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Cambridge Assessment International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9618/13**

Paper 1 Theory Fundamentals **October/November 2023**

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.

Cambridge International is publishing the mark schemes for the October/November 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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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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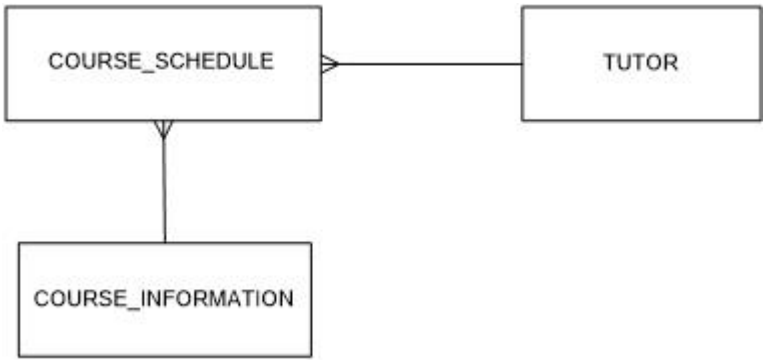
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Question	Answer	Marks
1(a)	**1 mark** for: • data values that are continuously changing // variable // any value	**1**
1(b)	**1 mark** for 1 correct line **2 marks** for 3 correct lines **Term** / **Description** sampling → the number of samples taken per second sampling rate → taking measurements at regular intervals and storing the values sampling resolution → the number of bits used to store each sample	**2**

Question	Answer	Marks
2(a)	**1 mark** for each bullet point: • more pixels can be stored / are available • the image is sharper / less pixelated	**2**
2(b)	**1 mark** for answer. **1 mark** for working Answer: 4096 kibibytes Working: File size = (2048 × 1024 × 16) / (8 × 1024)	**2**

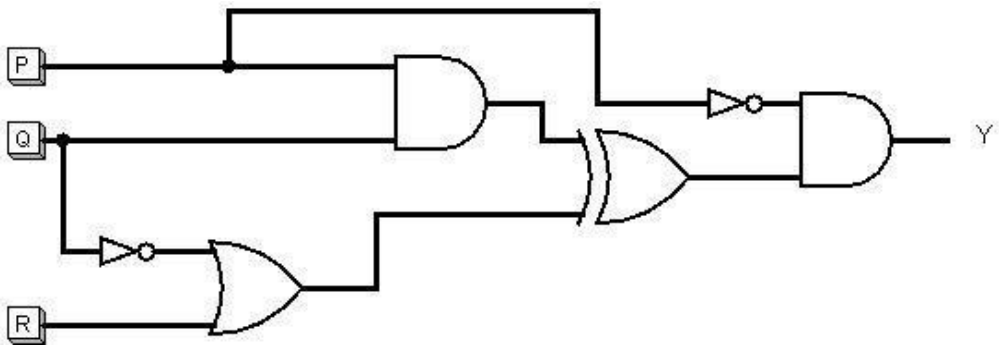
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Question	Answer	Marks
3(a)(i)	**1 mark** for each bullet point (**max 2**). • Courses must be available to anyone who wishes to follow them • Courses must be available on the internet • Company is willing to share infrastructure with other companies (public) • …which is more economic for the company	**2**
3(a)(ii)	**1 mark** for each bullet point (**max 2** for each disadvantage). • There could be a possible loss of control unlike the LAN • …because the data is stored on a remote infrastructure / someone else's infrastructure • …reliance on external agency to complete tasks, e.g. backups, security • Requires reliable internet connection • …to ensure access to the remote data, more likely with LAN • Increased recurring costs • ...as cloud provider charges must be paid, costs for LAN once only.	**4**
3(a)(iii)	**1 mark** each for firewall, encryption and passwords. Firewall: • Monitors incoming and outgoing traffic and rejects any traffic that does not meet the set rules Encryption: • Ensures that if data is intercepted / obtained it cannot be understood without the decryption key Passwords: • Ensures only users with the correct password can access the resources // prevents unauthorised access	**3**
3(b)(i)	**1 mark** for both 1:M relationships as follows:  	**1**

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Question	Answer	Marks
3(b)(ii)	**1 mark** for each bullet point. • `SELECT Count(CourseID)` • `AS NumOfCourses` • `FROM COURSE_SCHEDULE` • `WHERE DateStarted > "09/09/23";` `SELECT Count(CourseID) AS NumOfCourses FROM COURSE_SCHEDULE WHERE DateStarted > "09/09/23";`	**4**
3(c)	**1 mark** for each bullet point. • The administrator completes a visual check / checks by eye • …that the tutor identifier input matches the tutor identifier on the **original** document • Double entry check // the administrator (or a second person) enters the number a second time • …and the **system** compares it with the first entry	**4**

Question	Answer	Marks
4(a)	**1 mark** for each set of highlighted rows **P** **Q** **R** **Y** 0 0 0 1 0 0 1 1 0 1 0 0 0 1 1 1 1 0 0 0 1 0 1 0 1 1 0 0 1 1 1 0	**2**
4(b)	**1 mark** for **P** AND **Q** and NOT **Q** OR **R** **1 mark** for NOT gate and AND gate and XOR gate 	**2**

