Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

COMPUTER SCIENCE **9608/11**

Paper 1 Written Paper **October/November 2019**

MARK SCHEME

Maximum Mark: 75

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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This document consists of **8** printed pages.

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[Turn over

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

the specific content of the mark scheme or the generic level descriptors for the question
the specific skills defined in the mark scheme or in the generic level descriptors for the question
the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
marks are awarded when candidates clearly demonstrate what they know and can do
marks are not deducted for errors
marks are not deducted for omissions
answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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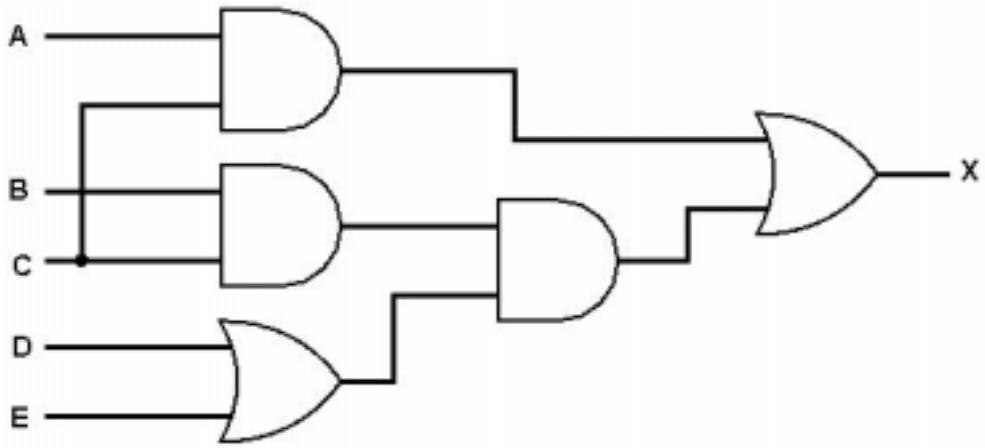
Question	Answer	Marks
1(a)	**1 mark** for each correct line **Register** / **Description** Current Instruction Register → Stores the instruction that is being decoded and executed Memory Address Register → Stores the address of the memory location about to be written to or read from Program Counter → Stores the address of the next instruction to be read Memory Data Register → Stores the data that has just been read from memory, or is about to be written to memory Stores the address of the input device from which the processor accesses the instruction	**4**
1(b)(i)	**1 mark** for naming, **1 mark** for purpose for each bus Data bus Carries data between the processor and memory / carries data that is currently being processed. Control bus Transmits signals between the control unit and the other components	**4**
1(b)(ii)	Significant increase in the number of directly addressed memory locations // increases the number of directly addressable memory locations from 2^{16} to2^{32}	**1**
1(c)	**1 mark** for each correctly inserted term A **macro** is a sequence of instructions that are given an identifier. These instructions may need to be executed several times. A **directive** is an instruction that tells the assembler to do something. It is not a program instruction. The processor's instruction set can be put into several groups. One of these groups is **data movement** // **input and output** // **arithmetic operations** // **jump instructions** // **compare instructions** // **modes of addressing**.	**3**

Question	Answer	Marks
2(a)(i)	**1 mark** per device to **max 2** e.g. Trackpad/touchpad microphone touchscreen scanner	**2**
2(a)(ii)	**1 mark** per device to **max 2** e.g. printer speakers touchscreen	**2**
2(a)(iii)	Magnetic hard disk drive // solid state drive	**1**
2(a)(iv)	**1 mark** per bullet point to **max 3** The ball touches horizontal and vertical rollers When the ball rotates / moves … one or both of the rollers rotate as well Each roller connects to a shaft which spins a disk with holes **Infrared** beams shine through the holes in the disks As the ball moves the roller the beam is broken by the space between the holes ... creating pulses of light The **distance and/or speed** of the mouse is determined from the rate of the pulses … by an on-board processor chip // by driver software in the computer	**3**
2(b)	**1 mark** per bullet point to **max 4** for each management task, **max 6** in total Process management: Manages the **scheduling** of processes … allows multi-tasking / multi-processing … ensures fair access … handles priorities Manages the resources the processes need Enables processes to share information Prevents interference between processes// resolution of conflicts Provision of a user interface: Allows a user to **communicate** with the hardware // vice-versa … by making navigation around the system easier Provides facility for user inputting data Provides facility for outputting to the user By example e.g. command line / GUI / menu-driven	**6**

Question	Answer	Marks
2(c)	**1 mark** per bullet point to **max 3** for each utility program, **max 4** in total Virus checker: **Scans** files stored on a **computer system** for malicious code Scans files when they **enter the system** / memory stick inserted / download etc. Sets up a schedule for virus-checking Isolates / quarantines / deletes viruses Regularly updates the virus definitions Backup software: Creates a copy of the contents of a disk / partition. Can be set up to automatically backup // schedules backups Allows the user to decide what is backed up, e.g. all data // all files that have changed since the last backup Allows the user to set up an off-site backup May encrypt the backup files Restores the data if necessary	**4**
2(d)	**1 mark** per bullet point to **max 2** The code is translated one line at a time ... and executed immediately The interpreter stops as soon as it finds an error	**2**

