

Computing

General Certificate of Secondary Education

Unit **A451**: Computer systems and programming

Mark Scheme for January 2013

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All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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Annotations

Annotation	Meaning
	Omission mark
	Benefit of the doubt
	Subordinate clause / consequential error
	Incorrect point
	Expansion of a point
	Follow through
	Not answered question
	No benefit of doubt given
	Point being made
	Repeat
	Slash / half-mark
	Correct point
	Too vague
	Zero (big)

Question		Answer	Marks	Guidance
1	(a)	<p><i>Correct answer:</i></p> $ \begin{array}{r} 1\ 1\ 0\ 1\ 1\ 0\ 0\ 0 \\ +\ 0\ 1\ 1\ 0\ 0\ 0\ 0\ 0 \\ \hline (1)\ 0\ 0\ 1\ 1\ 1\ 0\ 0\ 0 \end{array} $ <p><i>Award marks for:</i></p> <ul style="list-style-type: none"> • 1 1 1 0 0 0 for bits 5 to 0 • 0 0 for bits 7 and 6. 	2	
	(b)	<ul style="list-style-type: none"> • there is an overflow/a carry left over after the addition/does not fit into one byte. 	1	
2		<ul style="list-style-type: none"> • html: define content/layout of web pages/links • jpg: images/photos • mp3: sound/audio/music files • pdf: documents 	4	<p>Do not accept “text files” for pdf – candidates must indicate that there is some additional formatting / layout if they use “text”</p> <p>“Media files” is too vague for jpg or mp3</p>

Question		Answer	Marks	Guidance															
3	(a)	<ul style="list-style-type: none"> • 1 • 0. (respectively) 	2																
	(b)	<p><i>Correct answer:</i></p> <table border="1"> <thead> <tr> <th>p</th> <th>q</th> <th>(NOT p) AND q</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>1</td> <td>1</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table> <p><i>Award marks for</i></p> <ul style="list-style-type: none"> • Correct missing input cases (0 1, 1 1 or 1 1, 0 1) • Output of 1 for 0 1 • Output of 0 for 1 1. 	p	q	(NOT p) AND q	0	0	0	1	0	0	0	1	1	1	1	0	3	
p	q	(NOT p) AND q																	
0	0	0																	
1	0	0																	
0	1	1																	
1	1	0																	

Question		Answer	Marks	Guidance
4	(a)	<ul style="list-style-type: none"> To store the files/eg operating system Even when the system is switched off/which must be non-volatile. 	2	

Question		Answer	Marks	Guidance	
				Content	Levels of response
	(b)	<p><i>Points may include:</i></p> <p>Magnetic:</p> <ul style="list-style-type: none"> Tend to be large capacity, relatively cheap Sensitive to movement of system due to moving parts Used as main storage for computers, eg to store OS. <p>Solid state</p> <ul style="list-style-type: none"> Relatively expensive so tend to be of smaller capacity No moving parts so not sensitive to movement Used when portability is important... transferring files, USB keys... or as main storage for PDAs, mobile computers ... as a result, portable magnetic formats (eg floppy disks) are no longer used in favour of solid state storage. 	6	Examples may have been used to clarify points but are not required for the levels.	<p>High Level Response (5–6 marks) A detailed description of characteristics of both solid state and magnetic devices. Examples, if used, will be appropriate. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</p> <p>Medium Level Response (3–4 marks) A limited description of characteristic(s) of a solid state and/or magnetic devices. Examples, if used, are weak and do not follow from the points being made. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</p> <p>Low level Response (1–2 marks) An attempt to describe the characteristic(s) of magnetic or storage. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</p> <p>No response or response not worthy of credit (0 marks)</p>

