

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]

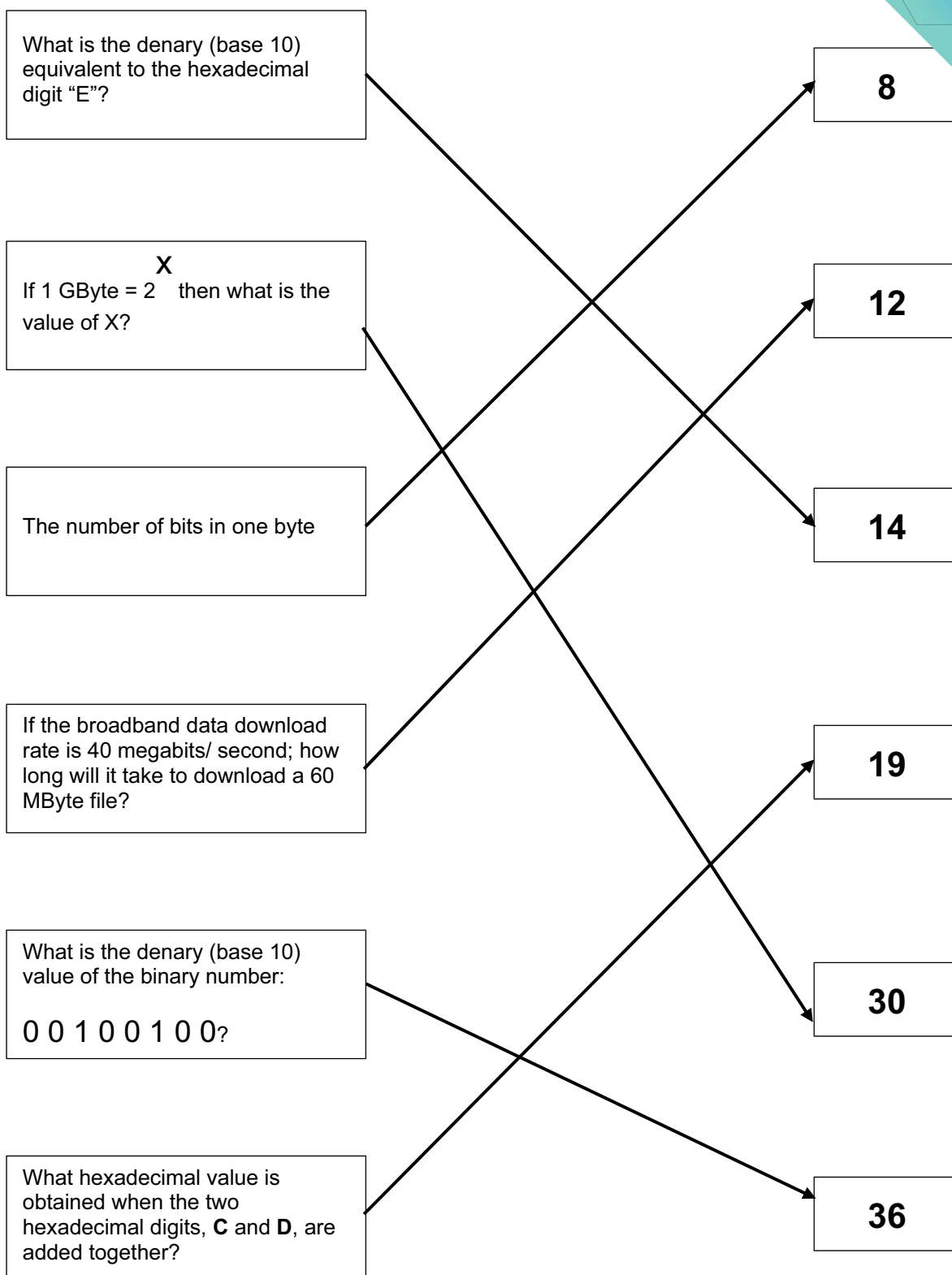
(e) Any **two** from:

- 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 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]



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 3.

Mark Scheme

Cambridge IGCSE – May/June 2016



- 1 compiler
assembler
interpreter

2

Application	Sensor
<i>controlling street lights</i>	Light
<i>monitoring a river for pollution</i>	Gas, pH, temperature, light
<i>controlling traffic lights</i>	pressure, magnetic field,

NOTE: The same sensor cannot be given twice

[3]

- 3 (a) 1 mark for each nibble

0100 1010 1111

[3]

- (b) (i) 0 1 1 0 1 0 0 1 105 hours 1 mark
0 0 0 1 1 1 1 1 31 minutes 1 mark
0 0 1 1 0 0 1 0 50 seconds 1 mark

[3]

- (ii) 1F

[1]

