

QUESTION 1.

Mark Scheme

Cambridge IGCSE – May/June 2015



(b)

description of stage	sequence number
the instruction is then copied from the memory location contained in the MAR (memory address register) and is placed in the MDR (memory data register)	3
the instruction is finally decoded and is then executed	7
<i>the PC (program counter) contains the address of the next instruction to be fetched</i>	(1)
the entire instruction is then copied from the MDR (memory data register) and placed in the CIR (current instruction register)	4
the address contained in the PC (program counter) is copied to the MAR (memory address register) via the address bus	2
the address part of the instruction is placed in the MAR (memory address register)	6
the value in the PC (program counter) is then incremented so that it points to the next instruction to be fetched	5*

The incrementation of the program counter can appear at any stage after 2. All other stages must be in the correct given order.

[6]

8 (a) hours: 18

minutes: 53

[2]

(b)

hours ("C")

minutes ("D")

0	0	0	0	0	1	1	1	:	0	0	0	1	1	1	1	0
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

[2]



(c) Any **three** from:

- reads values in registers “C” and “D”
- and checks the values against those stored in registers “A” and “B”
(**NOTE:** the first two statements can be interchanged, i.e. “A” and “B” read first)
- If values in corresponding registers are the same
- the microprocessor sends a signal to sound alarm/ring

[3]

(d) Any **three** from:

- uses a light sensor
- sends signal/data back to microprocessor
- signal/data converted to digital (using ADC)
- value compared by microprocessor with pre-set/stored value
- if value < stored value, signal sent by microprocessor ...
- ... to the voltage supply (unit)
- ... “value” of signal determines voltage supplied/brightness of LED

[3]

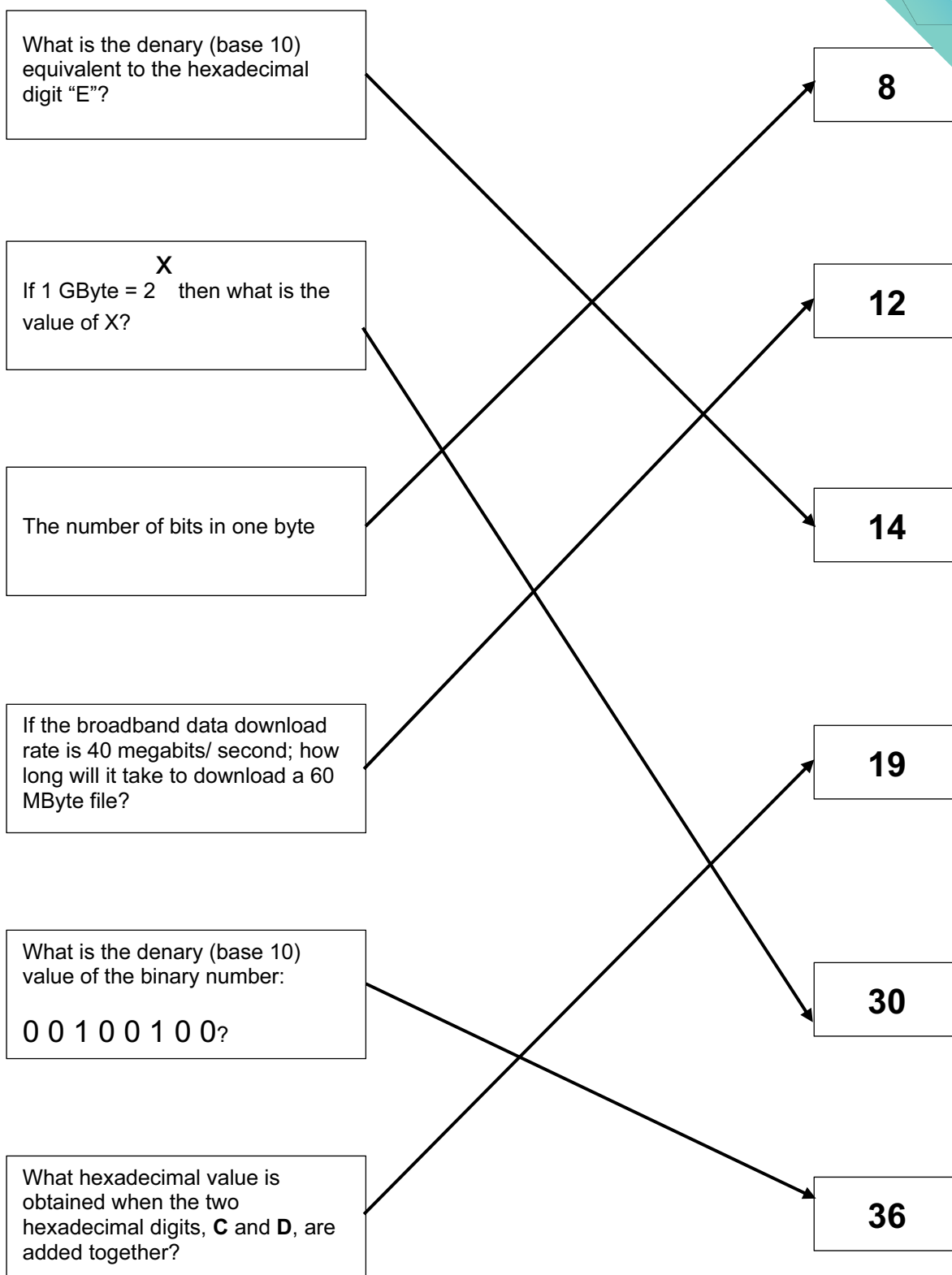
(e) Any **two** from:

