

QUESTION 2.



5 (a)

Description	Conventional telephone using PSTN	Internet-based system
connection only in use whilst sound is being transmitted		✓
dedicated channel used between two points for the duration of the call	✓	
connection maintained throughout the telephone call	✓	
encoding schemes and compression technology used		✓
lines remain active even during a power outage	✓	

[5]

(b) **maximum of two marks** for Internet references and **maximum of two marks** for world wide web references

Internet

- massive network of networks/interconnected network of computer devices
- Internet stands for Interconnected Networks
- uses TCP/IP protocol

World Wide Web (www)

- is a collection of (multimedia) web pages/documents
- ...stored on websites
- http/protocols used to transmit data
- web pages are written in HTML
- URLs specify the location of the web pages
- web documents are accessed using browsers

[3]

- (c)
- (i) router [1]
 - (ii) gateway [1]
 - (iii) server [1]

QUESTION 3.



5 (i) any **four** from:

- sensors send signals / data to a computer
- data / signal converted to digital (using an ADC)
- computer calculates the activity value based on sensor signal strength / data
- if calculated value > 3 ,
- determine location of sensor
- build up a map of seismic activity
- location and magnitude sent to printer
- ... via USB port / wireless link
- monitoring is continuous

[4]

(ii) – output / hard copy not picked up in good time

[1]

(iii) 1 mark for name + 1 mark for reason for choice

- speaker / buzzer / alarm bell
- gives control room operators an audible warning
- flashing lights
- gives control room operators an visual warning
- monitor
- use of red / flashing colours on monitor gets the attention of operators

[2]

6 any **four** points from (maximum 2 marks per type of cable):

QUESTION 4.



Question	Answer	
3(a)	Sampling rate The <u>number of samples</u> taken <u>per unit time</u> // the number of times the amplitude is measured <u>per unit time</u> Increasing the sampling rate will increase the accuracy / precision of the digitised sound // Increasing the sampling rate will result in smaller quantisation errors.	1 1
3(b)(i)	Pixel Smallest picture element which can be drawn Screen resolution The number of pixels which can be viewed horizontally and vertically on the screen // or by example - A typical screen resolution is 1680 pixels × 1080 pixels.	1 2
3(b)(ii)	8	1
3(b)(iii)	Working: Max <u>two</u> from: - Number of pixels is 2048×512 - One pixel will be stored as one byte - Number of kilobytes = $(2048 \times 512) / 1024$ Answer: <u>One</u> mark: Number of kilobytes = 1024 KB	1 1 1 1
3(b)(iv)	<u>One</u> from: - Confirmation that the file is a BMP - File size - Location/offset of image data within the file - Dimensions of the image in pixels // image resolution - Colour depth (bits per pixel) - Type of compression used, if any	1 1 1 1 1 1



Question	Answer
4(a)(i)	500
4(a)(ii)	496

QUESTION 5.



Question	Answer	Marks
3(a)	Definition: Max two from: - The number of distinct values available to encode/represent each sample 1 - Specified by the number of bits used to encode the data for one sample 1 - Sometimes referred to as bit depth 1 Explanation: Max two from: - A larger sampling resolution will mean there are more values available to store each sample 1 - A larger sampling resolution will improve the accuracy of the digitised sound // A larger sampling resolution will decrease the distortion of the sound 1 - Increased sampling resolution means a smaller quantization error 1	Max 3
3(b)(i)	One from: - The <u>number of pixels</u> per <u>unit measurement</u> 1 - The number of pixels in an image 1 - The number of pixels wide by the number of pixels high 1 - Number of pixels per row by the number of rows 1	1
3(b)(ii)	4	1
3(b)(iii)	Working: Max two from: - Number of pixels is 8192×256 1 - One pixel will be stored as one byte 1 - Number of kilobytes = $(8192 \times 256) / 1024$ 1 Answer: One mark: Number of kilobytes = 2048 KB 1	3
3(b)(iv)	Two from: - Confirmation that the file is a BMP 1 - File size 1 - Location/offset of image data within the file 1 - Dimensions of the image (in pixels) // image resolution 1 - Colour depth (bits per pixel, 1, 4, 8, 16, 24 or 32) 1 - Type of compression used, if any 1	Max 2

QUESTION 6.

