

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]

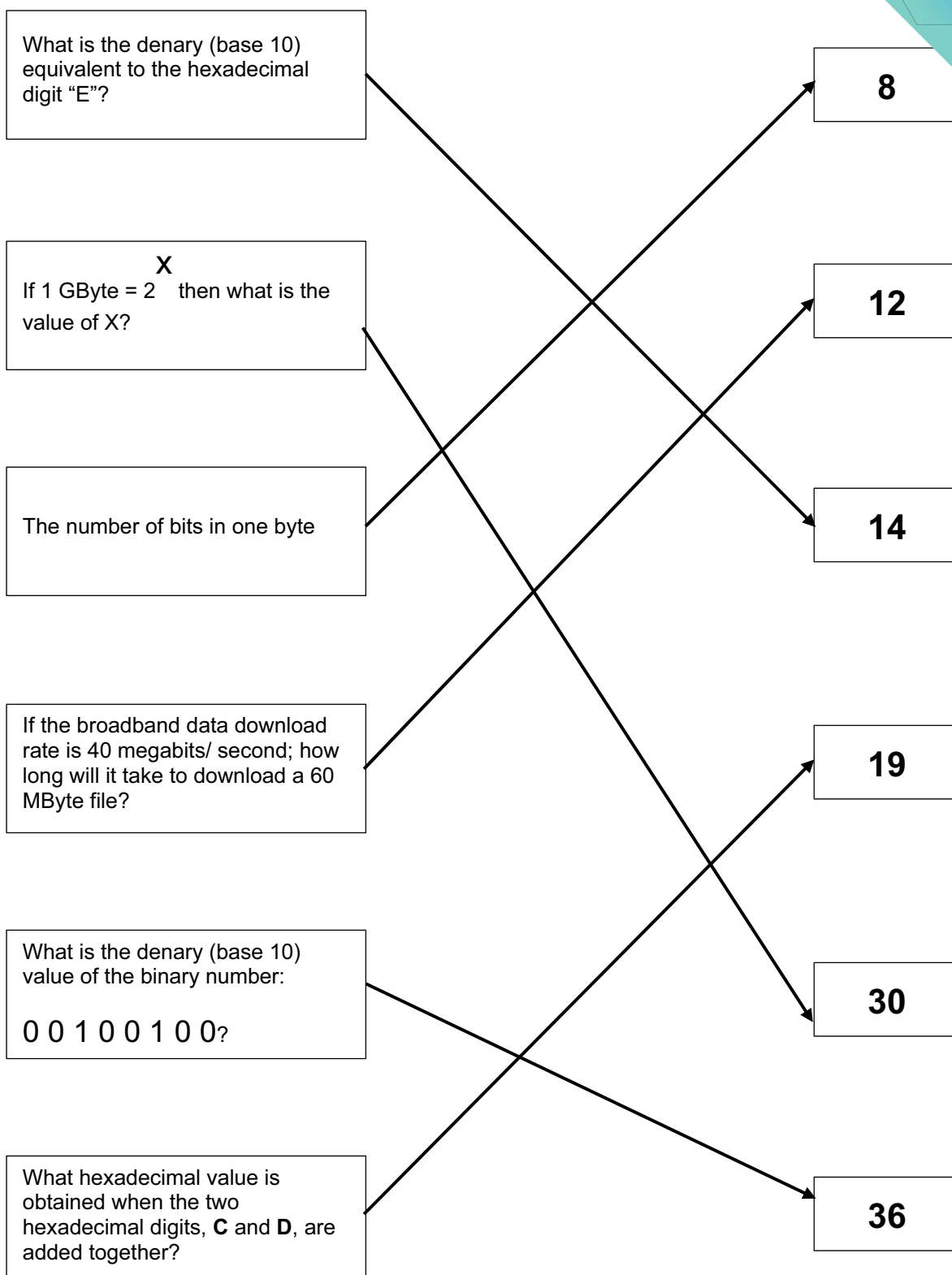
(e) Any **two** from:

- 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



(c) 1 mark for correctly completed truth table

A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

[1]