- no need to warm up
- whiter tint/more vivid colours/brighter image
- higher resolution
- much thinner monitors possible/lighter weight
- more reliable technology/longer lasting
- uses much less power/more efficient

[2]



9



5/6 matches – 5 marks
 4 matches – 4 marks
 3 matches – 3 marks
 2 matches – 2 marks
 1 match – 1 mark

QUESTION 2.

Mark Scheme

Cambridge IGCSE – May/June 2015



4 (a) Any **one** from:

- secure sockets layer
- encrypts data being transmitted
- use of https
- use public and private keys

[1]

(b) 1 mark for each number in the correct order, next to the correct stage.

Stage	Sequence number
the encrypted data is then shared securely between the web browser and the web server	6
<i>the web browser attempts to connect to a web site which is secured by SSL</i>	(1)
the web server sends the web browser a copy of its SSL certificate	3
the web browser requests the web server to identify itself	2
the web server will then send back some form of acknowledgement to allow the SSL encrypted session to begin	5
the web browser checks whether the SSL certificate is trustworthy; if it is then the web browser sends a message back to the web server	4

[5]



5 (a) 1 mark per correctly placed tick

Received byte	Byte transmitted correctly	Byte transmitted incorrectly
1 1 0 0 1 0 0 0		✓
0 1 1 1 1 1 0 0		✓
0 1 1 0 1 0 0 1	✓	

[3]

(b) (i) byte number: 7

column number: 6

[2]

(ii) Any **two** from:

- letter “A”(byte 7) transmitted as odd parity (three 1s)
- column 6 has odd parity (seven 1s)
- intersection of byte 7 and column 6 indicates incorrect bit value

[2]

(c) 190

[1]