Page 3	Mark Scheme	
	Cambridge IGCSE – May/June 2016	



- 4 (a) Any **three** from:
- The file can be compressed
 - The compression that is used is lossless (not lossy)
 - use of a compression algorithm
 - repeated words can be indexed
 - repeated word sections (e.g. "OU") can be replaced by a numerical value
 - reference to zip files
 - save file as a pdf/convert to pdf
- [3]
- (b) Any **four** from:
- the checksum for the bytes is calculated
 - this value is then transmitted with the block of data
 - at the receiving end, the checksum is re-calculated from the block of data received
 - the calculated value is then compared to the checksum transmitted
 - if they are the same value, then the data was transmitted without any error
 - if the values are different, then an error has been found
 - if the values are different, then a request is sent for the data to be re-transmitted
- [4]

QUESTION 4.

PUBLISHED



Question	Answer												
5(a)	1 mark per correct tick <table><tr><th>Received byte</th><th>corrupted during transmission (✓)</th><th>not corrupted during transmission (✓)</th></tr><tr><td>10110100</td><td>✓</td><td></td></tr><tr><td>01101101</td><td></td><td>✓</td></tr><tr><td>10000001</td><td>✓</td><td></td></tr></table>	Received byte	corrupted during transmission (✓)	not corrupted during transmission (✓)	10110100	✓		01101101		✓	10000001	✓	
Received byte	corrupted during transmission (✓)	not corrupted during transmission (✓)											
10110100	✓												
01101101		✓											
10000001	✓												
5(b)	Four from: • Uses acknowledgement and time out • Check performed on received data // error is detected by e.g. parity check, check sum • If error detected, request sent to resend data // negative acknowledgment is used • If no acknowledgement is sent that data is received // positive acknowledgment is used • Data is resent / Resend request repeated, till data is resent correctly ... • ... or request times out // limit is reached												

4

Question	Answer	Marks
6	1 mark for correct bus name and up to 2 further marks for appropriate purpose. Address (bus) Two from: • Carries / transports an address / location ... • ... of the next item to be fetched • Data travels one way (unidirectional) Data (bus) Two from: • Carries / transports data / example of data ... • ... that is currently being processed // that will be / has been processed • Data can travel in both directions (bidirectional) Control (bus) Two from: • Carries / transports signals • Control / directs the actions of the CPU / processor • Can be either Unidirectional or Bidirectional	6



Question	Answer
7	1 mark for correct line till 5 marks given.

Question	Answer	Marks
8	• Secondary • HDD/SSD • SSD/HDD • Primary • ROM/RAM • RAM/ROM	6

QUESTION 5.

PUBLISHED



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 6.

04/78/12

Question	Answer	Marks
8	1 mark for correct translator, 3 marks for explanation: – Compiler Any three from: – Does not require recompilation // compiled program can be executed without a compiler ... – ... therefore, allows faster execution – Provides an executable file ... – ... therefore, allows him to just send machine code – Dimitri's friend does not need translation/compilation software to execute the program	4

Question	Answer	Marks
9(a)	QR/Quick response	1
9(b)	Any four from: – Read/scanned using app (on mobile device) – It is the camera that is used to scan/capture the image – The three large squares are used to define the alignment // uses alignment targets/modules – Black squares reflect less light // white squares reflect more light – The app/device processes the image – Each small square/pixel is converted to a binary value	4

Question	Answer	Marks
10(a)	Any four from: – Conductive layer – An electrostatic/electric field is created – Sensor(s) (around the screen) monitor the electrostatic field – When touched (electrostatic) charge is transferred to finger – Location of touch is calculated // Co-ordinates used to calculate touch	4

Question	Answer	Marks
10(b)(i)	Any two from: – Gloves are not conductive // Gloves are an insulator – Block current/charge from finger / body / person – Stop the electrostatic field being disturbed/changed	2
10(b)(ii)	Any two from e.g. (1 mark for method, 1 for expansion): – She could use a (conductive) stylus... – ... this will allow the charge to be charged/disturbed – She could use capacitive gloves... – ... this will allow the charge to be charged/disturbed – She could use a natural language interface/voice operated interface ... – ... she could give vocal commands to the device	2

Question	Answer	Marks
11	Any six from: – Suitable sensor (motion/infra-red) – Data converted (from analogue) to digital (using ADC) – Data sent to microprocessor – Data is compared to stored value/range ... – ... if data matches/out of range data security light turned on ... – ... waits for suitable period/until no motion detected ... – ... light turned off – Continuous loop/process	6

Question	Answer	Marks
12(a)(i)	Encryption	1

QUESTION 7.

