

GCE

Computing

Unit **F451**: Computer Fundamentals

Advanced Subsidiary GCE

Mark Scheme for June 2017

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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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These are the annotations, (including abbreviations), including those used in scoris, which are used when marking

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)
	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.

		Answer	Marks	Guidance
1	a	Desktop Publishing application	1	Generic names only
	b	i <ul style="list-style-type: none"> -Router -Switch -Network Interface Card (1 per-, max 1)	1	Accept Hub
		ii <ul style="list-style-type: none"> - Can share hardware/software - Easy to maintain all computers (rather than standalones). - Staff can work off any computer (meaning no need for each member to have their own computer). - Easy for staff to share data. - Central backup (1 per-, max 2)	2	
	c	i <p>Encrypt the information... ...making it unreadable to anyone without a key/meaning even if anyone steals the data they can't read it.</p> <p>Set up user access controls... ...So that only members of staff who need to can access customer data.</p> <p>Set up a firewall... ...to monitor data going into and out of the network/helping prevent hackers/preventing data leaving the network in an unauthorised manner.</p> <p>Set up physical security measures/locks/biometrics etc... ...to restrict who can access the servers.</p> <p>Set up auditing/logging... ...To keep records of who accesses what data.</p> <p>1 mark per method identified (max 2) 1 mark per relevant description (max 2)</p>	4	

		ii	Data Protection Act	1	
		iii	Act only applies to personal data/data about people	1	
	d	i	<ul style="list-style-type: none"> - Copy the original data... - ..to a new location/onto a suitable storage medium.. - ...Delete the original data 	3	Accept 'move the data' as points 1 and 3 combined.
		ii	<ul style="list-style-type: none"> - To free up storage space... - ..whilst keeping data documents available should they be needed in the future. 	2	
2	a	i	<ul style="list-style-type: none"> - Data can be transmitted in both directions... - ...but only one direction at any given time. 	2	
		ii	<ul style="list-style-type: none"> - Connection from computer to printer to send data for printing - From printer to computer to send messages such as confirmation of printout/out of paper/low on ink 	2	
		iii	Data is sent down a single line/one bit at a time	1	
	b	i	<ul style="list-style-type: none"> -Portable storage medium -Most computers have an optical drive 	1	
		ii	<ul style="list-style-type: none"> -Drivers provide an interface/method of communication -To enable the operating system to control the printer 	2	
	c		<p>Mark band 6 – 8 Higher level response Candidate has given a full discussion of what is meant by a knowledge based system. There is a sensible description of how a KBS could be used to provide technical support. Candidate has used appropriate technical terminology throughout. There are few if any errors of grammar or spelling errors.</p> <p>Mark band 3 – 5 Medium level response Candidate has some description of what is meant by a knowledge based system though it may be incomplete or in parts inaccurate. There is an attempt to state how a knowledge based system could be used to provide technical support. Candidate has used some appropriate technical terminology in the response. There may be errors of grammar or spelling errors in the response but they are not obtrusive.</p> <p>Mark band 0 – 2 Low level response</p>	8	<p>Points made may include but are not limited to:</p> <p><u>Knowledge Based System</u> Makes use of body of knowledge to solve problems. Often used as expert systems (i.e. to take on the decision making of a human expert). Examples of use include medical diagnosis and valuation of antiques etc. The main components are the knowledge base (rule base) and inference engine. The knowledge base stores known facts and rules. The inference engine uses logic to apply the users' responses to the knowledge base. An interface provides a means for the user to interact with the system.</p>

		<p>Candidate has either attempted to describe what is meant by a knowledge based system or attempted to state how a knowledge based system could be used to provide technical support. Candidate has failed to use technical terminology. There are likely to be spelling errors and/or errors of grammar which will disrupt the flow of the response</p>		<p><u>Use of KBS</u></p> <ul style="list-style-type: none"> - Will ask customers questions about their problem... - ...via the interface - The answers they give will generate new questions... - ...this happens as a result of the inference engine applying the users answers to the knowledge base - This happens until the problem is identified... - ..or it can't be identified and has to be passed onto a human.
3	a	<p>Scale parts... ...Build TVs of different sizes. ...Be assured they fit.</p> <p>Library of parts... ...design for same part can be reused multiple times on tv/on different tvs.</p> <p>Can be linked to CAM (Computer Aided Manufacture)... ...So TVs/parts can be automatically built</p> <p>Textures can be added.... The look of the TV can be established before it is built.</p> <p>Materials can be assigned to different parts... ...Allowing the structural integrity to be tested in advance ...Allowing the price to calculated in advance.</p> <p>Circuits can be designed and simulated...</p>	4	