7 (a) Maximum 5 marks **in total** for question part

Description of how street light is controlled: **(max 4 marks)**

- sensor sends signal/data to the microprocessor
- signal/data converted to digital/using ADC
- microprocessor compares value to a stored value
- if input value < stored value ...
- ... signal sent from microprocessor to actuator
- ... and light is switched on/off
- whole process continues in an infinite loop

Avoiding frequent on/off switches: **(max 2 marks)**

- microprocessor continues to keep light on/off for a pre-determined period
- after pre-determined period, sensor output is again sampled

[5]



- (b) 1 mark for correct sensor, 1 mark for its matching application
(all THREE applications must be different)

sensor	application
infra-red/motion	automatic doors burglar alarm systems
temperature	chemical process central heating/air con system greenhouse environment oven
sound/acoustic	burglar alarm systems leak detection system disco lighting
moisture/humidity	clothes drier environmental control (greenhouse, air con)
pressure	burglar alarm system traffic light control chemical process
carbon dioxide/ oxygen/gas	pollution monitoring in a river greenhouse environment (growth control) confined area (e.g. space craft) Fish tank/Aquarium
magnetic field	mobile phone anti-lock braking CD players

[6]

- 8 1 mark per correct word

Freeware

Shareware

Free software

(Computer) Ethics

Plagiarism

[5]

QUESTION 3.

Mark Scheme
Cambridge IGCSE – May/June 2016



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

- protocol ends in “s”
- use of https

(b) Any **three** from:

- requests web server to identify itself/view the (SSL) certificate
- receives a copy of the (SSL) certificate, sent from the webserver
- checks if SSL certificate is authentic/trustworthy
- sends signal back to webserver that the certificate is authentic/trustworthy
- starts to transmit data once connection is established as secure
- if website is not secure browser will display an open padlock/warning message

[3]

7 (a) 1 mark for each correct binary value

3	0	0	1	1
---	---	---	---	---

5	0	1	0	1
---	---	---	---	---

[2]

(b)

0	0	0	1	→	1	} 1 mark
1	0	0	1	→	9	
0	1	0	0	→	4	
1	1	1	0	→	E	} 1 mark

[2]

Page 7	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

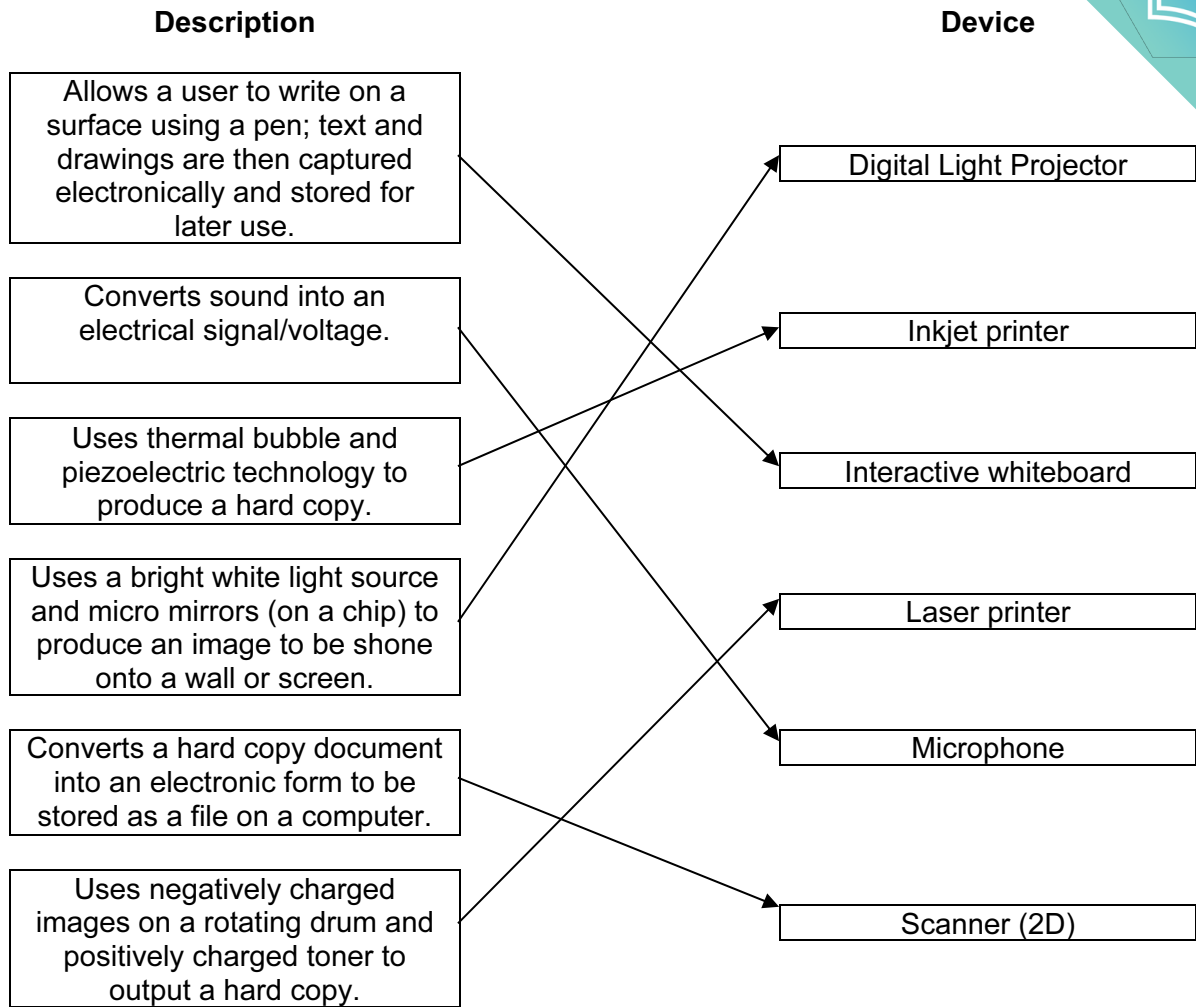
[2]