Cambridge
International
AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level



COMPUTER SCIENCE

9608/11

Paper 1 Written Paper

October/November 2017

MARK SCHEME

Maximum Mark: 75

Published

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Cambridge Assessment
International Education



Question	Answer									
1(a)(i)	119									
1(a)(ii)	−120									
1(a)(iii)	<table border="1"><tr><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>1</td></tr></table>	1	1	1	0	1	1	1	1	
1	1	1	0	1	1	1	1			
1(a)(iv)	Lowest value: −128 Highest value: +127	1								
1(b)(i)	0110 0101 0011	1								
1(b)(ii)	The second block of four binary digits represents a digit larger than 9 // 14	1								
1(b)(iii)	A string of digits on any electronic device displaying numeric values	1								

Question	Answer	Marks
2(a)		4
2(b)(i)	One mark from: - The program code can be translated to run on any processor / platform - Source code is translated into machine independent intermediate code not machine dependent code	1



Question	Answer
2(b)(ii)	Two marks from: • Java uses a two-step translation process • Java code is partially interpreted – partially compiled • Code is translated first into intermediate code / "bytecode"... • ...using the Java compiler • The bytecode is finally interpreted by the Java Virtual Machine

Question	Answer	Marks																																													
3(a)	Two marks from: - Physical measures - Access rights - Encryption - Firewall - Use authentication methods such as usernames and passwords - Anti-malware program	Max 2																																													
3(b)(i)	<table border="1"><tr><td>7</td><td>X</td><td>6</td><td>=</td><td>42</td></tr><tr><td>8</td><td>X</td><td>5</td><td>=</td><td>40</td></tr><tr><td>6</td><td>X</td><td>4</td><td>=</td><td>24</td></tr><tr><td>5</td><td>X</td><td>3</td><td>=</td><td>15</td></tr><tr><td>3</td><td>X</td><td>2</td><td>=</td><td>6</td></tr><tr><td>1</td><td>X</td><td>1</td><td>=</td><td>1</td></tr><tr><td></td><td></td><td></td><td>Total:</td><td>128 / 11</td></tr><tr><td></td><td></td><td></td><td></td><td>11 R 7</td></tr><tr><td colspan="4">Check digit:</td><td>11 – 7 = 4</td></tr></table> 1 mark for 6 values 1 mark for 2 steps Accept 128 MOD 11 = 7 1 mark for subtraction Answer: 786531 4 (1 mark for answer)	7	X	6	=	42	8	X	5	=	40	6	X	4	=	24	5	X	3	=	15	3	X	2	=	6	1	X	1	=	1				Total:	128 / 11					11 R 7	Check digit:				11 – 7 = 4	4
7	X	6	=	42																																											
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1	X	1	=	1																																											
			Total:	128 / 11																																											
				11 R 7																																											
Check digit:				11 – 7 = 4																																											
3(b)(ii)	One mark for name of check One mark for description Max two checks Uniqueness check Each PatientID must be unique Length check Each PatientID is exactly 7 characters Format check / Type check All 7 characters must be <u>digits</u> Presence check PatientID must be entered	Max 4																																													



Question	Answer																															
4(a)	A – System clock B – Control unit C – Main memory E – Control bus F – Data bus																															
4(b)	<table border="1"> <thead> <tr> <th>ACC</th><th>CountDown</th><th>OUTPUT</th></tr> </thead> <tbody> <tr> <td></td><td>15</td><td></td></tr> <tr> <td>67</td><td></td><td>C</td></tr> <tr> <td>15</td><td></td><td></td></tr> <tr> <td>14</td><td>14</td><td></td></tr> <tr> <td>51</td><td></td><td>3</td></tr> <tr> <td>14</td><td></td><td></td></tr> <tr> <td>13</td><td>13</td><td></td></tr> <tr> <td>32</td><td></td><td></td></tr> <tr> <td>88</td><td></td><td>x</td></tr> </tbody> </table> (1) (1) + (1) (1) (1)	ACC	CountDown	OUTPUT		15		67		C	15			14	14		51		3	14			13	13		32			88		x	5
ACC	CountDown	OUTPUT																														
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67		C																														
15																																
14	14																															
51		3																														
14																																
13	13																															
32																																
88		x																														
4(c)	Three marks from: - The assembler scans the assembly language instructions in sequence - When it meets a symbolic address checks to see if already in symbol table - If not, it adds it to the symbol table in the symbolic address column - If it is already in symbol table check if absolute address known - If the absolute address is known, it is entered in the appropriate cell - If the absolute address is not known mark / leave as unknown	Max 3																														
4(d)(i)	The op code / mnemonic / instruction table	1																														
4(d)(ii)	A – 1110 0110 0110 1000 (1) (1) B – E6 68 (1)	3																														