		<p>...Allowing them to be tested before they are built.</p> <p>Accept any other sensible feature and benefit.</p> <p>1 Mark per feature (max 2), 1 Mark per matching benefit (max 2)</p> <p>Each feature can have a maximum of 1 benefit mark.</p>			
	b	i	<ul style="list-style-type: none"> -A list of options is presented which the user picks from -This may lead to further options -It restricts access <p>(1 per -, Max 2)</p>	2	Accept any other sensible feature
		ii	<ul style="list-style-type: none"> - Limit the number of options... - ...Only so many can be seen on screen at one time - ...Too many become overwhelming for user - Limiting to 10 options... - ...allows numeric keys to be shortcuts - Most frequently used menu options should be at the top of the menu (and less frequently used at the bottom)... - ...reducing the amount of scrolling through the menu needed - ...making it easier to find frequently used options. <p>(1 per -, max 2)</p>	2	
4	a		<ul style="list-style-type: none"> -A memory location -Within the CPU 	2	
	b		<ul style="list-style-type: none"> -(Part of the CPU) that performs calculations -Logical comparisons. -Gateway from/to the CPU 	2	
	c		Accumulator	1	
	d		Current Instruction Register...	4	

		<p>...Stores the instruction being executed/decoded.</p> <p>Memory Address Register... ...Stores the address of memory location from which data is to be fetched or stored.</p> <p>Memory Data Register/Memory Buffer Register... ...Stores the data fetched from or to be stored in memory.</p> <p>Program Counter... ...Stores the location of the next instruction to be fetched.</p> <p>Index Register... ...stores value added to operand when using indexed addressing.</p> <p>1 per named register (max 2), 1 per matching description (max 2)</p>		
e		<ul style="list-style-type: none"> - Address Bus: (The address/location) 144 - Control Bus: A <u>signal</u> for data to be stored in memory. - Data Bus: (The value/data) 25 	3	Must use signal and not instruction for control bus.

5	a	i	<ul style="list-style-type: none"> -Can it be completed within the given time? -Can it be completed within the given budget? -Is it technically feasible? -Is it ethical? -Is it legal? -Is the workforce capable of using it? -Is it cost effective in the long run (1 per-, max 4)	4	
		li	<ul style="list-style-type: none"> - Prevents time and money being wasted on a project... - ...that ultimately fails 	2	
	b	i	<u>Advantage</u> <ul style="list-style-type: none"> -Can be distributed to a large number of people -Results can be quickly analysed. <u>Disadvantage</u> <ul style="list-style-type: none"> -Usually a low return rate -Questions determined in advance so can't be probed further -Not suited to open questions (1 per-, Max 1 per advantage, 1 per disadvantage)	2	
		ii	Interview... Discussion, (usually one to one) where questions are asked and answered. Observation... Workers (and customers) are observed using the existing system. Examining existing documentation... ...documents used and generated by the existing system are examined. Meeting... ...A group of people answering questions on/discussing the existing system (1 mark for method described, 1 mark for description)	2	

	c	<ul style="list-style-type: none"> - Creates a website with limited functionality/client sees a version of the website quickly - Get feedback from the Supermarket - Changes can be made (if requirements have been misinterpreted/changed). - before adding more functionality - ...which is time consuming. 	2		
	d	<ul style="list-style-type: none"> -Previously undetected bugs come to light. -Further enhancements/improvements are made. -Updates made due to changes external to the system. <p>(1 per - , max 2)</p>	2	Must give reasons it is not sufficient to solely name the maintenance type (e.g. perfective/adaptive/corrective).	
6	a		4		
	b	$ \begin{array}{r} 1\ 0\ 1\ 1\ 0\ 0\ 1\ 1 \\ 0\ 1\ 1\ 1\ 1\ 1\ 1\ 0\ + \\ \hline * 0\ 0\ 1\ 1\ 0\ 0\ 0\ 1 \\ \hline 1\ 1\ 1\ 1\ 1\ 1 \end{array} $ <ul style="list-style-type: none"> • correct answer (with or without the leftmost 1) • correct use of carry bits • absence of or clear discarding of left most 1 	3		
	c	i	261 1 mark for the 2 1 mark for the 61	2	
		ii	B1	1	

7	a	<ul style="list-style-type: none"> - To map binary values... - ...to characters (in a standardised way). 	2													
	b	<table border="1" style="width: 100%; text-align: center; border-collapse: collapse;"> <tr> <td style="width: 16.6%;">01101010</td> <td style="width: 16.6%;">01101001</td> <td style="width: 16.6%;">11100111</td> <td style="width: 16.6%;">11110011</td> <td style="width: 16.6%;">11100001</td> <td style="width: 16.6%;">01110111</td> </tr> <tr> <td>j</td> <td>l</td> <td>g</td> <td>s</td> <td>a</td> <td>w</td> </tr> </table> <p>1 mark for first two parity bits 0, 0 both correct 1 mark for middle two parity bits 1, 1 both correct 1 mark for last two parity bits 1, 0 both correct</p>	01101010	01101001	11100111	11110011	11100001	01110111	j	l	g	s	a	w	3	
01101010	01101001	11100111	11110011	11100001	01110111											
j	l	g	s	a	w											
	c	256	1													
	d	<ul style="list-style-type: none"> - Block parity - Data is formed into/treated as a grid/block - Parity bits are added at the end of each row and column - When data is received at the other end the parity of each row and column is checked - If all the parity bits are correct the data is (most likely) correct - If a row and column have incorrect parity where they intersect is the corrupted bit (which can be corrected). - If multiple bits are corrupted they can be detected but not corrected. <p style="text-align: center;">OR</p> <ul style="list-style-type: none"> - Hamming Codes - Bits are reserved as parity bits - The parity bits are the 1,2 and 4th bits / the 2ⁿ th bits - Data is put into the remaining bits - Parity bit on is calculated on bits 1,3,5 and 7, parity bit 2 on 2,3, 6 and 7, and parity bit 4 on 4,5,6 and 7 / parity bit at location n is calculated starting at n on a check n, skip n sequence. - When data is received parity bits are checked against 	4													