QUESTION 4.

Mark Scheme
Cambridge IGCSE – May/June 2016



5



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.

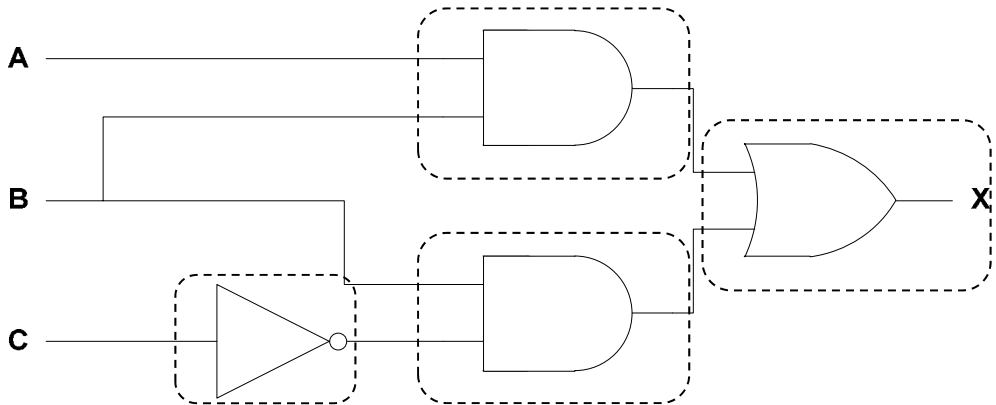
PUBLISHED



Question	Answer
8(b)	Six from: Encrypt the data so it cannot be understood by those not entitled to view it Password protected / biometrics to help prevent unauthorised access Virus checking software helps prevent data corruption or deletion ... identifies / removes a virus in the system ... <u>scans</u> a system for viruses Spyware checking software helps prevent data being stolen/copied/logged ... <u>scans</u> a system for spyware Drop-down input methods / selectable features to reduce risk of spyware / keylogging Physical method e.g. locked doors / CCTV timeout / auto log off ... to help prevent unauthorised access Network / company policies // training employees ... to educate users how to be vigilant Access rights allows users access to data that they have permission to view ... prevents users from accessing data that they do not have permission to view

Question	Answer	Marks
9	Six from: • temperature sensor • analogue data / temperature is <u>converted to digital</u> data (with an ADC) • sensor sends signal to the microprocessor • microprocessor compares input values with stored values/pre-set values ... • ... if the temperature value input is too high/low ... • ... a signal is sent from the microprocessor to turn on / off / up / down the cooling unit • ... if temperature matches the stored values ... • ... no action is taken • an actuator is used to turn the cooling unit on / off / up / down • the process is a continuous loop	6