Question	Answer	Marks
3(a)	**1 mark** for each gate A **AND** C B **AND** C D **OR** E (B AND C) **AND** (D OR E) Final **OR**  	**5**

Question	Answer	Marks
3(b)	**1 mark** for each pair of correct rows	**4**

A	B	C	Working space	X
0	0	0		0
0	0	1		1
0	1	0		1
0	1	1		0
1	0	0		0
1	0	1		1
1	1	0		0
1	1	1		1

Question	Answer	Marks
4(a)(i)	**1 mark** per bullet point to **max 3.** If no application to the bank **max 2** The bank's server holds the customer account data / website ... and performs the requested tasks / processes. The computers used by the **customers** are the clients … … that send requests to the server … which returns the results of the request … E.g. a customer asks for a list of recent transactions on their account.	**3**
4(a)(ii)	**1 mark** per example to **max 2** e.g. Sending and receiving email A company or school centrally storing files Using a print server Using a file server	**2**
4(b)	**1 mark** per bullet point to **max 3** All data is held on the server // All processing is performed on the server The server only sends the results of the query to the client The client does not have access to all the data ... which keeps the data more secure / consistent Customers can be identified when they log in …from a database of usernames and passwords	**3**

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(c)(i)</td><td>1 mark per bullet point to max 2

Less interference in the signal
The signal does not degrade as quickly // Needs less signal boosting
More secure // more difficult to hack
Greater bandwidth // <u>Faster</u> transmission speeds possible</td><td>2</td></tr>
<tr><td>4(c)(ii)</td><td>1 mark per bullet point to max 2

Initial installation cost is higher // Cable / hardware is more expensive to buy per metre
Specialists / trained personnel are needed to install / maintain
Difficult to terminate // The electronics at both ends are more complex
Fibres can break <u>when bent</u>
Only transmits data in one direction // Cannot transmit power, only data</td><td>2</td></tr>
<tr><td>4(d)(i)</td><td>1 mark per table

Table CUSTOMER with fields FirstName, LastName, DateOfBirth, CustomerID
Table ACCOUNT_TYPE with fields AccountID, Name, Bonus
Table CUSTOMER_ACCOUNT with fields ID, CustomerID, AccountID, Amount

CUSTOMER (<u>CustomerID</u>, FirstName, LastName, DateOfBirth)

ACCOUNT_TYPE (<u>AccountID</u>, Name, Bonus)

CUSTOMER_ACCOUNT (<u>ID</u>, CustomerID, AccountID, Amount)</td><td>3</td></tr>
<tr><td>4(d)(ii)</td><td>1 mark for 1 or 2 correct Primary Keys, 2 marks for 3 correct Primary Keys

CUSTOMER: CustomerID
ACCOUNT_TYPE: AccountID
CUSTOMER_ACCOUNT: ID</td><td>2</td></tr>
<tr><td>4(d)(iii)</td><td>1 mark for both table name and Foreign Key

Table: CUSTOMER_ACCOUNT
Foreign Key: CustomerID / AccountID</td><td>1</td></tr>
<tr><td>4(d)(iv)</td><td>1 mark for each correct term

<table>
<tr><th>Definition</th><th>Term</th></tr>
<tr><td>All the data about one entity</td><td>Table / Relation</td></tr>
<tr><td>The data in one row of a table</td><td>Tuple / Record</td></tr>
<tr><td>A column or field in a table</td><td>Attribute</td></tr>
</table></td><td>3</td></tr>
</table>

Question	Answer	Marks
5(a)(i)	256	**1**
5(a)(ii)	78	**1**
5(b)	1111 0011 1110	**1**
5(c)(i)	69	**1**
5(c)(ii)	Any scenario where a single digit needs to be transmitted / displayed e.g. calculator / digital clock	**1**
5(d)	**1 mark** per bullet to **max 2** Each character is represented by a **unique** … denary / hexadecimal / binary number	**2**
5(e)(i)	**1 mark** per bullet to **max 2** Lossless: All the data is needed // the original file is fully restored If any data is lost, the program will not run Probably does not require significant reduction in file size // a program written in a high-level language is just text, so does not need much reduction in size	**2**
5(e)(ii)	**1 mark** per bullet to **max 2** Lossy: All the data is not required The number of colours / resolution can be reduced without the user noticing Email requires a significantly smaller file size // takes less time to transmit Lossless: A high quality image may be needed All of the data is needed // cannot afford to lose any data // the original file is fully restored	**2**
5(e)(iii)	**1 mark** per bullet to **max 2** Lossy: Some loss of quality will not be noticed // high quality video not needed on the website A more significant reduction may be needed Takes a shorter time to upload / download // requires less bandwidth Lossless: A high quality video may be needed Might only be a short video clip All of the data is needed // cannot afford to lose any data // the original file is fully restored	**2**

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