		<p>respective bits. <i>(Still award if incorrect sequence stated on this point or previously.)</i></p> <ul style="list-style-type: none"> - If one bit is corrupted it's location can be found by adding the locations of the incorrect parity bits. - If 2/multiple bits are corrupted they can be detected but no corrected. <p>(1 mark per -, max 4)</p>			
8	a	i	-A system that gives a response within a guaranteed time frame Input is processed immediately.	1	
		ii	<ul style="list-style-type: none"> - Image needs to be updated immediately/as soon as there is a change... - ...otherwise illusion is ruined/there is lag between actions and the image seen/may cause motion sickness 	2	
		iii	<ul style="list-style-type: none"> -Control the hardware on a computer system -Provide an interface for the user -Provide a platform from which software can be run -Provide utilities to maintain the computer <p>(1 per -, max 2)</p>	2	Accept any reasonable OS function
	b	i	<ul style="list-style-type: none"> - A piece of software... - ...which allows a user to do/make something 	2	
		ii	<p>Mark band 6 – 8 Higher level response Candidate has given a full discussion of hardware required for both the VR system and the accompanying computer. They have clear and valid justifications why that hardware is necessary. Candidate has used appropriate technical terminology throughout. There are few if any errors of grammar or spelling errors.</p> <p>Mark band 3 – 5 Medium level response Candidate has some description of the hardware required (for 5 marks this will include hardware for the computer and VR system). There is reasonable justification for some of the hardware. Candidate has used some appropriate technical terminology in the response. There may be errors of grammar or spelling errors in the response but they are not</p>	8	<p>Answers may include (but are not limited to) discussion of <u>some</u> of the hardware components below:</p> <p><u>Hardware Required For Computer</u></p> <ul style="list-style-type: none"> - Powerful computer will be required to run it the system.... - ...due to the intensive nature of the system - CPU with fast clock rate (also multiple cores and large cache)... - allows the program to be processed at the speed needed to give the immediate responses needed.

		<p>obtrusive.</p> <p>Mark band 0 – 2 Low level response Candidate has attempted to describe the hardware required or at least one of the VR system or connected computer. There is little to no justification for it. Candidate has failed to use technical terminology. There are likely to be spelling errors and/or errors of grammar which will disrupt the flow of the response</p>	<ul style="list-style-type: none"> - Large amount of fast RAM... - ...to store all the data required within the application whilst it is in use reducing the reliance on slower secondary storage. - ...it being fast will help reduce the chance of it causing a bottleneck - Secondary storage may need to have a high capacity... - due to amount of graphical data that will need to be stored. - ...because of quick response times flash storage likely to be used. - Fast GPU/Graphics card... - ...will be a necessity in order to process the 3D graphics. - likely to have own onboard memory as quicker for it to access than RAM. - ...Likely to be the most important part of the setup. - Possible custom system may have some of software in ROM for instant access. - Motherboard to connect all components together. - Fans or water cooling needed... - ... as the fast components will produce a lot of heat. - Case... - ...to protect components and help with heat dissipation. - Input/Output peripherals (mouse, keyboard, monitor etc) to manage the computer. <li style="padding-left: 20px;"><u>Hardware for VR System</u> - Input via sensors - such as accelerometer to detect movement
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			<p>of the head</p> <ul style="list-style-type: none"> - gyroscopic sensor to detect rotation of the head - compass to detect turning - (infrared) Lights to be positioned round the room and sensors on the helmet (or vice versa)... - ...To track wearer's position in the room. - Possibly handheld pad/joystick/pointing device (may include the sensors mentioned above too) - Connection to headset may be wireless to allow free movement/wired to give a high enough bandwidth for data required. - Connection to controller likely to be wireless for free movement. - Output through screens within headset. As close to face must have high resolution... - ...As close to face, to prevent pixels being visible - Must have a fast refresh rate... - so image keeps up with movement - headphones.. - ... allowing separate sound to be channeled to each ear. - May include options such as gloves giving tactile or haptic feedback.
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