Question	Answer																																					
10(a)	1 mark for each correct gate, with the correct input(s) 																																					
10(b)	<table border="1"><thead><tr><th>A</th><th>B</th><th>C</th><th>X</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>0</td><td>0</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>1</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td></tr></tbody></table> 4 marks for 8 correct outputs 3 marks for 6 or 7 correct outputs 2 marks for 4 or 5 correct outputs 1 mark for 2 or 3 correct outputs	A	B	C	X	0	0	0	0	0	0	1	0	0	1	0	1	0	1	1	0	1	0	0	0	1	0	1	0	1	1	0	1	1	1	1	1	4
A	B	C	X																																			
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0	1	0	1																																			
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1	1	1	1																																			

QUESTION 6.

0478/12

Question	Answer	Marks
5(b)(i)	– Carries out authentication of server and client – Handles encryption algorithms / keys	2
5(b)(ii)	– Record layer	1
5(b)(iii)	Any one from: – SSL – HTTPS	1
5(c)	– Cookies	1

Question	Answer	Marks																					
6	<table border="1"> <thead> <tr> <th>Statement</th><th>Capacitive (✓)</th><th>Resistive (✓)</th></tr> </thead> <tbody> <tr> <td>Needs pressure to be applied to create a circuit</td><td></td><td>✓</td></tr> <tr> <td>May not register a touch if the user is wearing gloves</td><td>✓</td><td></td></tr> <tr> <td>More commonly used in smartphones</td><td>✓</td><td></td></tr> <tr> <td>More responsive to a touch</td><td>✓</td><td></td></tr> <tr> <td>Needs an electrical field to be changed to register a touch</td><td>✓</td><td></td></tr> <tr> <td>Cheaper to manufacture</td><td></td><td>✓</td></tr> </tbody> </table> One mark per correct tick	Statement	Capacitive (✓)	Resistive (✓)	Needs pressure to be applied to create a circuit		✓	May not register a touch if the user is wearing gloves	✓		More commonly used in smartphones	✓		More responsive to a touch	✓		Needs an electrical field to be changed to register a touch	✓		Cheaper to manufacture		✓	6
Statement	Capacitive (✓)	Resistive (✓)																					
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Question	Answer	Marks
7(a)(i)	– 12 (ignore leading zeros)	1
7(a)(ii)	– 198 (ignore leading zeros)	1
7(a)(iii)	– 1217	1
7(b)	One mark per each correct hex value in correct order – 0E9	3

Question	Answer	Marks
8(a)	Any three from: – It is a universal standard – It can't be inserted the wrong way around – Supports different transmission speeds – Automatically detects if correct driver installed	3
8(b)	Two marks for benefits, one mark for drawback Benefits: – Faster speed of printing – Can print duplex / on both sides – Many letters can be printed from one toner cartridge – Can print in high volumes Drawback – Toner cartridge more expensive to buy – More time to warm-up – Larger footprint	3

QUESTION 7.

0478/13

Question	Answer	Marks
1(a)	– 21 – 258 – 169	3
1(b)	1 mark for each correct hex value – 50 – 3D	4

Question	Answer				Marks																												
2(a)	<table><tr><th>Hardware device</th><th>Input (✓)</th><th>Output (✓)</th><th>Storage (✓)</th></tr><tr><td>Solid state drive (SSD)</td><td></td><td></td><td>✓</td></tr><tr><td>Sensor</td><td>✓</td><td></td><td></td></tr><tr><td>Headphones</td><td></td><td>✓</td><td></td></tr><tr><td>Microphone</td><td>✓</td><td></td><td></td></tr><tr><td>USB flash drive</td><td></td><td></td><td>✓</td></tr><tr><td>Actuator</td><td></td><td>✓</td><td></td></tr></table>				Hardware device	Input (✓)	Output (✓)	Storage (✓)	Solid state drive (SSD)			✓	Sensor	✓			Headphones		✓		Microphone	✓			USB flash drive			✓	Actuator		✓		6
	Hardware device	Input (✓)	Output (✓)	Storage (✓)																													
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	Microphone	✓																															
	USB flash drive			✓																													
	Actuator		✓																														
One mark for each correct tick																																	

