Question			Answer/Indicative content	Marks	Guidance
1	a	i	e.g. • **Fewer** mistakes (likely to be made) // **More** accurate • Faster as you can apply the same formula to multiple cells // By example • What-if analysis can be performed • Values can be changed and results **automatically(re)calculated** (by using formulas) • Can be shared electronically	1	Do not accept “faster” on its own without clarification of what/why it is faster. Examiner’s Comments Candidates who had a good knowledge of software were able to gain the mark on this question although many gave answers like faster or easier without saying what made it faster or easier.

Question			Answer/Indicative content	Marks	Guidance
		ii	e.g. • Database/DBMS • …to store/query/sort data about customers/staff/stock • Word processor • …to create documents / letters / invoices for clients/staff • Presentation software • …to create presentations for clients/staff • Email software • …for staff to communicate with each other or with customers • Graphics manipulation • …to produce adverts / images for sales • Web browser • …to view websites to purchase materials/stock// view competitor's website	4	Mark in pairs – one mark for naming type of application software, one for the example. Application type must be correct to give example. Do not accept brand names for first mark but FT for example. Ignore brand names if description given after E.g. Outlook / Email application Accept other sensible application software (such as CAD, Desktop Publishing). Do not accept special purpose / bespoke / utility software. Do not accept spreadsheet (given in question) Example must be relevant to the business <u>Examiner's Comments</u> Many candidates were able to identify application packages and could give valid tasks that a business could use them for. Less successful candidates tended to give utility software or were not able to apply the use to the business. Exemplar 1 Application 1 Word processor Example of task 1 To write up letters to send to clients/employees. Application 2 Presentation Software Example of task 2 Could be used to pitch new ideas to the bare bussness. The candidate has correctly identified 2 different applications and given a valid use for a business.

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td></td><td></td><td>iii</td><td>• No access to source code
• Cannot modify//improve to meet business needs
• Cannot fix bugs
• (Usually) cost to purchase licences // licenceconditions to meet//ongoing fees</td><td>3</td><td>Do not award a reverse of the mark point by describing open source

Examiner's Comments

Candidates who understood that the source code is not available did well on this question as they were then able to expand their answer and gain full marks. Some candidates described open source without giving a drawback of closed source.</td></tr>
<tr><td></td><td>b</td><td></td><td><table><tr><th>Statement</th><th>True</th><th>False</th></tr><tr><td>BIOS stands for Boot Input Output Standard</td><td></td><td>✓</td></tr><tr><td>The BIOS can be used to alter hardware settings, such as which storage device the computer boots from.</td><td>✓</td><td></td></tr><tr><td>BIOS settings are stored in RAM</td><td></td><td>✓</td></tr></table></td><td>3</td><td>1 mark per row.

Examiner's Comments

This question was generally well answered by candidates.</td></tr>
<tr><td></td><td>c</td><td></td><td>• Stored away from the computer(s)/remote…
• … so in case of disaster, data is not also damaged
• All of the data (from multiple machines) can bebacked up at the same time
• Can be accessed from elsewhere / other machines
• Storage can be expanded as necessary//no limit on size
• Speed of access is not a priority for a backup
• Can make recovery from another site easier
• No physical space needed for backup hardware
• No on site maintenance required
• Allows more local storage capacity for data</td><td>2</td><td>Allow multiple interpretations of virtual storage (e.g. cloud / devices not connected directly to the computer)

Do not allow space on its own or memory for storage

Examiner's Comments

Candidates who understood that virtual storage would be remote/not stored on the business premises were able to gain full marks on this question. Some candidates confused virtual storage with virtual memory and some did not understand that although it may be cloud storage it is still stored on a physical medium somewhere.</td></tr>
</table>