Question	Answer	
5(a)(i)	Three marks from: • Diaphragm / cone • (Voice) coil of wire • Spider / Suspension • (Permanent) Magnet • Basket • Dust cap • Outer frame	
5(a)(ii)	Four marks from: • Takes an electrical signal and translates it into physical vibrations to create sound waves • An electric current in the coil creates an electro-magnetic field • Changes in the audio signal causes the direction of the electric current to change • The direction of the current determines the polarity of the electro-magnet // changing the direction of the current changes the direction of the polarity of the electro-magnet • The electro-magnet is repelled by or attracted to the permanent magnet • Causing the coil to vibrate • The movement of the coil causes the cone / diaphragm to vibrate • That vibration is transmitted to the air in front of the cone / diaphragm as sound waves • The amount of movement will determine the frequency and amplitude of the sound wave produced	Max 4
5(b)(i)	One mark from: • External hard disk drive // SSD • External CD / DVD drive • Pen drive • Blu-ray drive	1
5(b)(ii)	Two marks from: • Additional secondary file storage // storing files • Backup of files • Archiving of files • Transfer files to second computer	Max 2



Question	Answer	
6(a)	Two marks from: - A system of moral principles - That guide behaviour / decision making - Based on philosophical / religious views - By example, e.g. respectful and considerate behaviour	
6(b)	One mark for identifying the issue One mark for correct principle One mark for possible action Max 2 issues (2 × 3 marks) 1 Uncomfortable with one of his colleagues Client and Employer // Management / Colleagues // Judgement // Self For example: Team building exercises // arranged meeting 2 Unfamiliar with programming language Self // Client and Employer // Product // Profession // Colleagues For example: Undergo training 3 Visit to unfamiliar workplace Client and employer // Management // Judgement // Profession // Colleagues For example: He should speak to his manager to discuss situation	Max 6

Question	Answer	Marks
7(a)(i)	<u>PatientID</u> } <u>DoctorID</u> } (1) <u>AppointmentDate, AppointmentTime</u> (1)	2
7(a)(ii)	<pre> graph TD PATIENT <--> DOCTOR PATIENT --> APPOINTMENT DOCTOR --> APPOINTMENT </pre> One PATIENT attends many APPOINTMENTs One DOCTOR takes many APPOINTMENTs Special case for 1 mark only (only if no one to many relationships shown) Many PATIENTs are seen by many DOCTORs	2



Question	Answer	
7(b)	Two marks from: Either: - Add an attribute (for example <code>Attended</code>) - To the appointment table // <code>APPOINTMENT</code> Or: - Add an attribute (for example <code>AppointmentsMissed</code>) - To the patient table // <code>PATIENT</code>	
7(c)(i)	Available to work at both <code>SITE-A</code> and <code>SITE-B</code>	1
7(c)(ii)	<code>APPOINTMENT(Site, AppointmentDate, AppointmentTime, DoctorID, PatientID)</code>	1
7(d)(i)	One mark per line <code>UPDATE DOCTOR</code> <code>SET DoctorID = '017'</code> <code>WHERE DoctorID = '117';</code>	3
7(d)(ii)	1 Mark per bullet, max 2 - Referential integrity should be maintained // Referential integrity could be violated. - Data becomes inconsistent - There may be records in the <code>APPOINTMENT</code> table showing doctor ID 117 - The <code>APPOINTMENT</code> table might not be automatically updated - Records in the <code>APPOINTMENT</code> table will become orphaned	Max 2
7(e)	One mark per line <code>SELECT AppointmentDate, AppointmentTime</code> <code>FROM APPOINTMENT</code> <code>WHERE PatientID = '556';</code>	3

QUESTION 7.



