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Cambridge Assessment International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9608/13**

Paper 1 Theory Fundamentals **May/June 2021**

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 May/June 2021 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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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>1(a)</td><td>1 mark for each validation type

<table>
<tr><th>Field</th><th>Validation description</th><th>Validation type</th></tr>
<tr><td>Name</td><td>A name must be entered</td><td>Presence check</td></tr>
<tr><td>Date of birth</td><td>Entered as dd/mm/yyyy</td><td>Format check</td></tr>
<tr><td>Telephone number</td><td>A limit of 15 characters can be entered</td><td>Length check</td></tr>
<tr><td>Experience level</td><td>Only values between 1 and 5 can be entered</td><td>Range check</td></tr>
</table></td><td>4</td></tr>
<tr><td>1(b)(i)</td><td>Verification // by example</td><td>1</td></tr>
<tr><td>1(b)(ii)</td><td>1 mark per bullet point:

• Parity
• Checksum</td><td>2</td></tr>
</table>

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>2(a)</td><td>1 mark per pair of outputs (shaded)

<table>
<tr><th>A</th><th>B</th><th>C</th><th>Working space</th><th>Q</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td></td><td>0</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td></td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td></td><td>1</td></tr>
</table></td><td>4</td></tr>
<tr><td>2(b)</td><td>1 mark for all four:

NOT
NAND
OR
XOR</td><td>1</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>3(a)</td><td>1 mark per shaded section

<table>
<tr><th rowspan="2">Instruction Address</th><th rowspan="2">IX</th><th rowspan="2">ACC</th><th colspan="7">Memory Address</th><th>Output</th></tr>
<tr><th>180</th><th>181</th><th>182</th><th>183</th><th>184</th><th>185</th><th>186</th><th></th></tr>
<tr><td></td><td></td><td></td><td>0</td><td>41</td><td>71</td><td>40</td><td>70</td><td>43</td><td>69</td><td></td></tr>
<tr><td>75</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>76</td><td></td><td>71</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>77</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>78</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>79</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>G</td></tr>
<tr><td>80</td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>81</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>79</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>)</td></tr>
<tr><td>80</td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>81</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>76</td><td></td><td>0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td>78</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>82</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table></td><td>5</td></tr>
<tr><td>3(b)</td><td>1 mark per bullet point max 2 marks

• Direct
• Indirect
• Relative</td><td>2</td></tr>
<tr><td>3(c)(i)</td><td>1110 1010</td><td>1</td></tr>
</table>

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Question	Answer	Marks
3(c)(ii)	EA	**1**
3(c)(iii)	–39	**1**
3(d)	**1 mark** for each correctly completed item **MAR** ← [PC] PC ← **[PC]** + 1 MDR ← [[MAR]] **CIR** ← [MDR]	**3**

Question	Answer	Marks
4(a)(i)	**1 mark** per bullet point to **max 3** • Install/manage device drivers • Control of hardware usage by processes // allocation of devices to processes // inter process communication • Device detection • Power Management • Keep track of device status (free or busy) • Buffer management	**3**
4(a)(ii)	**1 mark** per bullet point to **max 3** • Deals with interrupts • Deal with run time errors generated by software • Deal with hardware faults • Error diagnostic messages • Deadlock detection and recovery • Safe-mode boot-up routines • System shutdown • Saves system restore points	**3**
4(a)(iii)	**1 mark** per bullet point to **max 2** • Process / task/resource management • Main memory management • File/secondary storage management • Security management • Provision of a software platform/environment on which other programs can be run • Interrupt handling • Provision of a user interface **NOT** • Peripheral/hardware/device management • Error detection and recovery management	**2**

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<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th></tr>
<tr><td>4(b)(i)</td><td>1 mark for first 3 rows
1 mark for last 3 rows

<table>
<tr><th>Program</th><th>Utility</th><th>Not utility</th></tr>
<tr><td>Language translator</td><td></td><td>✓</td></tr>
<tr><td>Backup</td><td>✓</td><td></td></tr>
<tr><td>Integrated Development Environment (IDE)</td><td></td><td>✓</td></tr>
<tr><td>Graphics</td><td></td><td>✓</td></tr>
<tr><td>Defragmenter</td><td>✓</td><td></td></tr>
<tr><td>Spreadsheet</td><td></td><td>✓</td></tr>
</table></td><td>2</td></tr>
<tr><td>4(b)(ii)</td><td>1 mark per bullet point to max 2

e.g.
• Virus checker // anti-malware
• Disk formatter
• Disk contents analysis/disk repair
• System clean-up
• File compression
• Firewall
• Encryption</td><td>2</td></tr>
</table>

