available for any valid day'.

(c) Most candidates identified a suitable method of ensuring that each booking number was unique, better candidates explained how their program implemented the method. For example, 'A variable `BookingNumber` was set to the current number of days in the year at the start of the day and incremented by one every time a new booking was made that day.' would be a suitable answer.

Candidates that provided pseudocode or code for this part of **Task 2** needed to include an explanation of the code as well.

(d) Candidates that provided pseudocode or code for the part of **Task 2** specified in the question usually scored high marks. Those candidates drawing flowcharts often scored lower marks, as the flowcharts lacked the detail required. Many responses were far longer than required as some candidates incorrectly provided code for the whole of **Task 2**. Some candidates did not attempt this part of the question.

(e) Those candidates that provided the programming statements used to complete **Task 3** together an explanation of each statement usually scored high marks. Unlike **part (d)**, this answer requires an explanation of how each of the candidate's programming statement works together with the programming statement used.

All programming statements included in an answer must be explained in order the be creditworthy. Some candidates did not attempt this part of the question.

Section B

Question 2

(a) The full range of marks was seen for this question. Most candidates identified the error in line twelve. Many candidates identified the error in line eighteen. Identifying the error in line eight proved more challenging for many candidates.

(b) Most candidates identified at least one type of check included in the algorithm. Better responses included a description of how the check was applied by the algorithm. A common error seen was to identify a check that was not included in the algorithm, for example a presence check.

(c) Candidates whose responses identified the data used for testing the algorithm usually scored good marks for this part of the question. A common error seen was to omit the test data asked for in the question.

Question 3

(a) Most candidates included an example of a one-dimensional array. Better responses also included a relevant description. For example, 'A one-dimensional array is a column of items with the same data type stored under a single identifier name. An example of an array declaration is `DECLARE MyArray[1:10] OF INTEGER`.'

(b) Few responses included the required description of using the array index to search for a value in the array. Some candidates did not attempt this part of the question.

Question 4

(a) Most candidates correctly completed some columns in the trace table. Better candidates traced the algorithm carefully and completed all the columns accurately. Common errors included putting speech marks round the output or outputting `Error` instead of `30`.

(b) Many candidates identified a suitable improvement.

(c) Many candidates correctly identified the process of incrementing the `Serve` variable.

Question 5

(a) Most candidates completed part of the query-by-example grid correctly with accurate Field, Table and show rows. The completion of the Criteria row proved more challenging for many candidates. The best responses demonstrated good understanding of the criteria required, for example:

Field:	ItemNumber	Description	Uses	StockLevel
Table:	NURSE	NURSE	NURSE	NURSE
Sort:				
Show:	☑	☑	☐	☐
Criteria:			= 1	<[ReorderLevel]
or:				

(b) Many candidates correctly identified the duplication of data between the Uses and SingleUse fields.

COMPUTER SCIENCE

Paper 0478/23

Paper 23 Problem-solving and Programming

Key messages

Candidates who had previously worked through the pre-release material (Seaview Castle Visitor Centre) and who completed the tasks by producing their own programming code were able to demonstrate appropriate techniques for solving this problem.

Candidates who took care to ensure that they fully answered the questions that were asked, taking care to ensure their responses matched the context of the questions, scored higher marks than those who gave generic responses. Examples included: candidates who described how their program achieved specific tasks; candidates who supplied detailed annotations to their program code; candidates who took care to name and describe the use of variables and arrays appropriately, to match their purpose.

Candidates are advised to answer algorithm questions as stated, so that pseudocode questions are answered using pseudocode, program code questions are answered using program code and flowchart questions are answered using a flowchart.

Candidates are advised to make sure that any answers they provide are appropriate for the command word used in the question, such that, for example, questions beginning with explain will require more detail than those beginning with state. In addition, explain type questions usually require an explanation of how something was done, rather than a simple description of what was done.

General comments

Candidates demonstrated a good overall understanding of the requirements of the paper with very few questions left unanswered.

Candidates demonstrated a good understanding of how data could be stored and validated during the completion of the pre-release tasks.

Candidates are reminded that they should avoid using punctuation marks and spaces in variable, constant and array names.

Candidates are advised to make themselves fully aware of the concept of test data and how it is used to test programs during development; including the different types of test data and how the purpose of each type of test data is defined.

Comments on specific questions

Section A

Question 1

(a)	Candidates who gave the names and uses of appropriate variables and arrays for **Task 1** or **Task 2** scored high marks. Various variables and arrays could have been used in this context. The vast majority of candidates answered this question appropriately, however, marks were lost for inappropriate spaces or punctuation in names; or uses that were too vague.

(b) Candidates were required to describe how the validation of input could be tested to make sure it worked, which means that a description of the use of test data is expected as a response. Some candidates achieved some marks here, but only descriptions involving different types of test data and what would be the expected outcome received full marks.

(c) In order to achieve high marks, candidates would have to explain how their program determined which bookings for the same meeting room were for two or more days, and then they would show how the discount was calculated. Some candidates achieved high marks for this.

(d) Candidates were asked to produce an algorithm to show how their program completed a specific part of **Task 2** and many high scoring responses were seen. Some candidates gave flowcharts or code that seemed to cover the whole of the pre-release materials and did not always show the required part of the task in sufficient detail to meet many or all of the mark points. Another common loss of marks was the requirement to output the booking details and cost of the booking, where some of the required booking details were missing.

(e) Most candidates achieved some marks for explaining how their program would find and/or output dates when a particular meeting room was available. However, some candidates incorrectly assumed that the question was requiring an explanation of how a booking was made.

Section B

Question 2

Most candidates achieved at least one mark here, to demonstrate that they could identify descriptions related to a range of types of test data.

Question 3

Candidates were expected to describe the terms variable and constant; and give an example of each. The vast majority of candidates scored some marks here, with candidates generally giving better responses in the section on variables. It is important, when describing constants, that candidates explain that **constants remain the same whilst the program is executing**.

Question 4

(a) The vast majority of candidates achieved some marks for this trace table question, however, few candidates achieved full marks. Candidates are advised to make sure that they follow the algorithm through to completion, and complete the trace table as they go, rather than trying to insert values into columns by making assumptions as to what they think is happening.

(b) A small number of candidates realised that the algorithm was finding prime numbers from the inputted numbers and storing them in an array.

(c) Candidates were required to describe the implementation of a range check to make sure that only numbers greater than 3 were entered. The vast majority of candidates achieved at least one mark here.

Question 5

Candidates were required to complete a flowchart for a given task, with the flowchart structure and the variables to be used, given in the question. Some candidates achieved high marks; however, marks were lost where candidates did not use the variables given and inserted their own variable names. Candidates also lost marks if an inappropriate action was placed in a specific box, such as an output, rather than a conditional statement, in a decision box.

Question 6

(a) The vast majority of candidates correctly identified the Larger field as the one that could be of the Boolean data type.

(b) Most candidates achieved at least one mark for this question. Some common errors for each of the marking points were that: some candidates did not include all the required fields in their query-by-

example grid; some candidates did not enable the sort as ascending, in the PlanetName field; some candidates used incorrect search criteria in the YearLength and/or Larger fields.