Question			Answer/Indicative content	Marks	Guidance
	d	i	e.g. • Share hardware (e.g. printers) • Share files • Share Internet connection • Centralised security • Log on / access files from any machine on the LAN • Central maintenance • Central backup / storage • Central installation / update of programs • Can monitor user activity • Can control access levels // Centralised useradmin • Access an intranet	3	Mark first answer in each answer space Examiner's Comments This question challenged many candidates who were unable to give three advantages to the business and instead gave 3 benefits of a LAN over a WAN which was not what the question required. The candidates who did manage to gain full marks were able to give clear advantages to a business of having their machines networked in a LAN. OCR support Link to a resource for features of a computer network can be found in this document on TeachCambridgehttps://teachcambridge.org/item/01e01b94–6f2e-4afa-a765-c11b94aca292
		ii	• A set of rules // an agreement • Used to ensure the (proper / successful) **transfer of data** between devices // used to govern the **transmission / communication** between devices • May specify format of data / error checking / etc	2	Allow suitable example of contents of a protocol for MP3 Do not award a rule - must be plural Examiner's Comments This was generally well answered and many candidates were able to gain both marks

Question			Answer/Indicative content	Marks	Guidance
		iii	1 mark per protocol listed e.g. • HTTP // Hypertext Transfer Protocol • HTTPS // Hypertext Transfer Protocol Secure • TCP // Transmission Control Protocol • IP // Internet Protocol • UDP // User Datagram Protocol • FTP // File Transfer Protocol • Ethernet • WPA // Wi-Fi Protected Access • DHCP // Dynamic Host Configuration Protocol • SMTP // Simple Mail Transfer Protocol • POP // Post Office Protocol • IMAP // Internet Message Access Protocol • RDP // Remote Desktop Protocol • VoIP // Voice over Internet Protocol	2	Mark first answer in each answer space If mentioned one protocol with 2 versions e.g. IPv4 & IPv6 - only 1 mark If they've written the protocol in full but got any word wrong, no mark awarded <u>Examiner's Comments</u> Generally well answered and it was interesting to see the different protocols candidates were able to name. Some candidates named two of the layers in TCP/IP instead of protocols which gained them no marks.
		iv	• To apply protocols in order / one after the other • To provide independence of layers // Layers can be modified without affecting other layers // Layers are self-contained • Hides details from previous or next layer(s) // is an abstraction • Each layer is well defined / does a specific job • Breaks **tasks** down into manageable units // Groups similar protocols together • Improved troubleshooting (easier identification of the layer that causes the issue) • Each layer only communicates with adjacent layers// simplifies interfacing • Hardware/software can be manufactured to fit into one specific layer • Allows for standards for individual tasks/layers to be developed // for compatibility	3	<u>Examiner's Comments</u> Protocol layering has appeared in questions in previous papers, but many candidates were not able to explain why they are layered. Some candidates gave a description of the layers in TCP/IP without saying why it was layered.
	e	i	Real time	1	Correct answer only <u>Examiner's Comments</u> This question was generally well answered.

Question			Answer/Indicative content	Marks	Guidance
		ii	• Multi-tasking… • …runs multiple **programs at the same time** • Multi-user… • … allows multiple **users at the same time** (must be clear that candidate is not discussing an OS that simply has multiple accounts) • Distributed… • …allows multiple computers to work together **on a single task** • Embedded… • …has a dedicated/limited function • …is read-only / cannot be changed	6	Mark in pairs Allow real time if not given as previous answer Do not accept "runs on an embedded system" as expansion of embedded OS, this is NE. Examiner's Comments This question was generally well answered with Embedded, Distributed, Multi-User and Multi-Tasking being the most common answers. Some candidates struggled to name and a type of operating system. Centres should advise candidates that OS brand names are not accepted as a type.
	f		• Interrupt checked for at start/end of each fetch-execute cycle • If the interrupt is of a lower/equal priority to the current process then the current process continues • (If interrupt raised) contents of **registers** copied to stack • Flags are set to determine if interrupts are enabled / disabled • Program counter changed to point to Interrupt Service Routine (ISR) // ISR runs • After interrupt complete, previous **register** values restored back from stack • Flag is reset • If higher priority interrupt received during servicing of interrupt… • …this is added to stack and new interrupt dealt with	3	Examiner's Comments Many candidates were able to gain full marks on this question. Unfortunately, some candidates showed a lack of detail in their answers. Some candidates talked about interrupts being run during an FDE cycle or assumed that an interrupt would be run immediately with no reference to priorities. **OCR support** Resources for operating systems and interrupts can be found in this document. https://www.ocr.org.uk/Images/253685-the-function-and-purpose-of-operating-systemsdelivery-guide.pdf