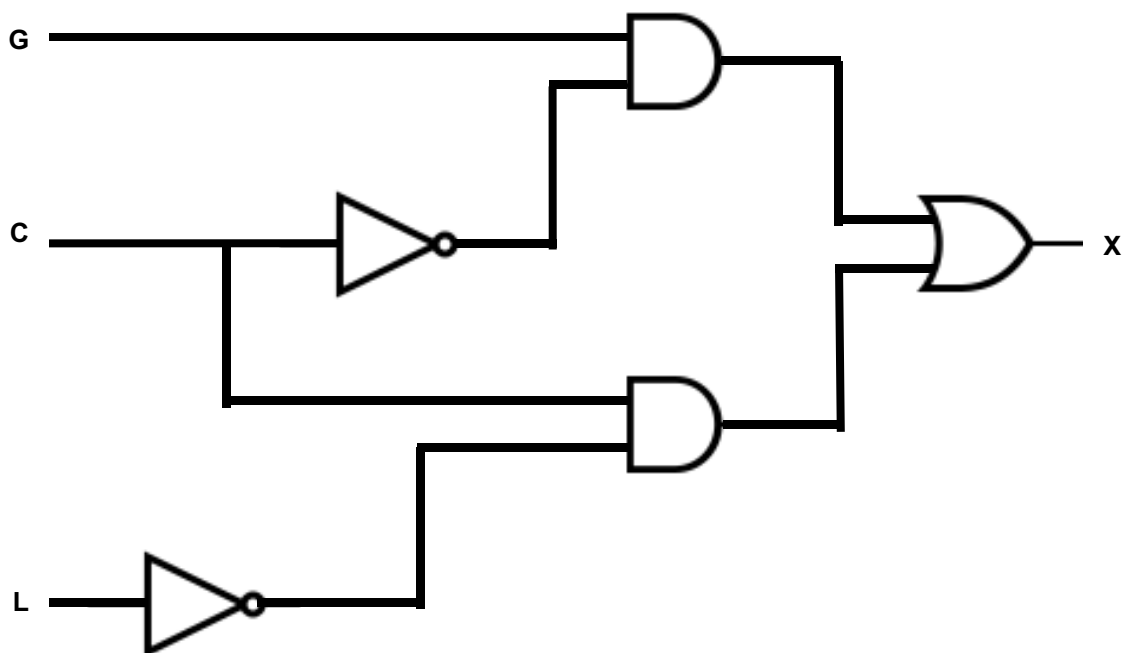
(d) Any **one** from:

- 2 bits interchanged (e.g. 1 → 0 and 0 → 1) that won't change parity value
- even number of bits/digits are transposed
- If there are multiple errors in the same byte/column, that still produce the same parity bit, the error will not be detected

[1]



6 (a) 1 mark per correct logic gate, correctly connected



[5]

(b)

G	C	L	Workspace	X	
0	0	0		0	] 1 mark
0	0	1		0	
0	1	0		1	] 1 mark
0	1	1		0	
1	0	0		1	] 1 mark
1	0	1		1	
1	1	0		1	] 1 mark
1	1	1		0	

[4]

QUESTION 3.

Mark Scheme
Cambridge IGCSE – May/June 2016



8 (a) (i) Any **two** from:

- to protect against key logging software/spyware
- can stop key presses being recorded
- can stop key presses being relayed
- drop down boxes cannot be recorded as key presses
- drop down boxes can be placed in different location on the screen each time (to overcome screen capture issues)

[2]

(ii) Any **one** from:

- hacker never finds all characters on the first hack
- makes it more difficult for hackers to find the order of the characters
- hacker needs to hack the system several times to gain the whole password
- shoulder surfing will not give person full password

[1]

(b) Any **two** from:

- fingerprint scanner
- face recognition software
- retina scanner/iris scanner
- voice recognition software

[2]

9 (a) 1 mark for correct check digit and 1 mark for showing the calculation

$$(4 \times 1) + (2 \times 2) + (4 \times 3) + (1 \times 4) + (5 \times 5) + (0 \times 6) + (8 \times 7)$$

$$= 4 + 4 + 12 + 4 + 25 + 0 + 56 = 105$$

$$105/11 = 9 \text{ remainder } 6$$

check digit is: **6**

1 mark for any correct
line of working

[2]

