COMPUTER SCIENCE

Paper 0984/12
Computer Systems

Key messages

Candidates need to show a greater use of technical terminology in their responses. Candidates also need to note the key terms given in a question and structure their response based upon these. Candidates should note that any context given in a question and provide their responses using the given context.

General comments

If a candidate writes their response to a question on an additional page, they must indicate very clearly on the script where their response is to be found. If answers are crossed out, any new answer must be written very clearly, so that the text can be easily read.

Comments on specific questions

Question 1

(a) Some candidates gave the correct hexadecimal number. Many candidates just gave F instead of FFF.

(b) Many candidates gave the correct denary number. Some candidates gave 4096 instead of 4095.

(c) Many candidates were able to correctly convert the two hexadecimal codes to 12-bit binary numbers. Some candidates did not show the required leading zeros to make sure that they gave a 12-bit binary number as required by the question.

(d) Most candidates correctly converted the two binary numbers to hexadecimal numbers.

(e) (i) Many candidates correctly identified that the hardware described was a microprocessor.

(ii) Most candidates selected the correct option.

(iii) Many candidates identified a suitable type of sensor.

(iv) A minority of candidates accurately described how the database is written to the optical storage. Some candidates tried to describe how data is read from optical storage. The question required candidates to describe how the data is written. The most common correct mark was for ‘a laser is shone onto the disk’.

Question 2

(a) Many candidates were able to give the correct binary answer. Some candidates did not show any working, such as any carries. Candidates are reminded to show all their working in binary addition questions.

(b) Many candidates were able to show the shift performed and the correct denary number as a result

Question 3

(a) Many candidates were able to accurately describe what is meant by an assembly language.

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(b) Most candidates were able to identify the correct translator.

(c) Many candidates were able to select the correct option. The most common incorrect response given was that it is machine independent.

Question 4

(a) Few candidates were able to complete an accurate diagram to show how instructions are decoded and executed. It would be beneficial for candidates to have a greater understanding of the operation of the CPU.

(b) Some candidates were able to give an accurate description of a core. Many candidates inaccurately referred to a core setting the speed of the CPU.

(c) Many candidates were able to explain two ways that the performance could be increased. The most common ways described were increasing the clock speed and increasing the number of cores. Some candidates gave this by example. For example, they stated that it could be upgraded to being a quad core processor. Answers given by example in this way were accepted.

Question 5

(a) Many candidates were able to identify the correct type of interrupt for the scenario.

(b) A minority of candidates provided an accurate description of what happens to an interrupt after it is placed in the queue. Most candidates gave an imprecise description of an interrupt, and little knowledge was demonstrated of the process of servicing an interrupt. Candidates need to have a greater understanding of the process of servicing an interrupt.

(c) Many candidates were able to correctly describe how data is sent using serial data transmission.

(d) Most candidates were able to give two correct suitable benefits.

(e) Many candidates were able to give one correct suitable drawback.

Question 6

(a) Many candidates were able to label the three distinct parts of the URL correctly.

(b) A minority of candidates were able to describe how the proxy server can help stop a DDoS attack. The most common correct mark point was that incoming traffic would be examined. Candidates were able to demonstrate little knowledge beyond this. Candidates need to have a greater understanding of the operation of a proxy server and how it can be used as a security solution.

(c) Many candidates were able to give the correct missing terms in the table. Few candidates were able to give accurate descriptions for HTML and DNS.

(d) Many candidates were able to give the correct missing terms.

Question 7

(a) A minority of candidates accurately described why the smart speaker described was not a robot. Many candidates inaccurately stated that it was not a robot because it could not be programmed.

(b) Most candidates were able to give the correct input device.

(c) Some candidates were able to explain how the smart speaker can make use of machine learning. Most candidates either gave a very generic description of machine learning that was not applied to the context, or they referred to the speaker using machine learning to improve the music chosen rather than improve the input. For example, they said that the machine learning would learn which artists the user liked and to play them first. This was not relevant to the context of improving the voice command input but incorrectly referred to the output played by the speaker.

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(d) Most candidates were able to correctly explain why the smart speaker is an embedded system.

(e) Some candidates were able to give two advantages of storing the music in the cloud. Many candidates stated that it meant the music could be accessed anywhere. This was an imprecise response and not fully relevant as if the music was stored locally within the speaker, it could still be accessed anywhere that the speaker was taken.

(f) (i) Most candidates were able to correctly explain how errors may occur in the data.

(ii) Most candidates were able to give two correct suitable error detection methods.

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COMPUTER SCIENCE

Paper 0984/22
Algorithms, Programming and Logic

Key messages

Candidates must read questions carefully before answering each question, using the given context.

Candidates are also required to use pseudocode to answer algorithm questions as stated in the question.

Candidates who took care to familiarise themselves with the syntax of the pseudocode defined within the course syllabus were more likely to answer those questions accurately.

Candidates who answered questions in an appropriate manner to the command word used, such as answering questions beginning with explain with more detail than questions beginning with identify, were more likely to achieve higher marks.

General comments

Most candidates demonstrated a good overall understanding of the requirements of this paper.

When answering 'explain' type questions, candidates are required to provide an explanation of how something was done, rather than providing a simple description.

When answering practical questions, candidates are required to provide an answer in the manner required in the question. For example, if a question asks candidates to use pseudocode, they must use the pseudocode statements and commands given in the syllabus.