Question	Answer/Indicative content	Marks	Guidance
g	**Mark Band 3 – High Level (7–9 marks)** The candidate demonstrates a thorough knowledge and understanding of memory management carried out by operating systems. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to thoroughly assess the importance of memory management to an efficient and secure system. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2 – Mid Level (4–6 marks)** The candidate demonstrates reasonable knowledge and understanding of memory management carried out by operating systems. The material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence / examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to assess the importance of memory management to an efficient and secure system. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. **Mark Band 1 – Low Level (1–3 marks)** The candidate demonstrates a basic knowledge of memory management carried out by operating systems; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired	9	*The following shows example content that may form part of a candidate's answer. It is not intended to be an exhaustive resource, nor should a candidate be expected to specifically cover any particular amount of this.* **Knowledge (AO1)** • Memory management means to ensure that RAM is used efficiently and not wasted • Removes data not needed anymore (garbage collection), frees up space and allocates memory to applications • Paging or segmentation may be used to split up memory • Paging uses fixed size divisions whereas segmentation uses varying size divisions • Paging is where memory is divided physically • Segmentation is where memory is divided logically • Virtual memory may be used when RAM is (almost)full to enable applications to continue to run **Application (AO2)** • If RAM is unavailable or full, applications cannot be loaded • Data transferred out of RAM into virtual memory to free up space and then transferred back again when needed • Also includes security so that data stored in memory is not vulnerable • Memory management is important for a well-running machine. If not, RAM would rapidly run out and fill up with unneeded data/instructions and so no new applications could run • Paging causes internal fragmentation whereas segmentation causes external fragmentation • A page table is used to map page location which is slower than a segmentation table • It is easier for the OS to manage page locations as they can be stored non-contiguously. Segments can be non-contiguous but work better contiguously

Question			Answer/Indicative content	Marks	Guidance
			knowledge and understanding to the context provided. The candidate provides nothing more than unsupported assertions. Any discussion of the importance of memory management will be vague or lacking detail. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. 0 mark No attempt to answer the question or response is not worthy of credit		Evaluation (AO3) • RAM is much more expensive than secondary storage (per unit/GB) so virtual memory is useful • rather than having to buy more RAM • Over use of virtual memory causes slow down and even disk thrashing if pages have to be swapped back and forth too often • Paging can be more effective because any free memory space can be used to swap data in and out whereas with segments, lots of space will sit unused until a segment the right size is available • Segmentation errors can cause memory leakage which would cause the system to crash • Security issues – applications can only access memory allocated to them so (for example) a malicious application cannot access the memory allocated to a banking app. Also when applications are closed, data is removed before being reallocated so that applications cannot see historic data Examiner's Comments Many candidates were able to show an understanding of pages being a fixed size and segments being variable size, but few were able to relate virtual memory to the use of pages and segments and few had an understanding of how they are used. Responses to why it is important tended to be vague. There were a few candidates who talked about compression which was not relevant to the question.
			Total	42	

Question			Answer/Indicative content	Marks	Guidance

2	a		• value == "E"
			• value == "S"
			• (numone+numtwo)
			• value
			• "E"
				5	All string values must be in quotes. Allow single or double quotes.
					
					Don't allow single = for MP1&2. Penalise once and FT for multiple occurrences.
					
					Case needs to match that used in the question
					
					Needs to have brackets for MP3
					
					do
					value = input("Enter a value")
					if value == "E" then
					num = numbers.pop()
					print(num)
					elseif value == "A" or value == "S" then
					numone = numbers.pop()
					numtwo = numbers.pop()
					if value == "A" then
					numbers.push(numone + numtwo)
					elseif value == "S" then
					numbers.push(numtwo - numone)
					endif
					else
					numbers.push(value)
					endif
					until value == "E"
					
					Examiner's Comments
					
					Generally well answered with most candidates being able to gain between 2 and 5 marks on this question.