(b) **incorrect** check digit

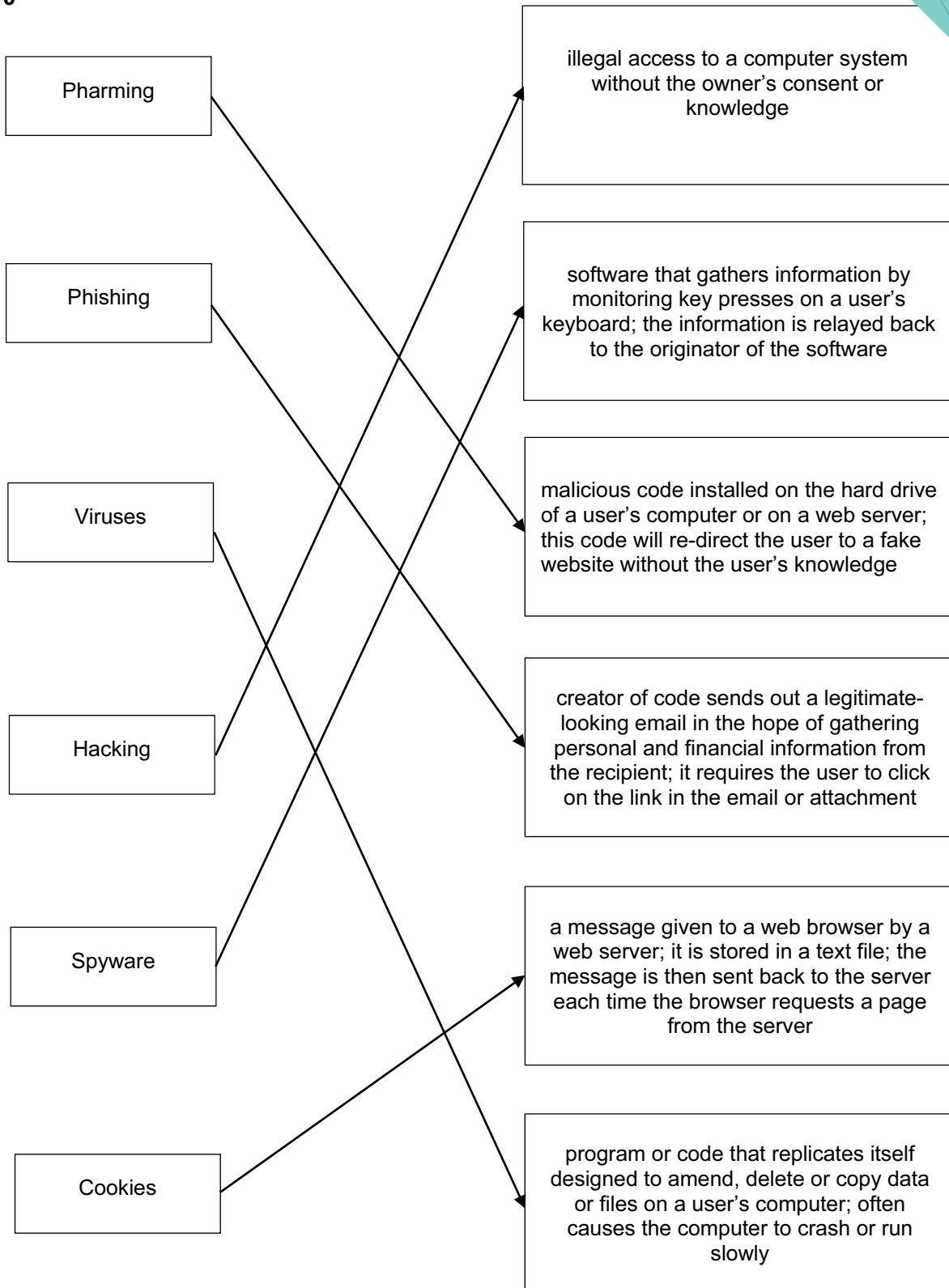
[1]

- check digit should be 1
- $(3 \times 1) + (2 \times 2) + (4 \times 3) + (0 \times 4) + (0 \times 5) + (4 \times 6) + (5 \times 7) // 3 + 4 + 12 + 0 + 0 + 24 + 35 //$
Total = 78
- 78/11 gives 7 remainder 1

[2]



10



5/6 matches – 5 marks
 4 matches – 4 marks
 3 matches – 3 marks
 2 matches – 2 marks
 1 match – 1 mark

QUESTION 4.