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Question	Answer	Marks
5(a)	**1 mark** for each bullet point (**max 2** for each feature). Context-sensitive prompts: • As the code is being written • …the options to complete the statement are shown Single stepping: • allows the programmer to execute the program one line at a time • …so that the effects of each statement can be seen	**4**
5(b)(i)	**1 mark** for each bullet point (**max 2**). • To reduce the time it takes to download the program files from the web server // to upload them to the server in the first place • To reduce the amount of storage space used on the web server // user's device	**2**
5(b)(ii)	**1 mark** for each bullet point (**max 3**). • Disk needs to be prepared for initial use • Disk needs to be checked for errors • A new file system needs to be generated on the disk • The file allocation table needs to be set up	**3**

Question	Answer	Marks
6(a)	**1 mark** for each bullet point (**max 2**). • Users are able to trial the program and may offer the programmer constructive **feedback** • **More people** might try the program because the trial is free of charge • Allows bugs to be found and corrected on a wide range of computer system configurations improving the programmer's original program • Users that find the trial useful will buy the program so programmer gets **income** • Allows the program to be **copyrighted** and so protects the programmer's intellectual property rights // no **illegal** modification allowed	**2**

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Question	Answer	Marks
6(b)	**1 mark** for each bullet point (**max 4**). • The programmer has ethical guidelines to follow • …so purchasers of programs know the standards being applied • …so programmer does not have to decide what is ethical or not • Clients know programmer is reputable • …recognition of programmer's skills/knowledge • There may be an entry requirement / exam • … so clients know that the programmer is competent • Professional ethical body provides help and support • Such as legal advice // by appropriate example • Enables programmer to attend the ethical body's training courses • …to keep skills up to date // to develop skills	**4**

Question	Answer	Marks
7(a)	**1 mark** for each bullet point (**max 2**). • Static RAM has faster access time • …because it does not need to be refreshed • …used on the CPU for improvement of CPU cache speed • Static RAM has lower	**2**
7(b)	**1 mark** for each bullet point (**max 2**) • EEPROM allows frequent / multiple read / write / erase operations • …which means that the contents of the firmware in the headset can be changed easily • …without fully erasing the contents of the firmware in the headset first	**2**
7(c)	**1 mark** for each bullet point (**max 4**) • The print instructions and data are sent by the laptop to a buffer (at laptop speed) • The data is transferred from the buffer to the printer (at printer speed) • …allowing user to continue using the laptop // and allowing processor to continue processing • …instead of waiting for relatively slower printer • When the buffer is empty an interrupt is sent to the laptop • …requesting more data	**4**

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Question	Answer	Marks
7(d)	**1 mark** for naming a correct port **2 marks** for matching justification • USB • …has fast data transfer speeds for data (to the headset) • …is a universal/popular cable // universal standard • HDMI • …allows video and audio to be transferred (on the same cable) • …convenience of HDMI as no need for two cables	**3**

Question	Answer	Marks
8(a)	**1 mark** for each bullet point (**max 2**) • Validation // a validation method named or described • …protects the data by ensuring that the data is reasonable / sensible and within specified bounds	**2**
8(b)	**1 mark** for difference **1 mark** for similarity Difference: • Pharming is malicious code that redirects to a **fake website**. Phishing uses an **email** to prompt user action. • Pharming is **automatic**. Phishing requires **user action**. Similarity: • Both try to obtain financial or personal information • Both are a false representation of an official organisation, e.g. a bank • Both make use of fake websites	**2**

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Question	Answer	Marks
8(c)	**1 mark** for each bullet point (**max 3**). • Download programs from reputable websites / sources • …as these are less likely to contain malware • Backup / archive computer systems • …so they can be restored in case of data loss from malware program installation • **Install and run** anti-malware program • …so that regular scans can be made for known malware • …and if malware is found it can be quarantined / removed • …and computer's anti-malware definitions are regularly updated • Using a firewall to block unused ports • …so that malware cannot enter the computer system • Deny administrator privileges to everyday users • …so that malware cannot be downloaded by everyday users • Avoid the use of / access to removable devices • …so that malware cannot be installed from these devices	**3**

Question	Answer	Marks
9(a)(i)	**1 mark** for each bullet point (**max 3**). • Control unit (CU) • Arithmetic **and** Logic Unit (ALU) • Immediate Access Store (IAS) • (System clock)	**3**
9(a)(ii)	**1 mark** for each bullet point (**max 2**). • Special purpose registers hold the status of a program whereas general purpose registers hold the temporary data while performing operations. • Special purpose registers are specialised for a specific use, whereas general purpose registers are used for any purpose. • General purpose registers can be used by most instructions, whereas special purpose can only be used by certain instruction	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>9(b)</td><td>1 mark for each correct answer (shaded cells)

<table>
<tr><th>Step</th><th>Description</th></tr>
<tr><td>PC ← [PC] + 1</td><td>The address in PC is incremented.</td></tr>
<tr><td>MDR ← [[MAR]]</td><td>The data in the location pointed to by the MAR is copied to the MDR.</td></tr>
<tr><td>MAR ← [PC]</td><td>The contents of PC are copied to the MAR.</td></tr>
<tr><td>CIR ← [MDR]</td><td>The contents of MDR are copied into CIR.</td></tr>
</table></td><td>4</td></tr>
<tr><td>9(c)</td><td>1 mark for an appropriate example.

Examples:
• Division by zero
• Runtime error
• Out of memory bounds
• Program requesting an external device / input
• Buffer overflow</td><td>1</td></tr>
<tr><td>9(d)</td><td>1 mark for each letter in the correct position (2, 4 and 6)

D
A
B</td><td>3</td></tr>
</table>

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