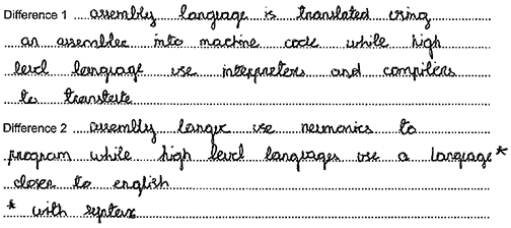
	b	i	• 8, 7 • 15 • 15,6	3	One mark per stack diagram Examiner's Comments This question was generally well answered although some candidates struggled to understand the concept of a stack and how data is pushed on to it and popped from it.
		ii	• 12 • 7 • 15	3	Examiner's Comments This was generally well answered, with the biggest misunderstanding being the way the subtraction occurs.

Question			Answer/Indicative content	Marks	Guidance
		iii	• S causes the two values inputted to be popped and only one value to be pushed back // 4 and 2 are popped and 2 is pushed • A causes an attempt to pop **two values but only one present / not two values there** • Causing a **stack** underflow	3	Examiner's Comments Many candidates were able to gain at least one mark on this question for stating that the addition would only be able to pop one number. The candidates who gained full marks were able to state the type of error correctly and explain why there was only one value able to be popped after the subtraction.
	c	i	• Stack is LIFO / FILO • Queue is FIFO / LILO • Stack uses one pointer (for head) • Queue uses two pointers (head and tail) • Stack, data is popped/pushed from the top • Queue, data is dequeued from the from the startand enqueued onto the back // a queue can be circular	2	Mark in pairs Accept descriptions of LIFO / FIFO for MP1 and 2 Examiner's Comments Generally well answered with the most popular answer being that a stack is LIFO and a queue is FIFO.
		ii	• Array is of fixed/defined size // static • List size can be changed // no defined size //dynamic • Array holds data of single data type • List can hold data of multiple / different types	2	Mark in pairs Examiner's Comments Generally well answered, although some candidates confused a list with a linked list.
		iii	• A tuple cannot be changed **at runtime** // a tupleis immutable	1	Examiner's Comments Generally well answered, with a tuple being immutable being the most common answer.
		iv	• **Go to** the first position indicated by the startpointer • From the first position, **read** the next pointervalue… • …follow this pointer value and **access** the data item	3	Accept answers relating to locations given by pointers Allow acceptable diagram illustrating the same points Examiner's Comments For this question candidates were asked how the second item in a linked list would be accessed using the pointers but many just gave descriptions of a linked list having pointers and data without saying how the data in the second item would be accessed.

Question			Answer/Indicative content	Marks	Guidance
			Total	22	

Question			Answer/Indicative content	Marks	Guidance
3	a	i	• BD	1	Correct answer only Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.
		ii	• 2AF	1	Correct answer only Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.
	b	i	• 1110 1011	1	Correct answer only Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.
		ii	• 1001 0101	1	Correct answer only Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.
		iii	• Calculations are more easily performed on two's complement • Two's complement allows for a (negligible) larger range of numbers to be stored // by example • No additional hardware is required in two's complement // Addition and subtraction are carried out using only an adder • Two's complement has only one representation for 0	1	Accept the reverse of the MP Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.

Question			Answer/Indicative content	Marks	Guidance
	c		• -15.75 is 10000.01 (in fixed point two's complement) • Binary point moved **4** places **left** • Mantissa 1000 0010 • Exponent 0100	4	Mantissa must be 8 bits, exponent must be 4 bits Accept alternative working for MP2 if appropriate. If mantissa AND exponent are correct with any working, 4 marks Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.
	d		• Exponent is -2 • Binary point moved **2** places **left** (0.001) // 0.5 x 2^{-2} • 0.125 // 1/8 (one eighth)	3	MP2 is for correct working of whichever method is used. If answer is correct and working is shown, 3 marks Examiner's Comments Binary and hexadecimal questions were generally well answered with many candidates being able to gain full marks across the question parts.
	e		• precision / accuracy • range / size / magnitude	2	Examiner's Comments Many candidates attempted this question with many showing a good understanding of floating-point binary. The most common error was to get the answers the wrong way round giving size or range for the first gap and precision or accuracy for the second.
			Total	14	