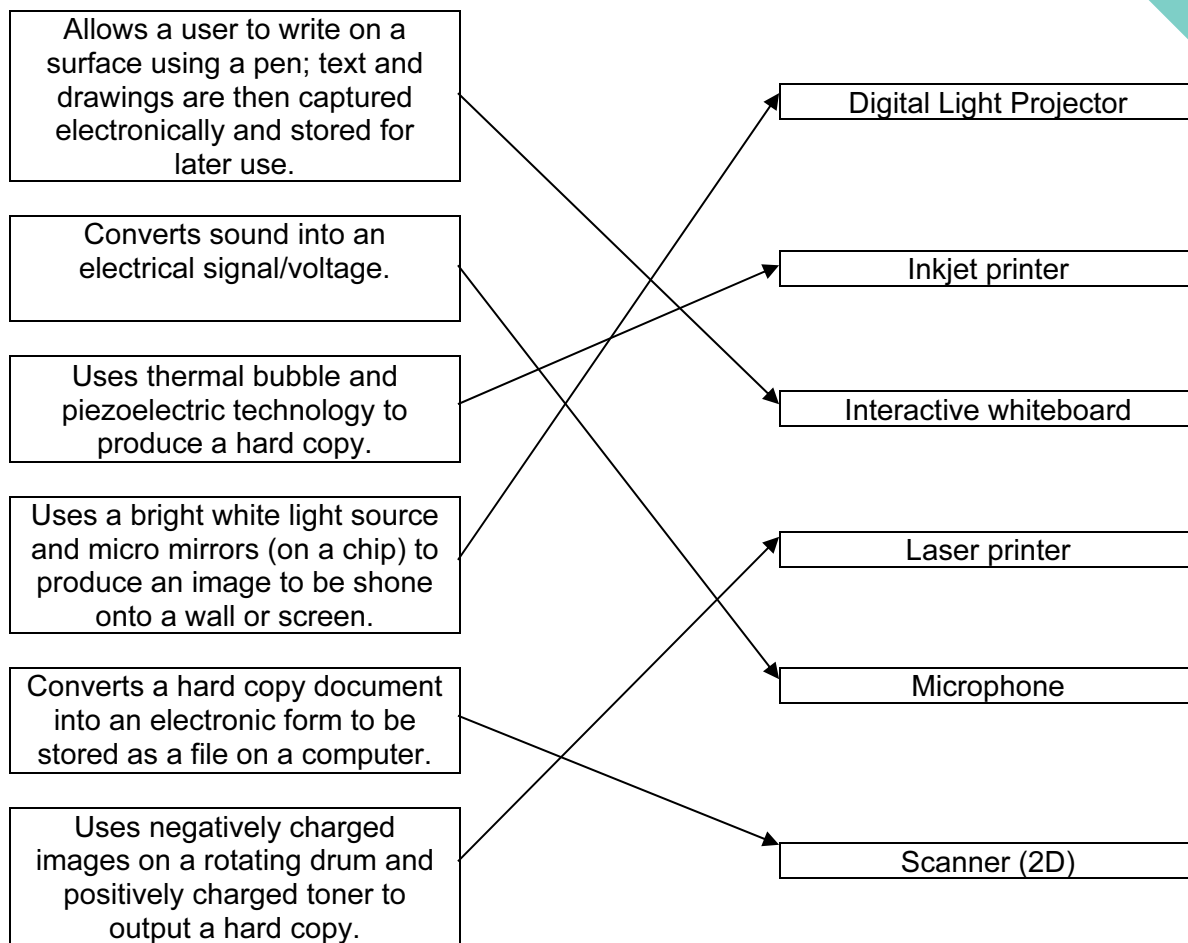
Mark Scheme
Cambridge IGCSE – May/June 2016



5

Description

Device



5/6 matches – 5 marks
4 matches – 4 marks
3 matches – 3 marks
2 matches – 2 marks
1 match – 1 mark

[5]



6 (a)

Type	Tick (✓)	Method	Tick (✓)
simplex		serial	
half-duplex		parallel	✓
full-duplex	✓		

Type	Tick (✓)	Method	Tick (✓)
simplex	✓	serial	✓
half-duplex		parallel	
full-duplex			

Type	Tick (✓)	Method	Tick (✓)
simplex		serial	✓
half-duplex	✓	parallel	
full-duplex			

[6]

(b) Any **two** from:

- single wire means there is less chance of interference/data corruption
- single wire reduces costs
- more reliable over greater distances
- bits will still be synchronised after transmission

[2]

QUESTION 5.



Question	Answer	
13(a)	Two from: • Smaller file to transmit • The file is transmitted quicker • Uses / requires less bandwidth	
13(b)(i)	• Lossless (compression) ... • ... It is important the code must be (exactly) the same as the original file • ... If it does not match the original file it will not work	3
13(b)(ii)	• Lossy (compression) ... • ... It would make the file smaller than lossless compression / the file would stream faster than lossless compression • ... The quality of the video can be reduced but it can still be viewed	3

QUESTION 6.