Question	Answer														
6(a)	1 mark for each correct row														
	<table><tr><th>Application</th><th>Input device</th><th>Output device</th></tr><tr><td>Capture the text from a paper document, in order that the text can be word-processed</td><td>Flatbed scanner / <u>Digital</u> camera</td><td></td></tr><tr><td>Producing a replica of a small plastic component from a washing machine</td><td></td><td><u>3D</u> Printer</td></tr><tr><td>A museum has interactive information facilities throughout the building</td><td>Touch screen / touch pad / microphone etc.</td><td>Touch screen / speakers etc.</td></tr></table>	Application	Input device	Output device	Capture the text from a paper document, in order that the text can be word-processed	Flatbed scanner / <u>Digital</u> camera		Producing a replica of a small plastic component from a washing machine		<u>3D</u> Printer	A museum has interactive information facilities throughout the building	Touch screen / touch pad / microphone etc.	Touch screen / speakers etc.		
Application	Input device	Output device													
Capture the text from a paper document, in order that the text can be word-processed	Flatbed scanner / <u>Digital</u> camera														
Producing a replica of a small plastic component from a washing machine		<u>3D</u> Printer													
A museum has interactive information facilities throughout the building	Touch screen / touch pad / microphone etc.	Touch screen / speakers etc.													
6(b)	1 Mark per bullet to max 4 • The hard disk has one or more platters made of aluminium or glass • Each surface of the platter/disk is ferrous-oxide which is capable of being magnetised • The platters/disks are mounted on a central spindle • The disks are rotated at high-speed • Each surface of the disk has a read/write head mounted on an arm positioned just above the surface • Electronic circuits control the movement of the arm and hence the heads • The surface of the platter/disk is divided into <u>concentric</u> tracks and sectors • One track in one sector is the basic unit of storage called a block • The data is encoded as a magnetic pattern for each block • When writing to disk, a variation in the current in the head produces a variation in magnetic field on the disk • When reading from disk, a variation in magnetic field produces a variation in current through the head				4										

4



Question	Answer	
7(a)(i)	1 Mark for correct primary key identified in both STAFF and CLIENT STAFF(<u>StaffID</u>, StaffName, Department) CLIENT(<u>ClientName</u>, Address, Town) 1 Mark for correct primary key identified in VISIT VISIT(<u>ClientName</u>, <u>VisitDate</u>) 1 Mark for correct primary key identified in INTERVIEW INTERVIEW(<u>ClientName</u>, <u>VisitDate</u>, <u>StaffID</u>, SpecialistFocus, InterviewText)	
7(a)(ii)	1 Mark for each correct relationship <pre> graph LR CLIENT --- > VISIT </pre> <pre> graph LR VISIT --- > INTERVIEW </pre>	3

QUESTION 8.



Question	Answer	
1(a)	1 mark per bullet point to max 3 - The microphone has a diaphragm - The incoming sound waves cause vibrations ... causing a coil to move past a magnet (dynamic microphone) // changing the capacitance (condenser microphone) - An electric current is generated / changed	
1(b)	1 mark per bullet point - The sampling resolution number of bits used to store each <u>sample</u> - Increasing the (sampling) resolution means a larger file size // Decreasing the (sampling) resolution means a smaller file size - Increasing the (sampling) resolution gives a more accurate representation of the analogue sound // Decreasing the (sampling) resolution gives a less accurate representation of the analogue sound - Increasing the (sampling) resolution means a greater range of values can be stored // Decreasing the (sampling) resolution gives a smaller range of values that can be stored - Increasing the (sampling) resolution reduces the quantization errors // Decreasing the (sampling) resolution causes greater quantization errors	3
1(c)	For 2 features 1 mark for identifying feature, 1 mark for describing what it does. For example: - Cut/delete ... Remove part of the sound file - Copy and paste ... Replicate part of the sound - Amplify ... Increase the volume of a section of sound	4
1(d)(i)	60 images are recorded per second	1
1(d)(ii)	1 mark per bullet point to max 2 - Each frame contains (all the lines for) the <u>complete image</u> - All the frame data is recorded at the same time - Each frame contains all the scan lines - The number of images stored is the same as the frame rate	2
1(e)	1 mark per bullet point to max 1 - A meta file / wrapper - Contains various different types of data	1

QUESTION 9.