Question			Answer/Indicative content	Marks	Guidance
4	a		• Assembly language uses mnemonics • HLL uses English-like words • Assembly language uses an assembler toconvert to machine code • HLL uses a translator (compiler/interpreter) toconvert to machine code • Assembly language is a one-to-one conversionto machine code • HLL may produce multiple lines of machine codeper line of code // one-to-many • Assembly language requires more knowledge ofthe processor // allows direct control of theprocessor • HLL provides more abstraction // requires lessknowledge of the processor • Assembly language is likely to be specific to theprocessor type used // is machine dependent • HLL is portable // can be used for multipleprocessor types // programmer can pick from anumber of HLLs and paradigms // is machineindependent	4	Mark in pairs. Allow examples (e.g. JMP, print) for MP1 and 2 <u>Examiner's Comments</u> There was a range of marks candidates could access for this question. The question asked for two differences and those candidates with a good understanding of language paradigms were able to gain full marks by giving the difference for both. Candidates tended to lose marks on this question by only giving one side of the difference, e.g. saying a high level language is translated using an interpreter or compiler but then not giving the other side that assembly language is translated using an assembler. Exemplar 2  Difference 1 assembly language is translated using an assembler into machine code while high level language use interpreters and compilers to translate Difference 2 Assembly langage use memonics to program while high level languages use a language* closer to english * with syntax In this response the candidate has given two clear differences and has explained what the difference is for both.
	b	i	• Can execute multiple **instructions** / FDE cycles **at the same time** // some **instructions** in the program can be run **in parallel**	1	Do not accept just "multiple instructions" Do not accept tasks/programs for instructions <u>Examiner's Comments</u> Many candidates were able to gain the mark here. Candidates who did not tended to be vague or repeated the question.
		ii	• Some instructions may not be able to be run in parallel • An instruction may be dependent / waiting for otherinstructions to be completed • Other factors influence processing speed – clockspeed / cache / bottlenecks / etc • Program / OS needs to be written to specifically usemultiple cores	2	<u>Examiner's Comments</u> Most candidates were able to access one mark but many gave only one point. Candidates should be encouraged to look at how many marks there are for a question and make sure they provide enough points to be able to access those marks.

Question	Answer/Indicative content	Marks	Guidance
c	**Mark Band 3 – High Level (7–9 marks)** The candidate demonstrates a thorough knowledge and understanding of encryption **and** hashing and how they can be used to store data and communicate securely. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to weigh up both technologies which results in a supported and realistic judgement covering when each can be used. This is well balanced. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2 – Mid Level (4–6 marks)** The candidate demonstrates reasonable knowledge and understanding of encryption **and** hashing and how they can be used to store data and communicate securely; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence / examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to come to a conclusion showing some recognition of either technology. This may not be well-balanced, covering one side significantly more than the other, although both sides will be present. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. **Mark Band 1 – Low Level (1–3 marks)** The candidate demonstrates a basic knowledge of encryption or/and hashing	9	*The following shows example content that may form part of a candidate's answer. It is not intended to be an exhaustive resource, nor should a candidate be expected to specifically cover any particular amount of this.* **Knowledge (AO1)** • Encryption converts data into data that cannot beunderstood (ciphertext) using a key. • Symmetric encryption uses the same key for bothencryption and decryption • Asymmetric encryption uses two keys, one forencryption, one for decryption • Encryption is two-way, so data can be restored tooriginal form, but key is required. • Hashing is a one-way (non-reversible) mathematicalprocess that produces a value from the input value. **Application (AO2)** • For robot's data storage, symmetric encryption isuseful as no keys to share/transmit. • For robot-robot/user communication, asymmetricencryption / public key encryption means that onlythe public key needs to be shared. Data can beencrypted/decrypted with this while the private key iskept secure • Also possible to verify identity of sender / origin ofdata using asymmetric encryption. • Hashing is useful for information (e.g. password) thatneeds to be verified but does not need to be knownat any point; once hashed, it is impossible to returnto it. **Evaluation (AO3)** • Encryption useful for most data storage as anyonehacking into the robot will not be able toread/understand the data. • Hashing is useful for data storage of password /other items that need to be verified, hash of inputcompared against hash stored to confirmcorrectness. • Hashing is not useful for data that