Question	Answer	Marks
5(a)	**1 mark** for each bullet point to **max 2** • `$first_name` • `$last_name` • `$result`	**2**

5(b)	**1 mark** for all 3
	
	`06`
	`07`
	`13`
		1

5(c)	**1 mark** per bullet point • Concatenate the **contents** of `$first_name` and `$last_name` with a space in the middle... • …and store in `$result`	**2**

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Question	Answer	Marks
6(a)	**1 mark** per bullet point • C in correct position • B and D in correct positions • A in correct position 1 **C** // The client-side code is processed 2 The form data is transmitted to the web server 3 **B** // The server-side code is processed 4 **D** // The web server produces the HTML code 5 The HTML code is returned to the browser 6 **A** // The browser displays the web page	**3**
6(b)	**1 mark** per bullet point for justification to **max 3** • IP address is (physical) address of the server • A domain name is a memorable form for an IP address • `cambridgeinternational.org` is the domain name • An example of an IP address is 198.162.2.1 • Each domain name is linked to an IP address • A Domain Name Server/Service (DNS) is used to translate a domain name into its corresponding IP address • Domain name does not change but IP address could change (dynamic) • IP address can be used to address server directly, • The domain name needs translation before server can be assessed	**3**

Question	Answer	Marks
7(a)	**1 mark** per bullet point to **max 3** • The program will not run if there are any errors • The program must be recompiled after every change // cannot correct errors in real-time • Part-programs cannot be tested • One error may result in other false errors being reported	**3**

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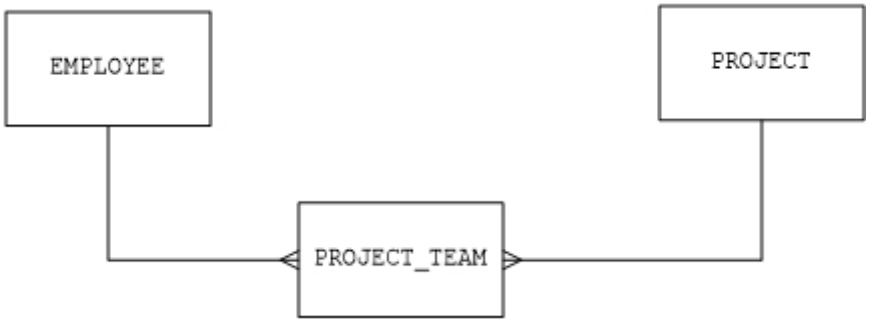
Question	Answer	Marks
7(b)	**1 mark** per bullet point, **max 2** marks per licence Open Source • The (source) code is distributed with the software • users can modify the software • The software is (usually) **free of cost** • Users must redistribute the modified software under the same terms Commercial • The software is (usually) purchased for a cost • A licence **defines** how it can be used • The source code is not distributed // users cannot change the software	**4**
7(c)	**1 mark** per bullet point to **max 3** e.g. • To identify what employees can do • To identify what employees cannot do • To identify the repercussions of employees performing activities they should not • To identify the company's/employee's responsibilities • To identify the company's values/missions • To identify what behaviour/events/activities can be measured against • To identify how they will comply with legislation	**3**

Question	Answer	Marks
8(a)	**1 mark** for each correct join  	**2**
8(b)	**1 mark** per bullet point • `EmployeeID` is the Primary Key in `EMPLOYEE` • …**links to** `EmployeeID` which is the Foreign Key in `PROJECTTEAM` • `ProjectID` is the Primary Key in `PROJECT` • …**links to** `ProjectID` which is the Foreign Key in `PROJECTTEAM`	**4**

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Question	Answer	Marks

8(c)	**1 mark** per bullet point
	
	• `ALTER TABLE EMPLOYEE`
	• `ADD Gender CHAR(1)`
	
	Example:
	`ALTER TABLE EMPLOYEE`
	`ADD Gender CHAR(1);`
		2

8(d)	**1 mark** per bullet point
	• `SELECT FirstName, LastName, Salary`
	• `FROM EMPLOYEE`
	• `WHERE Salary > 17 500`
	
	Example:
	`SELECT FirstName, LastName, Salary`
	`FROM EMPLOYEE`
	`WHERE Salary > 17 500;`
		3

Question	Answer	Marks
9(a)(i)	Sampling rate	**1**
9(a)(ii)	Sampling resolution // bit depth	**1**
9(b)	**1 mark** per bullet point, **max 2** for each Spatial Redundancy • Intra-frame // Redundancy within a frame • Pixels in a single video frame have the same value • A description of an appropriate compression method e.g. RLE Temporal Redundancy • Inter-frame // Redundancy between frames • Pixels in a sequence of **consecutive** video frames have the same value in the same location • …records only the differences between the frames	**4**

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