Comments on specific questions

Question 1

Most candidates were aware that the result of the operation 4 ^ 2 is 16.

Question 2

(a) Most candidates identified some of the errors in the given algorithm, but few identified five errors. Errors included an incorrect data type in one of the declaration statements, an output that should have been an input, an incorrect array index, an incorrect loop termination command and an incorrect flag assignment.

(b) (i) Candidates who understood how to construct procedures in pseudocode achieved better marks. The marks were awarded for correctly completing the parameter name and data type in the procedure header statement, using the parameter as the loop termination variable, correctly storing the input data into the array, and closing the nested loops with `NEXT` statements.

(ii) Candidates were required to write an input statement and a procedure call statement to pass a value to the procedure used in **Question 2(b)(i)**. Many candidates were able to construct an appropriate input statement, but few were able to complete the task using the `CALL` command.

(c) (i) Many candidates achieved at least one mark for recognising that many people share the same first name, so this would not be a good search key. Those who expanded this point, to say that the results output may well be for a different person to the one expected, achieved both marks.

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(ii) Most candidates identified an improvement that could be made to the search key, including use of first and last names, or using some form of identification code. Some candidates gave a more complete answer by giving a reason for this, such as to make the search criteria more specific to the person being sought.

Question 3

A mixed set of results was seen for this question with candidates achieving marks across the whole range of possible marks. Candidates with a clear understanding of normal, boundary and abnormal test data and the purpose of each achieved the highest marks.

Question 4

(a) Many candidates correctly stated that the purpose of a length check was to make sure the data entered has the required number of characters, or similar. A significant number of candidates stated that the purpose of a length check was to check the length of the data entered, which, although not an incorrect statement, does not demonstrate that candidates understand the meaning of the test, as they used its name in their explanation.

(b) There was a mixed range of responses. Most candidates wrote a correct algorithm to check that an email address had been input and contained an @ character. This was a substantial algorithm that made use of string handling functions and iteration. Many candidates made a good attempt at this algorithm and achieved marks at the higher end of the range.

Question 5

(a) Stronger candidates worked systematically through the algorithm using the supplied input data and completed the trace table as they went. Most candidates achieved at least one mark.

(b) The majority of candidates recognised at least one of the processes that the algorithm performed. This included checking that the input was a code, that it contained four characters, that it had not been used before and if there was enough space left in the array, stored any code that passed these tests. Some candidates identified all of these.

(c) Candidates were required to write a short algorithm to declare and initialise the array used to store the codes so that each element of the array began with the null string, defined in the question as "". This required a declaration statement for the array itself, a declaration for a loop counter, a simple loop that iterated six times and a statement to assign the null string to each array element.

Question 6

(a) This was generally answered well, with many candidates achieving high marks. Candidates are however advised to make sure that their logic gate representations match as closely as possible those given in the syllabus.

(b) Most candidates achieved at least one mark for completing the truth table for the given logic expression, with the full range of marks seen.

Question 7

(a) Many candidates correctly stated the purpose of a primary key in a database table as uniquely identifying a record. Some candidates simply stated ‘unique identifier’ or similar is describing a property of a primary key rather than stating its purpose, so does not answer the question.

(b) The majority of candidates were able to identify fields from the database table that were likely to use each of the given data types, or most of the given data types.

(c) Candidates, in most cases, correctly stated the output that would be generated by the given select query. Some errors were seen in the presentation of this data, including, commas incorrectly used to separate the columns, data not being in the specified order, or additional columns listed that were not required.

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(d) Most candidates answered this question very well. Some candidates had not listed the correct fields for the query or used the wrong comparison statement such as >10, when it should have been >=10, or sorted on the wrong field.

Question 8

Candidates were required to complete an extended program to meet a set of requirements given in a scenario. The scenario for this question was to write a program to test the fairness of a random number generator.

The program was required to generate 100,000 random numbers, integers between 1 and 10 inclusive, and store them in a one-dimensional (1D) array. The frequency that each of the ten possible random numbers occurred was then to be counted and the results stored in a two-dimensional (2D) array. The ten possible random numbers were also stored in this 2D array. The next stage required the 2D array to be sorted in descending order of frequency. After this, the chance of each of the possible random numbers being generated was to be calculated using the formula chance = frequency/100,000 and rounded to four decimal places. Finally, output was required to show each of the ten possible random numbers, in descending order of frequency, with the chance that it would be generated.

Declarations and appropriate initialisation of arrays and variables were required for this question.

There were a wide range responses, with the majority of responses using either pseudocode or Python. Many candidates provided solutions worthy of marks in the higher or middle mark bands. Candidates whose responses more closely matched the requirements outlined in the scenario, and used good programming skills, achieved the highest marks. These candidates also followed the remaining additional guidance written at the end of the scenario, which required the comprehensive use of comments to explain what each part or subpart of their solution was doing and to use appropriate messages with all inputs and outputs.

The best responses correctly used the data structures given in the scenario in the way they were expected to be used as stated in their descriptions. These were the 1D array `RandomNumber()` to store the 100,000 random numbers that were generated and the 2D array `CountedNumber()` to store the possible random numbers 1 to 10, and the number of times that each of these numbers was generated.

Some candidates incorrectly expected each of the random numbers to be input by a user instead of using the random number generator.

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