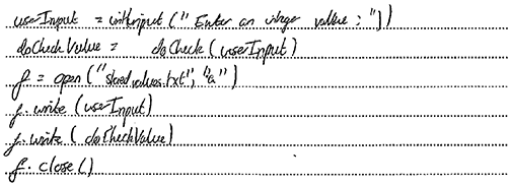
Question			Answer/Indicative content	Marks	Guidance
			and how they can be used to store data and communicate securely; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than unsupported assertions. Any discussion will be almost entirely one-sided. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. 0 mark No attempt to answer the question or response is not worthy of credit.		needs to bereturned to the user as impossible to return to. • Encryption useful for data transmission as dataintercepted cannot be decrypted without the key. Examiner's Comments Most candidates could name symmetric and asymmetric encryption and state how the keys in each were used as well as being able to show a basic understanding of hashing being irreversible but few could apply that to the question. Many talked about hash tables although the question states that hashing is used to secure the data.
	d	i	• and • href • Login • text/password • submit	5	<html> <head> <title>Robot User Interface</title> </head> <body> Robot directives - Serve the company trust - Protect data - Uphold standards Updates Login <form action="dologin.php"> Password <input type = "text" name="pw"> <input type = "submit"> </form> </body> </html> HTML tags are not case sensitive Correct answer only Examiner's Comments Generally well answered and many candidates gained full marks with most being able to gain at least two.

Question			Answer/Indicative content	Marks	Guidance

		ii	• h1 and other code contained in { }
			• color :white;
			• background-color : red;
			//background: red;
				3	Ignore presence or lack of <style> tags.
					Ignore lack of semicolons
					
					Penalise misspelling of "color" once and then FT
					
					h1 {
					color:white;
					background-color: red;
					}
					
					White can be #FFFFFF or #FFF
					Red can be #FF0000 or #F00
					
					<u>Examiner's Comments</u>
					
					Many candidates were able to gain full marks. The most common reasons candidates lost marks was through the use of quotes around the colour equals instead of colons and for misspelling colour

	e	i	• <u>Copyright Designs and Patents Act</u> Any two from: • Gives the author (the programmers)ownership/copyright of the photographs • …no need to apply // this is automatic • Others cannot use/distribute // can beprosecuted/fined for using/distributing… • …without permission • Permission can be granted / bought / licenced	3	Must be full name of Act for MP1 FT for versions of Copyright or nothing for MP2-6 <u>Examiner's Comments</u> Many candidates were able to gain 2 marks but many did not give the full name of the legislation.
		ii	• Ask permission of **author / photographer /owner** • Use images marked as copyright free (e.g.Creative Commons Licence) • Purchase (licence to use) image	2	Do not accept just "ask permission" <u>Examiner's Comments</u> Many candidates were able to gain 2 marks. It was surprising to see how many believed that you could use copyright images for your business just by crediting the artist. Candidates should be made aware that although crediting the artist may help avoid plagiarism it does not allow you free use of a copyright image.

Question			Answer/Indicative content	Marks	Guidance
	f	i	• DELETE FROM TblAccessLog • WHERE UserType = "NotNeeded"	2	Do not accept DELETE * or inclusion of field names Need quotation on MP2 For field and table names, case must match - only penalise once and FT Do not award MP2 if == is used instead of = Examiner's Comments Many candidates gained the mark for the WHERE statement but less gained a mark for the DELETE statement.
		ii	• Each attribute name is unique • Primary key identified • No repeated **attributes** • All data in attributes must be atomic (cannot befurther split up) // by example	2	Do not accept repeated data / data redundancy (higher than 1NF) unless specified that this is within one field Allow fields/properties as alternative to attribute Examiner's Comments There were some excellent responses to this question and most candidates were able to gain at least one mark.
		iii	• DateAccessed… • …has non-atomic data // data can be split up (into separate dates)	2	Examiner's Comments Very well answered and most candidates could identify the DateAccessed field as being where the problem lay.
			Total	35	