Question	Answer	Marks
2(b)	– Input – Black – White – Sensors – Binary One mark for each correct term in the correct place	5

Question	Answer	Marks
3(a)	Any three from: – Sends request to webserver – Receives web pages back from webserver – Converts HTML to display web page – Manages protocols	3
3(b)	Any three from: – Many requests are sent from a computer – Requests are sent to the <u>webserver</u> – The webserver becomes flooded with traffic – The webserver cannot handle the requests / fails – The website can no longer be accessed – Attack maybe distributed	3

Question	Answer	Marks
4	– Serial (ignore any ref to simplex etc.) – IP (address) – Browser – MAC (address)	4

QUESTION 8.

Mark Scheme

Cambridge IGCSE – October/November 2015



11 1 mark for each input device + 1 mark for correct MATCHING reason for each device

Input Devices

- Barcode scanner
- ... to scan the barcode on boarding pass/mobile phone screen
- keyboard
- ... to key in data in case barcode fails to scan
- (electronic) scales
- ... weigh luggage at check-in

1 mark for each output device + 1 mark for correct MATCHING reason for each device

Output Devices

- beeper/speaker
- ... confirm barcode read/indicate error if barcode not read
- (LCD) screen
- ... select options (e.g. airline) at check-in
- printer
- ... produce bag labels

[4]

12 (a)

1	1	1	1	1	0	0	0
0	0	0	0	0	1	1	1

[2]

(b) 1 mark for error detection method and 1 mark for description

- Check sum
- ... sum of bits is transmitted and checked against the sum of the received bits
- Check digit
- ... a digit that is calculated (e.g. using modulo-11) and transmitted with the data
- ARQ
- ... when an error is detected in a packet of data a request is automatically sent for the data to be resent

[2]

QUESTION 9.

Mark Scheme

Cambridge IGCSE – October/November 2015

8 1 mark for each named application + 1 mark for each matching reason for choice



Input device	Application and reason
Light sensor	Automatic doors – detects a person when light beam broken and opens doors Street lighting – detects change in light and switches on/off the street lights Greenhouse – ensures correct lighting conditions for growth of plants
Keyboard	Word processor/spreadsheet/database – need to key in data manually (e.g. report writing) Control room interface – need to manually key in data (e.g. flow speed of liquid)
Barcode reader	Supermarket checkout – read barcodes to find prices, description – allows automatic stock control Library system – can track books on loan – can link books to borrowers using barcoded cards Airport check-ins – barcodes on luggage to track whereabouts
Touch screen	Ticket/information kiosk – easy method for public to enter data – limited number of options Mobile phone/tablet – easy method to input data – use of icons for application selection Control room interface – faster/easier method to input data into system – fewer chances of error since number of choices limited

Page 9	Mark Scheme
	Cambridge IGCSE – October/November 2015



9 (a) 8 MB
100

- (b) (i) Any **two** from:
- removes sounds human ear can't hear very well
 - if two sounds played at same time, softer sound removed
 - uses perceptual music shaping
- [2]

(ii) Lossy [1]

- (iii) **One** from, for example:
- jpeg
 - MP4
 - zip
 - gif
- [1]

10 symmetric encryption

encryption key

plain text

encryption algorithm

cypher text [5]

QUESTION 10.

Mark Scheme

Cambridge IGCSE – October/November 2016



9 Any **six** from:

- infrared / motion / pressure (sensor) // sensor detects movement/pressure
- signals/data sent (continuously) to microprocessor
- converted from analogue to digital (using ADC)
- microprocessor compares value with those stored in memory
- if sensor value does not match the stored value(s) ...
- ... signal sent to switch on the light
- ... signal sent to keep the light on
- ... light remains on for a period of time (30 seconds)
- if sensor value matches the stored value(s) ...
- ... light will remain off
- ... will turn off after period of time (30 seconds)
- works in a continues loop

[6]

10 (a) (i) 2 marks for 3 correct binary conversions, 1 mark for 2 correct binary conversions