Question	Answer	Marks
4(a)(i)	1 mark per bullet point to max 3 - The microphone has a diaphragm / ribbon (accept equivalent) - The incoming sound <u>waves</u> cause vibrations (of the diaphragm) ...causing a coil to move past a magnet (dynamic microphone) // changing the capacitance (condenser microphone) // deforms the crystal (crystal microphone) etc. - An electrical signal is produced	3
4(a)(ii)	1 mark per bullet to max 3 - The revolving drum is initially given an electrical charge - A laser beam (bounces off moving mirrors) <u>scans back and forth</u> across the drum ...discharging certain points (i.e. 'drawing' the letters and images to be printed as a pattern of electrical charges) - The drum is coated with oppositely charged toner (which only sticks to charged areas) - The drum rolls over electro-statically <u>charged</u> paper // Electro-statically <u>charged</u> paper is fed (towards the drum) - The 'pattern' on the drum is transferred to the paper - The paper is passed through the fuser to seal the image - The electrical charge is removed from the drum // the excess toner is collected	3
4(b)	1 mark per bullet to max 2 - Stores all the scan lines for an entire frame // displays / records all the frame data at the same time // not split into fields - Complete frames are displayed <u>in sequence</u> - The rate of picture display is the same as the frame rate.	2



Question	Answer	
4(c)	1 mark per bullet to max 4 • DRAM has to be refreshed / charged and SRAM does not require a refresh • DRAM uses a single transistor and capacitor and SRAM uses more than one transistor • DRAM stores each bit as a charge and in SRAM each bit is stored using a flip-flop/latch • DRAM requires higher power consumption under low levels of access, (which is significant when used in battery-powered devices because it requires more circuitry for refreshing) // SRAM uses less power (no need to refresh) • DRAM less expensive to purchase (requires fewer transistors) // SRAM is more expensive to buy (as it requires more transistors) • DRAM has slower <u>access</u> time/speed (because it needs to be refreshed) // SRAM has faster <u>access</u> times • DRAM can have higher storage/bit/data <u>density</u> // SRAM has lower storage/bit/data <u>density</u> • DRAM used in main memory and SRAM used in cache memory	
4(d)(i)	1 mark for correct answer Formal or legal recognition of ownership of the program // Formal or legal restriction / permissions on use of the program // The intellectual property rights to the program	1
4(d)(ii)	1 mark per bullet point • She does not wish to release the source <u>code</u> • She does not want anyone to be able to edit / modify / share the source code/program • She wants to make money from the program	2



Question	Answer
4(d)(iii)	1 mark for a <u>name and a description</u> of each licence to max 2 Commercial Software • The program is purchased for a fee • It restricts the number of users/possible time period for use // Limited number of installations allowed // Software key needed to install • Source code not provided // source code protected / cannot be edited • Anyone can purchase/download if agree to the terms Shareware • The program is free for a trial period // The (free) program may have limited functionality // Need to purchase / enter details after trial • Users do not have access to the source code // source code may not be edited • Users may re-distribute the software. Freeware • There is no charge for the software • The software could still be copyrighted • She can set her own restrictions on what a user can do with the program

QUESTION 10.