Question			Answer/Indicative content	Marks	Guidance
5	a		• 9	1	Examiner's Comments This was a relatively simple algorithm question which candidates could answer using pseudocode or program code. Many had not read the first part of the Question 5 (a) where the doCheck function was already shown and tried writing the doCheck function instead of passing a parameter to it as stated in the question. Many candidates were unable to show an understanding of how to open a file and write to it. However there were very many excellent responses to all parts of this question. Exemplar 3  userInput = int(input("Enter an integer value: ")) doCheckValue = doCheck(userInput) f = open("checkvalues.txt","a") f.write(userInput) f.write(doCheckValue) f.close() In this response the candidate has clearly shown input, calling the doCheck function and assigning the return value to a variable, File is opened and file name is enclosed in quotes and file is closed. The file name is then used to write to the file with the two values.

Question			Answer/Indicative content	Marks	Guidance

	b		• **input and store/use** a value from user
			• call **doCheck** function with value input from user **and save/use returned value**
			• open and close text file in write/append mode, if given
			• write value returned to text file
			• Write value input to text file
				5	Example code:
					`num = input("enter a number")`
					`value=doCheck(num)`
					`txtfile = openWrite("storedvalues.txt")`
					`txtfile.writeLine(num)`
					`txtfile.writeLine(value)`
					`txtfile.close()`
					
					MP2 - **doCheck** is case sensitive
					
					MP3 - need speech marks around file name
					
					<u>Examiner's Comments</u>
					
					This was a relatively simple algorithm question which candidates could answer using pseudocode or program code. Many had not read the first part of the Question 5 (a) where the doCheck function was already shown and tried writing the doCheck function instead of passing a parameter to it as stated in the question. Many candidates were unable to show an understanding of how to open a file and write to it. However there were very many excellent responses to all parts of this question.
					
					Exemplar 3
					
					`userInput = int(input("Enter an integer value: "))`
					`doCheckValue = doCheck(userInput)`
					`f = open("storedvalues.txt","a")`
					`f.write(userInput)`
					`f.write(doCheckValue)`
					`f.close()`
					
					In this response the candidate has clearly shown input, calling the doCheck function and assigning the return value to a variable, File is opened and file name is enclosed in quotes and file is closed. The file name is then used to write to the file with the two values.

			Total	6	

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>6</td><td>a</td><td>i</td><td>• ¬ (A ∨ B) // NOT (A OR B)
• ⩒ C // XOR C</td><td>2</td><td>First MP requires brackets, NOT A or B is incorrect.

Can be written in different order (e.g. C XOR NOT (B OR A) as long as logically correct.

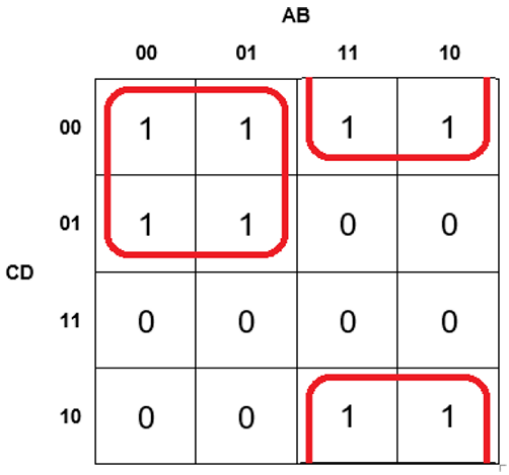
Accept $\overline{(A + B)} \oplus C$

<u>Examiner's Comments</u>

This question was generally well answered, although some candidates confused AND and OR</td></tr>
<tr><td></td><td></td><td>ii</td><td>• 1 mark for first two rows (1,0)
• 1 mark for next two rows (0,1)
• 1 mark for next four rows (0,1,0,1)

