
COMPUTER SCIENCE

9608/12

Paper 1 Written Paper

May/June 2018

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 **9** printed pages.

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.

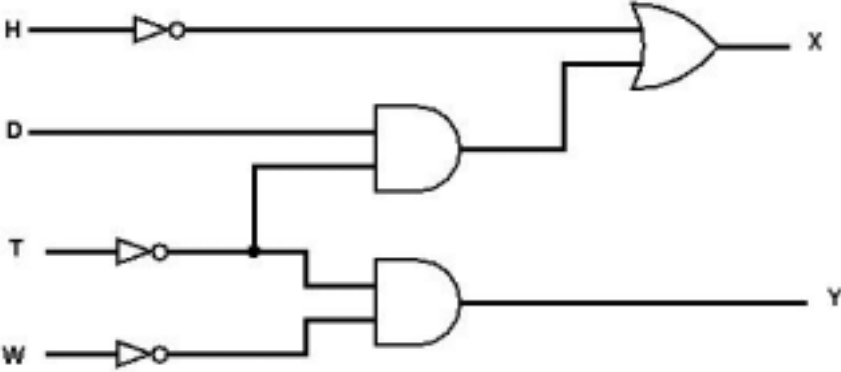
GENERIC MARKING PRINCIPLE 5:

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.

Question	Answer	Marks															
1(a)(i)	<p>1 mark per bullet to max 3</p> <ul style="list-style-type: none"> Storage space divided into file allocation units Space allocated to particular files Maintains/creates directory structures Specifies the logical method of file storage (e.g. FAT or NTFS) Provides file naming conventions Controls access // implements access rights // implements password protection // Makes file sharing possible Specifies tasks that can be performed on a file (e.g. open, close, delete, copy, create, move etc.) 	3															
1(a)(ii)	<p>1 mark per bullet to max 3</p> <ul style="list-style-type: none"> Installs printer driver Sends data to the printer / buffer to print // sends documents to the print queue Sends commands to printer Receives and handles (error) messages/signals/interrupts from the printer 	3															
1(b)(i)	<p>1 mark for each correct box ticked.</p> <table border="1" data-bbox="448 969 1182 1223" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Program</th> <th style="text-align: center;">True</th> <th style="text-align: center;">False</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Database</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">Virus checker</td> <td style="text-align: center;">✓</td> <td></td> </tr> <tr> <td style="text-align: center;">Web browser</td> <td></td> <td style="text-align: center;">✓</td> </tr> <tr> <td style="text-align: center;">Backup software</td> <td style="text-align: center;">✓</td> <td></td> </tr> </tbody> </table>	Program	True	False	Database		✓	Virus checker	✓		Web browser		✓	Backup software	✓		4
Program	True	False															
Database		✓															
Virus checker	✓																
Web browser		✓															
Backup software	✓																
1(b)(ii)	<p>1 mark for each valid utility program to max 2 e.g.</p> <ul style="list-style-type: none"> System clean up Automatic update Disk contents analysis / Disk checking / Disk repair File compression Disk formatter Firewall Disk Defragmenter 	2															

Question	Answer	Marks																																													
<p>2(a)</p>	<p>1 mark for each gate with the correct inputs. Final two gates must also have the correct output.</p> 	<p>6</p>																																													
<p>2(b)</p>	<p>One mark for each pair of rows.</p> <table border="1" data-bbox="363 837 1249 1547"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>Working space</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> <td></td> <td>1</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>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> <td></td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>1</td> <td></td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td></td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>1</td> <td></td> <td>0</td> </tr> </tbody> </table>	A	B	C	Working space	X	0	0	0		1	0	0	1		1	0	1	0		1	0	1	1		0	1	0	0		0	1	0	1		0	1	1	0		0	1	1	1		0	<p>4</p>
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Question	Answer	Marks																																																						
3(a)	<p>1 mark for correct parity bit</p> <p>Parity bit</p> <table border="1"> <tr> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>	0	0	1	0	0	0	0	0	1																																														
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3(b)	<p>1 mark for the correct bit circled.</p> <table border="1"> <thead> <tr> <th>Parity bit</th> <th colspan="8">Data</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>1</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Parity byte</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>0</td> <td>0</td> <td>1</td> </tr> </tbody> </table>	Parity bit	Data								1	0	1	0	1	1	1	1	1	0	1	1	0	0	1	1	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	Parity byte	0	0	0	0	1	0	0	1	1
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Parity byte	0	0	0	0	1	0	0	1																																																
3(c)	<p>1 mark per each correct row</p> <table border="1"> <thead> <tr> <th>Measure</th> <th>Validation</th> <th>Verification</th> </tr> </thead> <tbody> <tr> <td>Checksum</td> <td></td> <td>✓</td> </tr> <tr> <td>Format check</td> <td>✓</td> <td></td> </tr> <tr> <td>Range check</td> <td>✓</td> <td></td> </tr> <tr> <td>Double entry</td> <td></td> <td>✓</td> </tr> <tr> <td>Check digit</td> <td>✓</td> <td></td> </tr> </tbody> </table>	Measure	Validation	Verification	Checksum		✓	Format check	✓		Range check	✓		Double entry		✓	Check digit	✓		5																																				
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Question	Answer	Marks
4(a)(i)	219	1
4(a)(ii)	DB	1
4(a)(iii)	-37	1
4(b)(i)	<p>1 mark from:</p> <p>The <u>symbols</u> that the <u>computer</u> recognises/uses A list of <u>characters</u> recognised by the <u>computer</u> hardware and software</p>	1