Question	Answer	
2(a)(i)	1 mark per device to max 2 e.g. • Trackpad/touchpad • microphone • touchscreen • scanner	
2(a)(ii)	1 mark per device to max 2 e.g. • printer • speakers • touchscreen	2
2(a)(iii)	Magnetic hard disk drive // solid state drive	1
2(a)(iv)	1 mark per bullet point to max 3 • The ball touches horizontal and vertical rollers • When the ball rotates / moves • ... one or both of the rollers rotate as well • Each roller connects to a shaft which spins a disk with holes • Infrared beams shine through the holes in the disks • As the ball moves the roller the beam is broken by the space between the holes • ... creating pulses of light • The distance and/or speed of the mouse is determined from the rate of the pulses • ... by an on-board processor chip // by driver software in the computer	3
2(b)	1 mark per bullet point to max 4 for each management task, max 6 in total Process management: • Manages the scheduling of processes • ... allows multi-tasking / multi-processing • ... ensures fair access • ... handles priorities • Manages the resources the processes need • Enables processes to share information • Prevents interference between processes// resolution of conflicts Provision of a user interface: • Allows a user to communicate with the hardware // vice-versa • ... by making navigation around the system easier • Provides facility for user inputting data • Provides facility for outputting to the user • By example e.g. command line / GUI / menu-driven	6



Question	Answer	
2(c)	1 mark per bullet point to max 3 for each utility program, max 4 in total Virus checker: • Scans files stored on a computer system for malicious code • Scans files when they enter the system / memory stick inserted / download etc. • Sets up a schedule for virus-checking • Isolates / quarantines / deletes viruses • Regularly updates the virus definitions Backup software: • Creates a copy of the contents of a disk / partition. Can be set up to automatically backup // schedules backups • Allows the user to decide what is backed up, e.g. all data // all files that have changed since the last backup • Allows the user to set up an off-site backup • May encrypt the backup files • Restores the data if necessary	
2(d)	1 mark per bullet point to max 2 • The code is translated one line at a time • ... and executed immediately • The interpreter stops as soon as it finds an error	2

QUESTION 11.



Question	Answer																
6(a)(i)	1 mark for touchscreen being both 1 mark for remaining 3 devices <table border="1"> <thead> <tr> <th>Device</th><th>Input</th><th>Output</th></tr> </thead> <tbody> <tr> <td>Touchscreen</td><td>✓</td><td>✓</td></tr> <tr> <td>Webcam</td><td>✓</td><td></td></tr> <tr> <td>Microphone</td><td>✓</td><td></td></tr> <tr> <td>Fingerprint scanner</td><td>✓</td><td></td></tr> </tbody> </table>	Device	Input	Output	Touchscreen	✓	✓	Webcam	✓		Microphone	✓		Fingerprint scanner	✓		
Device	Input	Output															
Touchscreen	✓	✓															
Webcam	✓																
Microphone	✓																
Fingerprint scanner	✓																
6(a)(ii)	1 mark for any 1 correct letter in the correct position 2 marks for any 2 correct letters in the correct positions 3 marks for any 3 correct letters in the correct positions 4 marks for 5 correct letters in the correct positions C An electric current is sent to the speaker. E The electric current passes through the coil. <i>The current in the coil creates an electromagnetic field.</i> A Changes in the audio signal cause the direction of the electrical current to change. This determines the polarity of the electromagnet. D The electromagnet is repelled by, or attracted to the permanent magnet. <i>The movement of the coil causes the diaphragm to vibrate.</i> B The vibration creates sound waves.	4															
6(b)(i)	To store files / software long term	1															
6(b)(ii)	1 mark per bullet point to max 3 - No moving parts - Solid state memory is non-volatile - Makes use of blocks / arrays of ... Semiconductors // NAND gates // NOR gates // transistors // integrated circuits - SSD Controller manages the components - Uses a grid of columns and rows that has two transistors at each intersection - One transistor is called a floating gate - The second transistor is called the control gate - Memory cells store voltages which can represent either a 0 or a 1 - Essentially the movement of electrons is controlled to read/write - Not possible to overwrite existing data // it is necessary to first erase the old data then write the new data in the same location	3															