<table>
<tr><th>A</th><th>B</th><th>C</th><th>P</th><th>Marking Guidance</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>1</td><td rowspan="2">1 Mark</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>0</td><td rowspan="2">1 Mark</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td rowspan="4">1 Mark</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>1</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>0</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
</td><td>3</td><td><u>Examiner's Comments</u>

This question was generally well answered.</td></tr>
</table>

Question			Answer/Indicative content	Marks	Guidance
	b		• Correct highlighting on K map as shown • ¬A ∧ ¬C // $\bar{A}.\bar{C}$ // NOT A AND NOT C… • A ∧ ¬D // $A.\bar{D}$ D // A AND NOT D… • …∨ // + // OR joining the 2 correct expressions together	4	 Do not penalise candidates who attempt to simplify even further (e.g. NOT A AND NOT C = NOT (A OR C) using De Morgan's). MP1 - correct answer only MP4 is dependent on MP2 & 3 Examiner's Comments There were many candidates who were able to gain full marks on this question. Those who did not showed a lack of understanding of grouping on a Karnaugh map, either grouping to include zeros or missing the wrapping group and adding another group in for the top row.
			Total	9	

Question			Answer/Indicative content	Marks	Guidance
7			**Mark Band 3 – High Level (9–12 marks)** The candidate demonstrates a thorough knowledge and understanding of The Regulation of Investigatory Powers Act (RIPA) 2000. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate is able to weigh up both sides of the argument which results in a supported and realistic judgement covering the benefits and drawbacks of the Act. This is well balanced. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2 – Mid Level (5–8 marks)** The candidate demonstrates reasonable knowledge and understanding of The Regulation of Investigatory Powers Act (RIPA) 2000; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence / examples are for the most part implicitly relevant to the explanation. The candidate makes a reasonable attempt to come to a conclusion showing some recognition of benefits and/or drawbacks. This may not be well-balanced, covering one side significantly more than the other, although both sides will be present. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. **Mark Band 1 – Low Level (1–4 marks)** The candidate demonstrates a basic knowledge of The Regulation of Investigatory Powers Act (RIPA) 2000; the	12 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	*The following shows example content that may form part of a candidate's answer. It is not intended to be an exhaustive resource, nor should a candidate be expected to specifically cover any particular amount of this.* **Knowledge (AO1)** • Implements additional rights regarding surveillance / monitoring of individuals and acquisition of communications data • Provides the right for many organisations (including the Police and security services) to do this. • Purpose is to detect crime and defend national security (e.g. terrorism, public disorder) • Gives access to individuals' private communications, such as emails, text messages, phone calls, Internet history. • Some people feel this is an invasion of their privacy **Application (AO2)** • Monitoring can be carried out by far more organisations than just the Police and Security services – for example, local councils, the pension regulator and the Environment Agency are all able to use surveillance or request data about individuals. • If files are encrypted, the Act gives powers to force the handover of keys (from individuals or organisations) with a 2 year prison sentence possible on refusal. • Wide ranging powers have allowed Police and Security services to intercept criminals' communications and stop / disrupt crime. **Evaluation (AO3)** • In the modern world, it is important that Police and Security services are given the power to deal with electronic communications in this way. Many crimes (e.g. terrorism) can be detected and stopped before they occur, making the public safer. • However, some say that it is now a

Question			Answer/Indicative content	Marks	Guidance
			material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than unsupported assertions. Any conclusion, if present, will be almost entirely one-sided. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. 0 mark No attempt to answer the question or response is not worthy of credit.		"snooper's charter", with more organisations using their powers for minor offences such as detecting those lying about their address to get children into a better school or fly-tipping. • Many communication tools (e.g. WhatsApp) now include end-to-end encryption by default so that messages cannot be divulged by the organisation because they do not have access to it. Other encryption tools include plausible deniability. Examiner's Comments Responses to this question were varied, some candidates showed a clear understanding of the powers and to whom they are given. Some were aware of the powers but focused on the police or security services in their response. Some went off track, talking about other countries. In general this was not answered well and candidates tended to have a one sided view of the act.
			Total	12	