Question		Answer	Marks	Guidance
5	(a)	eg <ul style="list-style-type: none"> • Can share files/can work collaboratively on same files • Can share hardware resources/suitable example • Can access their files from any computer/classroom • Can work together from different computers using instant messaging • Centralised deployment of software to all computers 	2	
	(b)	eg <ul style="list-style-type: none"> • Passwords protected user accounts • ... to ensure that only authorised people can access the network. • Network policy restrictions eg students only allowed to log in during school hours, from certain computers • ... ensures that attempts to enter in the system are likely to be genuine. • Different levels of access/each user can only access the files they need • ... prevents accidental damage to files. • Firewall... • ... to prevent unauthorised access /hacking into the network. <p><i>Marks in pairs. Award one mark for a correctly identified measure and another mark for an appropriate expansion <u>explaining</u> how this measure improves security</i></p>	4	Filtering / censoring is not answering the question (unless candidates explain that web sites known to pose a security threat – e.g. because they are known to distribute viruses – are filtered)

Question			Answer	Marks	Guidance
6	(a)	(i)	<ul style="list-style-type: none"> The height/amplitude of the sound wave is measured ... at regular intervals ... and converted to binary. 	2	Remember to transfer marks between (i) and (ii) if necessary... many candidates may make this point in their answer to part (ii)
		(ii)	<ul style="list-style-type: none"> If the interval is smaller/if you sample more often you have more data to store... ... so larger file but the sound reproduced is closer to the original... ...so better quality. 	3	Accept the converse ie if you sample less often you have a smaller file etc... as long as the explanation is correct

Question			Answer	Marks	Content	Guidance
						Levels of response
7			<p><i>Points may include:</i></p> <p>Advantages</p> <ul style="list-style-type: none"> • Computer system is more systematic than human... will not forget some patients/give consistent results • Software can be deployed in several departments • Easier to analyse records and measure the performance of the hospital. <p>Reliability</p> <ul style="list-style-type: none"> • Critical application, lives may be at stake if there are errors in the program • Loss of data/loss of power or any system down time can have adverse effects. 			<p>High Level Response (5–6 marks) A good understanding with detailed descriptions of both advantages and the need for reliability. There will be few if any errors in spelling, grammar and punctuation. Technical terms will be used appropriately and correctly.</p> <p>Medium Level Response (3–4 marks) A description of some advantages of the system and the need for reliability but one may be limited. There may be occasional errors in spelling, grammar and punctuation. Technical terms will be mainly correct.</p> <p>Low Level Response (1–2 marks) There may be an attempt to describe the advantages or the need for reliability but this is vague and some of the statements made are inaccurate. Information will be poorly expressed and there will be a limited, if any, use of technical terms. Errors of grammar, punctuation and spelling may be intrusive.</p>