PUBLISHED



Question	Answer
4	Two marks for each correct description Parity Check • Checks a byte of data • Check is performed when data is received • A parity bit is added (to the parity byte) • Counts / checks number of 1's // counts / checks to see if 1's are even // counts / checks to see if 1's are odd • Can be <u>even</u> or <u>odd</u> • If parity is incorrect, error is detected Check digit • A digit that is calculated from the data // uses modulo to calculate digit // valid description of modulo • It is appended / added to the data • Digit is recalculated when data is entered • Digits are compared to check for error Checksum • A value is calculated from the data // Valid description of calculation • It is transmitted with the data • Value is recalculated after transmission • Values are compared after transmission to check for error Automatic Repeat reQuest • Uses acknowledgement / request and time-out • Error control protocol • Check performed on receiving data // error is detected by e.g. parity check, check sum • If error detected, request is sent to resend data // negative acknowledgement is used • Resend request is repeated till data is sent correctly / requests time out / limit is reached • Send acknowledgement that data is received // positive acknowledgement is used • If acknowledgement not received in set time data is resent



Question	Answer																									
5(a)	1 mark for correct method, 1 mark for correct answer 32 + 16 + 8 + 1 (00)111001																									
5(b)	registers must have leading zeros, allow follow through from 5(a) for an incorrect value 1 mark for each correct register. <table border="1"><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr></table> <table border="1"><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>1</td></tr></table>	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	2
0	0	1	1	1	0	0	1																			
0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1											
5(c)	Two from: • data • ASCII value / Unicode value / character • number • part of image / small image • a sound / sound sample / small sound track • instruction	2																								
5(d)	3A	1																								

Question	Answer	Marks
6	1 mark for correct name of code, up to a further 3 marks for appropriate explanation • Quick response (QR) Code Three from: • Barcode is captured / scanned / imaged, by a camera / scanner / barcode reader / QR code reader • Read using a laser • Processed by an app • Light is reflected back • Black squares reflect less light than white squares • Modules are used for orientation / alignment • Squares / data are decoded	4

QUESTION 7.

0478/13

Question	Answer	Marks
9	– 1 – 0 – 1 – 1	4

Question	Answer	Marks
10(a)	Any four from: – Example of spyware e.g. Keylogger is used – Spyware is downloaded without knowledge (by example) – Spyware records key presses / screen clicks / screen activity – Data is relayed back to third party – Data is analysed // Patterns in data could reveal log-in details ... – ... details can then be used to log into the laptop (remotely)	4
10(b)	– Biometric device – Two step authentication	1

QUESTION 8. Mark Scheme

Cambridge IGCSE – October/November 2015



(b) (i) 1 mark for each correct parity bit

parity bit

0	1	1	0	0	1	1	0
---	---	---	---	---	---	---	---

parity bit

1	0	0	0	0	0	0	1
---	---	---	---	---	---	---	---

[2]

(ii) Any **one** from:

- an even number of digits are changed
- a transposition error(s) has occurred

[1]

8 1 mark for each step in correct order. (NOTE: Marks can be awarded for a correct sequence.)

Steps in the printing process	Step order
As the printing drum rotates, a laser scans across it; this removes the positive charge in certain areas	4
The printing drum is coated in positively-charged toner; this then sticks to the negatively-charged parts of the printing drum	6
The paper goes through a fuser which melts the toner so it fixes permanently to the paper	9
The printer driver ensures that the data is in a format that the laser printer can understand	(1)
A negatively-charged sheet of paper is then rolled over the printing drum	7
Data is then sent to the laser printer and stored temporarily in the printer buffer	2
The toner on the printing drum is now transferred to the paper to reproduce the required text and images	8
The printing drum is given a positive charge	3
Negatively-charged areas are then produced on the printing drum; these match exactly with the text and images to be printed	5

[8]

QUESTION 9.

Mark Scheme

Cambridge IGCSE – October/November 2016



8

Statement	TRUE or FALSE
MIDI stores the actual music notes in a compressed format	FALSE
JPEG files are examples of lossless file compression	FALSE
MP3 files are, on average, 90% smaller than the music files stored on a CD	TRUE
MP4 files are examples of lossy file compression	TRUE

[4]

9 (a) Any **two** from:

- a large number of requests are sent to the network/server all at once
- designed to flood a network/server with useless traffic/requests
- the network/server will come to a halt/stop trying to deal with all the traffic/requests
- prevents users from gaining access to a website/server

[2]

(b) 1 mark for each security threat and 1 mark for matching description

Security threat	Description
Viruses	– software that replicates – causes loss/corruption of data // computer may “crash”/run slow
Hacking/cracking	– illegal/ unauthorised access to a system/data
Phishing	– a <u>link/attachment</u> sends user to fake website (where personal data may be obtained)
Pharming	– malicious code installed on user’s hard drive / computer – user is <u>redirected</u> to a fake website (where personal data may be obtained)
Spyware/key logger	– send/relay key strokes to a third party

[4]

QUESTION 10.