[2]

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

(ii) 1 mark for each correct hex value converted

1 A F

[3]

(b) 2 marks for working + 1 mark for correct answer

Working

- $1200 \times 8 = 9600$ (bytes)
- $9600/1024$ or $9600/1000$

Answer

- 9.4 or 9.6 kilobytes

[3]

(c) Any **one** from:

MAC address

- Media Access Control (address)
- unique number that identifies a device (connected to the Internet)
- address is made up of manufacturer id + serial number of device
- address is allocated by the manufacturer

Any **one** from:

IP address

- Internet Protocol (address)
- location/address of a device on the Internet
- address is unique for given Internet session
- address is supplied when a device connects to the Internet
- address is allocated by the network

[2]

Page 9	Mark Scheme	
	Cambridge IGCSE – October/November 2016	



- (d) – record (layer)
– handshake (layer)

11 Any **six** from:

- Help stop the misuse of computers
- The use of computers needs to be governed
- Help keep users safer when using computers
- Provides rules for using computers
- Help stop intellectual property theft
- Helps prevent the misuse of personal information
- Reference to laws (relevant example)
- Reference to security issues (relevant example)

NOTE: Answer must refer to the importance of ethics and be more than a description of ethics.

[6]

QUESTION 11.

0478/11

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	Answer	Marks															
7(a)	<table border="1"> <thead> <tr> <th>Input A</th><th>Input B</th><th>Output</th></tr> </thead> <tbody> <tr> <td>0</td><td>0</td><td>0</td></tr> <tr> <td>0</td><td>1</td><td>1</td></tr> <tr> <td>1</td><td>0</td><td>1</td></tr> <tr> <td>1</td><td>1</td><td>1</td></tr> </tbody> </table>	Input A	Input B	Output	0	0	0	0	1	1	1	0	1	1	1	1	1
Input A	Input B	Output															
0	0	0															
0	1	1															
1	0	1															
1	1	1															
7(b)	Exclusive OR / XOR / EOR	1															
7(c)	One mark for each correct logic gate with correct inputs	5															
7(d)	Two from: - Can work continuously - Avoids human error - It could be a dangerous environment and will avoid human risk - Detect errors instantly - Maintain consistent and correct conditions	2															

Question	Answer	Marks
8	Six from: • PC holds address of the instruction • The address held in PC is sent to MAR ... • ... using address bus • MAR goes to location in memory where instruction is stored • Instruction sent to MDR ... • ... using data bus • Instruction sent to CIR • Control unit sends signals to manage the process ... • ... using the control bus	6
9(a)	Two from: • Layout of the webpage • e.g. where a paragraph is placed • Defined using tags	2
9(b)	One mark for each correct term in the correct order: • browser • IP address • web server • HTML	4

Question	Answer	Marks
4(a)	One mark for each correct logic gate with correct input(s)	4

Question	Answer	Marks																																													
4(b)	Four mark for 8 correct outputs Three marks for 6 or 7 correct outputs Two mark for 4 or 5 correct outputs One mark for 2 or 3 correct outputs <table><tr><th>A</th><th>T</th><th>P</th><th>Working space</th><th>X</th></tr><tr><td>0</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>0</td><td>1</td><td></td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td><td></td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td></td><td>0</td></tr><tr><td>1</td><td>0</td><td>0</td><td></td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td></td><td>1</td></tr><tr><td>1</td><td>1</td><td>0</td><td></td><td>1</td></tr><tr><td>1</td><td>1</td><td>1</td><td></td><td>1</td></tr></table>	A	T	P	Working space	X	0	0	0		0	0	0	1		1	0	1	0		0	0	1	1		0	1	0	0		0	1	0	1		1	1	1	0		1	1	1	1		1	4
A	T	P	Working space	X																																											
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4(c)	Six from: • Sensor sends a signal/reading/data to the microprocessor • Signal/reading/data is analogue and is converted to digital using ADC • Reading/data is stored in the system • Microprocessor compares data/reading to the pre-set value of 7 • If value is greater than 7 ... • ... a signal/data is sent by the microprocessor to display a warning message on a monitor • The process is continuous	6																																													

Question	Answer								Marks	
5	One mark for each correct parity bit								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