Question	Answer	Marks
4(b)(ii)	<p>1 mark per bullet to max 2</p> <p>UNICODE has greater range of characters than ASCII UNICODE represents most written languages in the world while ASCII does not ASCII used for English only ASCII uses 7 or 8 bits or one byte whereas UNICODE uses up to 4 bytes per character UNICODE is standardised while ASCII is not</p>	2
4(b)(iii)	<p>1 mark for correct working, 1 mark for correct answer</p> <p>Working:</p> <p>Code for Z = Code for A + 25₁₀ Code for Z = 41₁₆ + 25₁₀ Code for Z = 41₁₆ + 19₁₆ Code for Z = 5A₁₆</p> <p>Answer: 5A₁₆</p>	2

Question	Answer	Marks
5(a)	<p>1 mark per bullet to max 3</p> <p>Amplitude (of the sound wave) measured At <u>set / regular</u> time intervals / per time unit / time period Value of the sample is recorded as a binary number</p>	3
5(b)	<p>1 mark per bullet to max 2</p> <p>(Increasing the sampling resolution means) more bits per sample // larger range of values Larger file size More accurate representation of sound</p>	2
5(c)	<p>1 mark per bullet to max 3</p> <p>Fewer samples (per unit time) File size will decrease Larger gaps / spaces between samples // Greater quantization errors Sound accuracy will reduce // not as close to original sound</p>	3

Question	Answer	Marks
5(d)	<p>1 mark for naming feature/tool, 1 mark for description. Max 2 features e.g.</p> <p>Fading Change the volume of a section of the sound for it get louder/quieter</p> <p>Removing sound / elements Delete sections of the sound wave, for example, background noise</p> <p>Copy Repeat elements of the sound wave</p>	4

Question	Answer	Marks
6(a)	<p>1 mark each mark grade</p>	2
6(b)	25	1
6(c)	<p>1 mark per bullet Takes the value entered in the <u>text box / input field</u> 'Mark' Stores (it) in the variable <u>mark</u> // Assigns (it) to the variable <u>mark</u></p>	2
6(d)(i)	Client-side	1
6(d)(ii)	<p>1 mark per bullet to max 3 Client-side (script) is run on the computer making the request ...when the (web page) data is received by the computer Server-side (script) is run on the <u>web</u> server The <u>results</u> are sent to the computer that made the request</p>	3

Question	Answer	Marks
7(a)(i)	<p>1 mark per bullet <u>UserName</u> is the <u>primary key</u> in <u>USER</u> <u>UserName</u> is (included as) a <u>foreign key</u> in <u>PHOTO</u></p>	2
7(a)(ii)	<p>1 mark for each correct relationship</p>  <pre> graph LR PHOTO[PHOTO] --> USER[USER] USER[USER] --> TEXTPOST[TEXTPOST] </pre>	2

Question	Answer	Marks
7(b)	<p>1 mark per bullet to max 2 for explanation</p> <ul style="list-style-type: none"> Referential integrity is making sure tables do not try to reference data which does not exist // A value of one attribute of a table exists as a value of another attribute in a different table A primary key cannot be deleted unless all dependent records are already deleted Cascading delete A primary key cannot be updated unless all dependent records are already updated Cascading update / edit Every foreign key value has a matching value in the corresponding primary key The foreign keys must be the same data type as the corresponding primary key <p>1 mark for a suitable example e.g.</p> <ul style="list-style-type: none"> A <code>UserName</code> cannot be deleted from the <code>USER</code> table if they have a related <code>photo/textpost</code> If <code>UserName</code> is updated in <code>USER</code> table, it must also be updated in <code>PHOTO</code> and <code>TEXTPOST</code> tables Cannot create/edit a record in <code>TEXTPOST</code> / <code>PHOTO</code> without a matching entry in <code>USER</code> table 	3
7(c)	<p>Max 1 mark from each bulleted group</p> <p>1NF</p> <ul style="list-style-type: none"> No repeated groups of attributes All attributes should be atomic No duplicate rows <p>2NF (in 1NF and)</p> <ul style="list-style-type: none"> No partial dependencies <p>3NF (in 2NF and)</p> <ul style="list-style-type: none"> No non-key dependencies No transitive dependencies 	3
7(d)(i)	<p>1 mark per bullet</p> <pre>CREATE TABLE USER and (); UserName, FirstName and SecondName as VARCHAR and commas DateOfBirth as DATE and comma PRIMARY KEY(UserName) An appropriate NOT NULL</pre> <pre>CREATE TABLE USER (UserName: varchar(15) NOT NULL, FirstName: varchar(25), SecondName: varchar(25), DateOfBirth: Date, PRIMARY KEY(UserName));</pre>	5

Question	Answer	Marks
7(d)(ii)	1 mark per bullet ALTER TABLE USER ADD COUNTRY varchar; ALTER TABLE USER ADD Country varchar;	2