0478/11

Question	Answer	Marks										
2	1 mark for each correct file format e.g. <table><tr><th>File type</th><th>File format</th></tr><tr><td>Pictures</td><td>.JPEG</td></tr><tr><td>Text</td><td>.doc, .txt, .rtf, .docx, .odt .pdf</td></tr><tr><td>Sound</td><td>.mp3, .wav, .aif, .flac, .mid</td></tr><tr><td>Video</td><td>.mp4, .flv, .wmv</td></tr></table>	File type	File format	Pictures	.JPEG	Text	.doc, .txt, .rtf, .docx, .odt .pdf	Sound	.mp3, .wav, .aif, .flac, .mid	Video	.mp4, .flv, .wmv	3
File type	File format											
Pictures	.JPEG											
Text	.doc, .txt, .rtf, .docx, .odt .pdf											
Sound	.mp3, .wav, .aif, .flac, .mid											
Video	.mp4, .flv, .wmv											

Question	Answer	Marks
3(a)	– Part 1 (access) protocol – Part 2 domain (name) – Part 3 filename	3
3(b)	Four from: – IP address is used to identify a device (on the Internet / network) – IP address is allocated by the network/ ISP – Can be used in place of URL – IP addresses can be IPv4 or IPv6 – IP address can be static ... – ... meaning it doesn't change each time it is connected to the Internet – IP address can be dynamic – ... meaning that it can change each time a device is connected to the Internet – Any valid example (e.g. xxx.xxx.xxx.xxx or xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx)	4

QUESTION 11.

0478/11

Question	Answer	Marks
7(a)	1 mark for each correct answer: • uses several/multiple wires • transmits multiple bits at a time	2
7(b)	Benefit 1 mark for: • quicker/faster data transfer Drawback One from: • More chance of data being skewed due to bits being sent simultaneously/out of order // less safe transmission as bits are sent simultaneously/out of order • More expensive as requires more/several/multiple wires • More chance of interference as more/several/multiple wires are used (than can create crosstalk)	2
7(c)	One from: • Used in integrated circuits • Used in RAM • Used in connections to peripheral devices (e.g. printer)	1

Question	Answer	Marks
8	1 mark for each correct answer, in the given order: • browser • webpages • Internet Service Provider (ISP) • Internet • protocol • IP address	6

PUBLISHED

Question	Answer	Marks
9	Five from: • The data is sent to the microprocessor • The analogue data is converted to digital (using ADC) • The microprocessor compares the data to a stored value of 5 kg ... – ... If the value is greater than 5 kg ... – ... a counter is added to/incremented • The process is continuous	5

Question	Answer	Marks
10	Four from: • It performs a number of basic tasks, including controlling hardware/file handling (any other suitable examples) • It allows the user to communicate with the computer using hardware // without it the user would not be able to communicate with the computer using hardware • It provides the user with a user interface // without it the user would not have a user interface to use • PC's are often used to perform many complex tasks at a time ... – ... the OS is needed to handle this multitasking – ... therefore, it provides the ability to handle interrupts	4

QUESTION 12.

0478/12

Question	Answer	Marks
8	Four from: • Used to attend to certain tasks/issues • Used to make sure that vital tasks are dealt with immediately • The interrupt/signal tells the CPU/processor (that its attention is required) • A signal that can be sent from a device (attached to the computer) • A signal that can be sent from software (installed on the computer) • The interrupt will cause the OS/current process to pause • The OS/CPU/ISR will service/handle the interrupt • They have different levels of priority • After the interrupt is serviced, the (previous) process is continued • It enables multi-tasking to be carried out on a computer • A valid example of an interrupt e.g. 'out of paper' message for a printer	4

