Cambridge Assessment International Education

Cambridge International AS & A Level

COMPUTER SCIENCE **9608/12**

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.

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This document consists of **10** printed pages.

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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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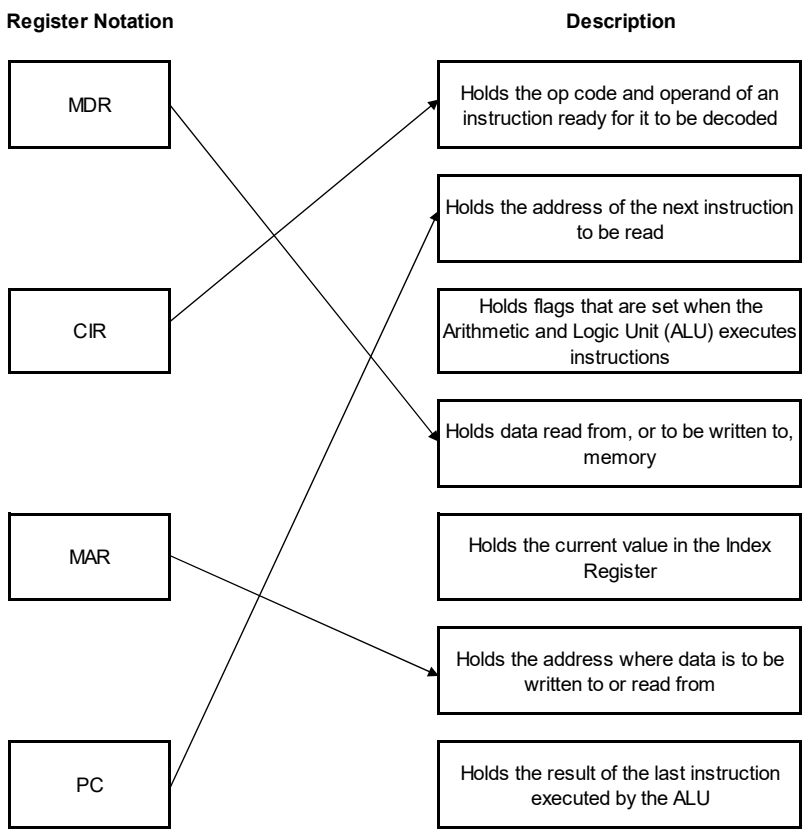
Question	Answer	Marks
1(a)	**1 mark** per pair of outputs (shaded)	**4**

A	B	C	Working space	Q
0	0	0		0
0	0	1		0
0	1	0		0
0	1	1		0
1	0	0		1
1	0	1		1
1	1	0		1
1	1	1		1

Question	Answer	Marks
1(b)	OR, AND, NOT	**1**

Question	Answer	Marks
2	**1 mark** for each register correctly described	**4**



Question	Answer	Marks
3(a)	**1 Mark** for each set of shaded rows	**5**

Instruction Address	ACC	Memory Address			
		100	101	102	103
		1	*3*	*0*	*100*
50	1				
51					
52					
53	1				
54				1	
55	1				
56	2				
57		2			
58					
51					
52					
53	3				
54				3	
55	2				
56	3				
57		3			
58					
51					
52					
59	6				
60				6	
61					

3(b)	`LDD 100`	**1**

Question	Answer	Marks
3(c)(i)	`0011 1011`	**1**
3(c)(ii)	`3B`	**1**
3(d)	**1 mark** each (**max 2**) • Immediate • Indexed • Relative	**2**

Question	Answer	Marks
4(a)	**1 mark** per drawback identified, **1 mark** for related description (**max 6**) • There is data duplication // redundant data • …because the same data is stored multiple times // data changed in one file is not automatically changed in others // by example • There could be data inconsistency // reduced data integrity • … because duplicated data might be stored as different values // by example • There is **program-data** dependency • … if the data **structure** changes all the programs accessing that data must be changed too // by example • It is not easy to perform **complex** searches/queries • … a new program has to be written each time • Lack of privacy • …as access controls are usually to the system rather than the data // user views cannot easily be implemented	**6**
4(b)	**1 mark** per bullet point (**max 3**) • There is no unique <u>primary</u> key • Customer name is not atomic // Customer name needs to be split into first name and last name // by example • Customer name / Customer date of birth / Destination / Guide name / Trip have repeated groups of attributes	**3**

Question	Answer	Marks

4(c)	**1 mark** per bullet point
	
	• Create table `GUIDE_TABLE` with brackets and semi-colon
	• `GuideID` of suitable data type
	• `Guide` and `Gender` of suitable data type(s)
	• `DateOfBirth` of correct data type
	• Declaring `GuideID` as Primary Key
	
	Example answer:
	`CREATE TABLE GUIDE_TABLE(`
	`  GuideID INT,`
	`  Guide VARCHAR(25),`
	`  DateOfBirth DATE,`
	`  Gender CHAR(1),`
	`  PRIMARY KEY (GuideID)`
	`);`
		5