Question	Answer	
6(c)	1 mark per bullet point to max 2 - RAM stores currently running parts of files / programs / processes / OS - ROM stores boot up instructions / OS kernel // data permanently // store the firmware for the tablet	
6(d)(i)	1 mark per bullet point to max 4 Max 3 for image Max 3 for sound Images - The images are stored as bitmaps - Each image is made up of pixels ... each pixel is of a single colour - Each colour has a unique binary number Store the sequence of binary numbers for each image / frame // store the binary value of each pixel Sound - Measure the height/amplitude of the sound wave - A set number of times per second // at regular time intervals - Each amplitude has a unique binary number Store the sequence of binary numbers for each sample	4
6(d)(ii)	1 mark per bullet point max 2 for each coding term. Interlaced encoding - The data from a single frame are encoded as two separate fields - One containing the data for the even numbered rows / lines and the other has the data for the odd numbered rows / lines - The image is rendered by alternating between the even field and the odd field of each successive frame - The viewer sees data from two frames simultaneously - The rate of picture display (the field rate) is twice the rate of image frame display (the frame rate) - Produces what appears to the eye to be a high refresh rate - Halves the transmission bandwidth requirements Progressive encoding - Stores the data for an entire frame - Displays all the frame data at the same time - The rate of picture display is the same as the frame rate - High bandwidth requirements	4



Question	Answer	
6(e)(i)	1 mark per bullet to max 3 • The data is compressed before transmitting • The video is transmitted continuously as a series of bits • The video is hosted on a media server • On download, the server sends the data to a buffer on the client computers // The buffer stores the data from the server • The recipient / user's software receives bit stream from the buffer	
6(e)(ii)	1 mark for: On-demand 1 mark for justification from: • The video does not need to be broadcast live // the video is already recorded • Dominic's colleagues will watch the video at a later date // at their convenience	2
6(e)(iii)	1 mark per description Temporal Redundancy • Pixels in a sequence of consecutive video frames have the same value in the same location Spatial Redundancy • A sequence of consecutive pixels in a single video frame have the same value	2

QUESTION 12.



Question	Answer													
1(a)(i)	1 mark per input device to max 2 e.g. - Barcode scanner / Infra-red scanner - Pressure sensor - RFID / chip reader - Bank note scanner - Pin / key pad - Magnetic strip reader													
1(a)(ii)	1 mark per output device to max 2 e.g. - Speaker - Printer - LCD screen	2												
1(a)(iii)	1 mark for at least two statements in the correct position, 2 marks for all four statements in correct position. 1 B (The screen has a layer that stores an electrical charge) 2 <i>When the user touches the screen</i> 3 A (Charge is drawn to the point of contact) 4 C (There is a change in the electrostatic field) 5 <i>The coordinates of the point of contact can be calculated</i> 6 D (These coordinates are sent to the touchscreen driver)	2												
1(b)(i)	1 mark per bullet point to max 2 - To store the files needed to boot the system - To store parts of the self-checkout machine operating system - To store the self-checkout machine software - To store the intermediate data / running total for items purchased	2												
1(b)(ii)	1 mark for at least one correct row, 2 marks for all three correct rows <table border="1"> <thead> <tr> <th>Statement</th><th>SRAM</th><th>DRAM</th></tr> </thead> <tbody> <tr> <td>More expensive to make</td><td>✓</td><td></td></tr> <tr> <td>Requires refreshing (recharging)</td><td></td><td>✓</td></tr> <tr> <td>Made from flip-flops</td><td>✓</td><td></td></tr> </tbody> </table>	Statement	SRAM	DRAM	More expensive to make	✓		Requires refreshing (recharging)		✓	Made from flip-flops	✓		2
Statement	SRAM	DRAM												
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Question	Answer	
1(c)(i)	1 mark per bullet point to max 3 plus 1 mark for suitable example • When a barcode on an item is scanned • ... the server performs any requested tasks // the server looks up the details of the product • The self-checkout machine is a client • ... that send requests to the server // the self-checkout machine asks for, e.g. the price of the item • The server returns the results of the request // the server returns e.g. the item price • Self-checkout machine displays e.g. price to the user	
1(c)(ii)	1 mark for each security method to max 2, 1 mark for integrity Security • encryption • access rights • username and password // biometrics // user accounts • backup // disk mirroring • firewall • Physical methods (e.g. CCTV, locked rooms etc.) Integrity • checksum • parity • validation on input	3