Question	Answer	Marks
9(a)(i)	Two from: • Data is transmitted one bit at a time • Data is transmitted using a single wire • Bits arrive in order/sequence	2
9(a)(ii)	Two from: • Data is transmitted multiple bits at a time/simultaneously • Data is transmitted using multiple wires • Bits may arrive out of sequence/skewed (and are reordered)	2
9(a)(iii)	1 mark for each: • Data is transmitted in both directions • ... at the same time/simultaneously	2

Question	Answer	Marks
9(b)	Maximum of three marks per error detection method. 1 mark for naming the method, 2 marks for describing it. Parity (check) • Odd or even parity can be used • Bits are added together // 1 bits are counted • Parity bit added (depending on parity set) • Parity checked on receipt • If parity bit is incorrect an error is detected Checksum • Calculation performed on data (to get the checksum) • Checksum sent with data • Checksum recalculated after transmission • Comparison made between checksum before and checksum after transmission • Error detected if checksums are different Automatic repeat request (ARQ) • Uses acknowledgement and timeout • Request is sent (with data) requiring acknowledgement • If no response/acknowledgment within certain time frame data package is resent • When data received contains an error a request is sent (automatically) to resend the data • The resend request is repeatedly sent until packet is received error free/limit is reached/acknowledgement received	9

Question	Answer	Marks
10	Five from: • The sensor sends data to the microprocessor • The analogue data is converted to digital (using ADC) • The microprocessor compares the reading to the set range/stored values/stored data (6 to 8) ... – ... If the reading is >8 or <6 / outside range ... ○ ... the microprocessor sends a signal to output the alert • The process is continuous/repeated	5

QUESTION 13.

0478/13

Question	Answer	Marks
12	Four from (Max three from each): MP3 • Digital recording of sound • Produced by recording software / microphone • Used when distributing sound files • Compressed file format MIDI • Instructions of how to make sound • Non-audio recording • File created using digital musical instruments • Produced by synthesizer • Used when composing music • Individual notes/instruments can be changed	4

Question	Answer	Marks
13(a)	1 mark for storage, 1 mark for justification • External/Removable HDD // External/Removable SSD // Large capacity USB Flash Drive • Backups must be stored separately • Will hold sufficient data • Faster write abilities (SSD/USB drive only)	2

Question	Answer	Marks
10(a)	Four from: • Validation method • Used to check data entry • Digit is calculated from data // by example • Digit is appended / added to data • Digit is recalculated when data has been input • Digits are compared • If digits are different, error is detected // If digits match, no error is detected	4
10(b)	Six from (maximum three marks per security method): • Firewall ... • ... Monitors the traffic • ... Blocks any traffic that doesn't meet the criteria / rules • (Strong) password // biometric ... • ... Data cannot be accessed without the use of the password / bio data • ... Prevent brute force attacks • Encryption ... • ... Data will be scrambled • ... Key is required to decrypt the data • ... If data is stolen it will be meaningless • Physical security methods ... • ... The physical security will need to be overcome • ... This can help deter theft of the data • Antispyware ... • ... will remove any spyware from system • ... will prevent data being relayed to a third party	6

Question	Answer	Marks
11(a)	RAM - To store the data / instructions / parts of OS that are currently in use ROM - To store the firmware / bootup instructions / BIOS SSD - To store files / software // by example	3
11(b)	Two from: - It is more durable // it has no moving parts - It has a faster read / write / access speed - It is more compact / light weight / smaller / portable - It uses less energy // battery will last longer - It is quieter - Not affected by magnetic forces - It runs at a cooler temperature - Less latency // takes less time to warm up	2

Question	Answer	Marks																																				
5	One mark for each correct parity bit <table><tr><td></td><td>Parity bit</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>Register A</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr><tr><td>Register B</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td></tr><tr><td>Register C</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td></tr></table>		Parity bit								Register A	0	0	1	0	0	0	1	1	Register B	0	0	0	0	0	1	1	1	Register C	0	0	0	0	0	0	1	1	3
	Parity bit																																					
Register A	0	0	1	0	0	0	1	1																														
Register B	0	0	0	0	0	1	1	1																														
Register C	0	0	0	0	0	0	1	1																														

Question	Answer	Marks
6(a)	• Free software	1
6(b)	• Freeware	1
6(c)	• Shareware	1
6(d)	• Plagiarism // Intellectual property theft	1
6(e)	• Copyright	1