Question	Answer	Marks
5(a)	**1 mark** for `base` and `height`, **1 mark** for `area` • `base` and `height` • `area`	**2**
5(b)	When the button is clicked the **function** `area()` is **called**	**1**
5(c)	`The area is: 8`	**1**
5(d)	(logical) `OR`	**1**
5(e)(i)	Presence check	**1**
5(e)(ii)	**1 mark** for each (**max 2**) • range check • length check • type check	**2**

Question	Answer	Marks
5(f)	**1 mark** for each correct letter/statement in each space 1 Bochen completes the online booking form and clicks 'Submit'. 2 **F** // **JavaScript is executed on the client's web browser to validate the form data.** 3 Any errors found are flagged, and step 1 is repeated. 4 **D** // **The form data is transmitted to Cambridge International Holidays' webserver.** 5 PHP code is executed to perform extra data validation checks on the form data. 6 **A** // **Any errors found at the server side are flagged and step 1 is repeated.** 7 The booking details are added to the database. 8 **C** // **PHP is executed to generate a confirmation (HTML) web page that is returned to the client's web browser.**	**4**

Question	Answer	Marks
6(a)	**1 mark** per bullet point for each justification, to **max 2** e.g. **Either** Ethical • Latifah believes that her productivity is better using an IDE that she has experience of • … and the work is still compatible with other IDEs • …the IDE is open source so does not cost anything extra • Reference to IEEE standards <u>in context</u> **Or** Unethical • Latifah is knowingly using software that is not provided or supported by the company • …and this may lead to issues with future software compatibility/maintenance • Reference to IEEE standards <u>in context</u>	**2**

Question	Answer	Marks
6(b)	**1 mark** per bullet point for each justification, to **max 2** e.g. **Either** Ethical • Samid believes his daughter is qualified and would be the best person for the job • …and believes that it is in the best interest of his client to secure a high-quality employee as soon as possible • … they may have interviewed her with a third party and she came out as the best candidate • Reference to IEEE standards <u>in context</u> **Or** Unethical • Samid shows poor judgement by favouring his daughter • …rather than using a fair and open recruitment process • there may be people with better qualifications that are being overlooked • Reference to IEEE standards <u>in context</u>	**2**
6(c)	**1 mark** per bullet point for each justification, to **max 2** e.g. **Either** Ethical • Jason **has already** raised his concerns (to his manager) • …and has fulfilled his professional responsibilities by doing so. • Reference to IEEE standards <u>in context</u> **Or** Unethical • Jason should continue to raise any concerns he has with a higher level of management in the company • …because it may be against the public interest for users to have their data used in this way without them explicitly knowing it. • Reference to IEEE standards <u>in context</u>	**2**

Question	Answer	Marks
7(a)(i)	**1 mark** per bullet point to **max 2** • The images on the hard disk can be lost or corrupted • To **make a copy** of her files (which can be stored elsewhere) • So that the images can be **restored**	**2**
7(a)(ii)	**1 mark** per bullet point to **max 2** • Frequent changes to the images mean the data for each **file** is split across the disk • To rearrange the (fragmented) files into **contiguous** locations // to bring all the empty space together • To improve the time it takes to access and load the files	**2**

Question	Answer	Marks
7(a)(iii)	**1 mark** per bullet point to **max 2** • **Areas of the disk** can become corrupt • To identify/mark the **errors/bad sectors** • ...so they can be repaired // so bad sectors are no longer used	**2**
7(b)	**1 mark** per bullet point to **max 4** e.g. • Vertical height in pixels • Horizontal width in pixels • Bit depth/number of bits per pixel • Total file size in bytes • Offset in bytes where the image data is located • Type of compression used	**4**
7(c)	Justification **1 mark** per bullet point to **max 3** Lossy: • Lossy compression will achieve a much higher compression ratio (than lossless) for photographic images... • ...so the images will load faster • There will be little identifiable change to the viewed images • It may not be important that the originals are not recoverable Lossless: • Images may be required in their original form // may need to be recovered completely • Images may already be a small file size so major reduction in file size is not needed... • ...as the files will load quickly	**3**

Question	Answer	Marks
8(a)	**1 mark** per term **Description** — **Term** Ensures the data is accurate and up to date — **Data integrity** Prevents accidental or malicious data loss — **Data security** Prevents unauthorised access to data — **Data privacy**	**3**
8(b)	**1 mark** per bullet point to **max 2** • Mathematical algorithm // encrypted data • Attached to electronically transmitted document • …to verify its content/that it comes from a trusted source/	**2**

Question	Answer	Marks
9(a)	**1 mark** for identification, **1 mark** for description (**max 2**) Benefits: • Less hard-wiring/hardware is required • Users and computers can be mobile • It is much **more** straightforward to connect other devices Descriptions: • Reduced cost of setting up the network • The network can be accessed from anywhere within range of an access point • No need to physically connect each device	**2**
9(b)	**1 mark** for identification, **1 mark** for matching description (**max 2** for each) • Transmissions may be **less** secure • …because data packets can be intercepted // **easier** connection by unauthorised user • Bandwidth may be limited // As more devices connect the bandwidth can be reduced • …so access may be slow • It is subject to interference from other signals or obstacles • …which can hinder transmission or corrupt data • Limited range // greater attenuation • …so there is a need for repeaters // users can easily move out of range • Higher latency • …so transmission will be slower	**4**