Question		Answer	Marks	Guidance												
8	(a)	eg <ul style="list-style-type: none"> • Circuit only needs to check for two states/uses switches... • ... electricity flowing or not flowing/on or off/1 and 0 • ... resulting in more reliable circuits. 	2													
	(b)	(i) <ul style="list-style-type: none"> • Each character is assigned a <u>unique</u> character code • Each letter is converted to its character code (which is a binary number) 	1													
		(ii) <ul style="list-style-type: none"> • 0100 0011 0100 0001 0100 0010. 	1	Correct answer only but spaces don't matter												
		(iii) <ul style="list-style-type: none"> • ASCII uses 8 bits... • ... and so can only represent 255/256 distinct characters... • ..many more characters are needed for coping with all languages (eg Unicode 16bits). • ASCII does contain characters used in some languages 	2	Accept answers referring to 7 bits are equally valid												
9	(a)	<ul style="list-style-type: none"> • The error does not prevent program running... • But it does not produce the expected output/it does not do what the programmer intended. • A reasonable example 	2													
	(b)	<p><i>Correct answer:</i></p> <table border="1"> <thead> <tr> <th>Input Data</th> <th>Expected outcome</th> <th>Reason for test</th> </tr> </thead> <tbody> <tr> <td>C</td> <td>D E F</td> <td>checks the output is the next three letters in the list</td> </tr> <tr> <td>A</td> <td>BCD</td> <td>checks the output goes back to the beginning of the list</td> </tr> <tr> <td>H</td> <td>Error message</td> <td>Not a valid/existing note</td> </tr> </tbody> </table> <p><i>1 mark per box</i></p>	Input Data	Expected outcome	Reason for test	C	D E F	checks the output is the next three letters in the list	A	BCD	checks the output goes back to the beginning of the list	H	Error message	Not a valid/existing note	6	Only award the mark for Reason for test, if the Expected outcome is correct enough to justify the reason given
Input Data	Expected outcome	Reason for test														
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Question		Answer	Marks	Guidance															
10	(a)	eg <ul style="list-style-type: none"> Provides interfaces between user and computer/Determines look and feel of the computer Provides a platform for software to run Manages peripherals used by the system Manages memory. 	2																
	(b)	<table border="1"> <thead> <tr> <th>Utility</th> <th>Used for security</th> <th>Used for disk organisation</th> </tr> </thead> <tbody> <tr> <td>Antivirus</td> <td>✓</td> <td></td> </tr> <tr> <td>Defragmenter</td> <td></td> <td>✓</td> </tr> <tr> <td>File transfer</td> <td></td> <td>✓</td> </tr> <tr> <td>Firewall</td> <td>✓</td> <td></td> </tr> </tbody> </table>	Utility	Used for security	Used for disk organisation	Antivirus	✓		Defragmenter		✓	File transfer		✓	Firewall	✓		4	
Utility	Used for security	Used for disk organisation																	
Antivirus	✓																		
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	(c)	<ul style="list-style-type: none"> The source code is distributed with the software The customer can modify the source code The customer can redistribute the source code (with the same licence/restrictions) 	2																

Question		Answer	Marks	Guidance
11	(a)	<ul style="list-style-type: none"> • A persistent... • ... and structured/organised store of data • Allows data to be queried/interrogated. 	2	Candidates will typically describe the properties of persistence and organisation in their own words.
	(b)	<p>eg</p> <p>Email address</p> <ul style="list-style-type: none"> • Must contain an @ sign • Must contain a full stop (after the @ sign). <p>Gender</p> <ul style="list-style-type: none"> • Must be one of Male, Female, (Other). <p>Password</p> <ul style="list-style-type: none"> • Must have a given minimum length • Must contain a non-letter. 	3	<p>Accept any suitable validation for the field given.</p> <p>Do not accept checking that the email address is genuine/real, but accept checking that the email address does not belong to another registered member</p> <p>Do not accept a length check for gender</p> <p>Do not accept entering the password twice</p>
	(c)	<ul style="list-style-type: none"> • Avoids data repetition/redundancy/inconsistency... • ... with the personal details of the user • ... a user can have more than one picture/one to many • The primary key of the USER is stored in the PICTURE table • Where it is a foreign key. 	4	

Question		Answer	Marks	Guidance
12	(a)	eg <ul style="list-style-type: none"> • Editor • Allows Jim to enter the program code • Colour coding keywords • Auto-completes code as you type. • Compiler • Transforms the written source code into machine code. • Debugging tools • Highlights errors in the code • Suggests possible solutions. (2 marks per tool)	4	Do not accept me spell check
	(b)	<ul style="list-style-type: none"> • 50 • 250. 	2	

Question	Answer	Marks	Guidance
(c)	<p>eg</p> <pre> INPUT TeddyBears INPUT Hours PerTeddyBear = 2 * TeddyBears PerHour = 5 * Hours IF PerTeddyBear > PerHour THEN OUTPUT PerTeddyBear ELSE OUTPUT PerHour END IF </pre> <p>Award marks for:</p> <ul style="list-style-type: none"> • Inputting teddybears and hours • 2 * number of teddy bears • 5 * hours • Comparing the two answers • Outputting the piece rate if it is greater • Outputting the hour rate if it is greater. 	6	If correctly calculated but not output give benefit of doubt once

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