0478/13

Question	Answer				Marks
9	Statement	Assembler (✓)	Compiler (✓)	Interpreter (✓)	3
	Translates high-level language into machine code		✓	✓	
	Provides error diagnostics	✓	✓	✓	
	Translates whole program to object code in one operation	✓	✓		
	Translates and executes one line of code at a time			✓	
	1 mark for each correct column				

Question	Answer	Marks
10	Any six from: – Program counter (PC) holds address / location of the instruction – The address held in PC is sent to MAR – Address is sent using address bus – PC is incremented – The instruction is sent from address in memory to MDR – Instruction is transferred using the data bus – Instruction sent to CIR	6

Question	Answer	Marks
11	Any three from: – Optical media – Non-volatile – Offline – Single (continuous spiral) track – Data stored using lands / pits – Read using (red) lasers – Can be read only (R) or read write (RW)	3

Question	Answer	Marks
12	$256 \times 200 = 51\,200$ $\frac{51\,200 \times 16}{8} = 102\,400$ $\frac{102\,400}{1024} = 100$ Answer 100 kB One mark for correct answer and two marks for correct calculations.	3

QUESTION 8.

0478/12

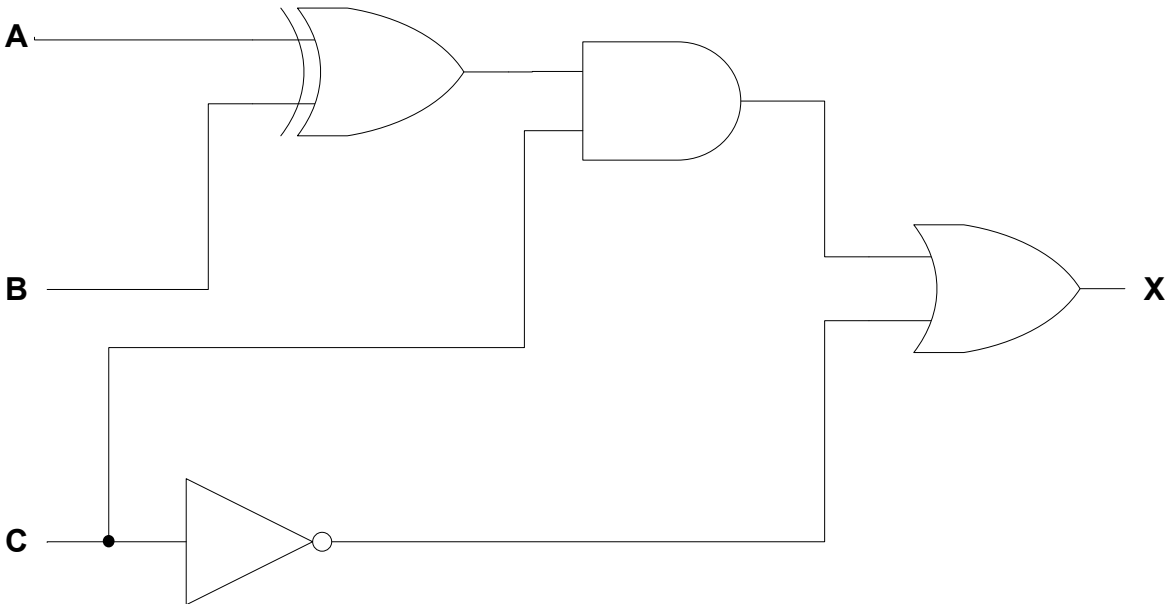
Question	Answer	Marks
5(b)(i)	– Carries out authentication of server and client – Handles encryption algorithms / keys	2
5(b)(ii)	– Record layer	1
5(b)(iii)	Any one from: – SSL – HTTPS	1
5(c)	– Cookies	1

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 (✓)																					
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		✓																					

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	Answer	Marks
5(a)	Any four from: – Stock control system has a database of stock – Each product has a (unique) barcode – Barcode is scanned, and product looked up in database – Stock levels for product are reduced (by 1) – Stock is checked against minimum level – If stock at/below minimum level an order is placed – When stock is re-ordered flag is reset	4
5(b)	– It has RAM to store the data / programs / by example currently in use – It has ROM to permanently store the boot up instructions – It has HDD to store the stock database / software / OS / by example	3
5(c)	Any four from: – MAR – MDR – PC – ALU – CU – ACC – CIR – Buses – Registers	4

Question	Answer	Marks
6(a)	 One mark for each correct gate.	4

QUESTION 10.

Mark Scheme

Cambridge IGCSE – October/November 2015



3 (a)

Statement	True	False
Cookies can destroy or modify data in a computer without the user's knowledge		✓
Cookies generate website pop-ups		✓
Cookies allow a website to detect whether a viewer has viewed specific web pages	✓	

[3]

(b) Registers

Any **two** from:

- PC (Program Counter)
- MAR (Memory Address Register)
- MDR (Memory Data Register)
- CIR or IR ((Current) Instruction Register)
- ACC (Accumulator)

Buses

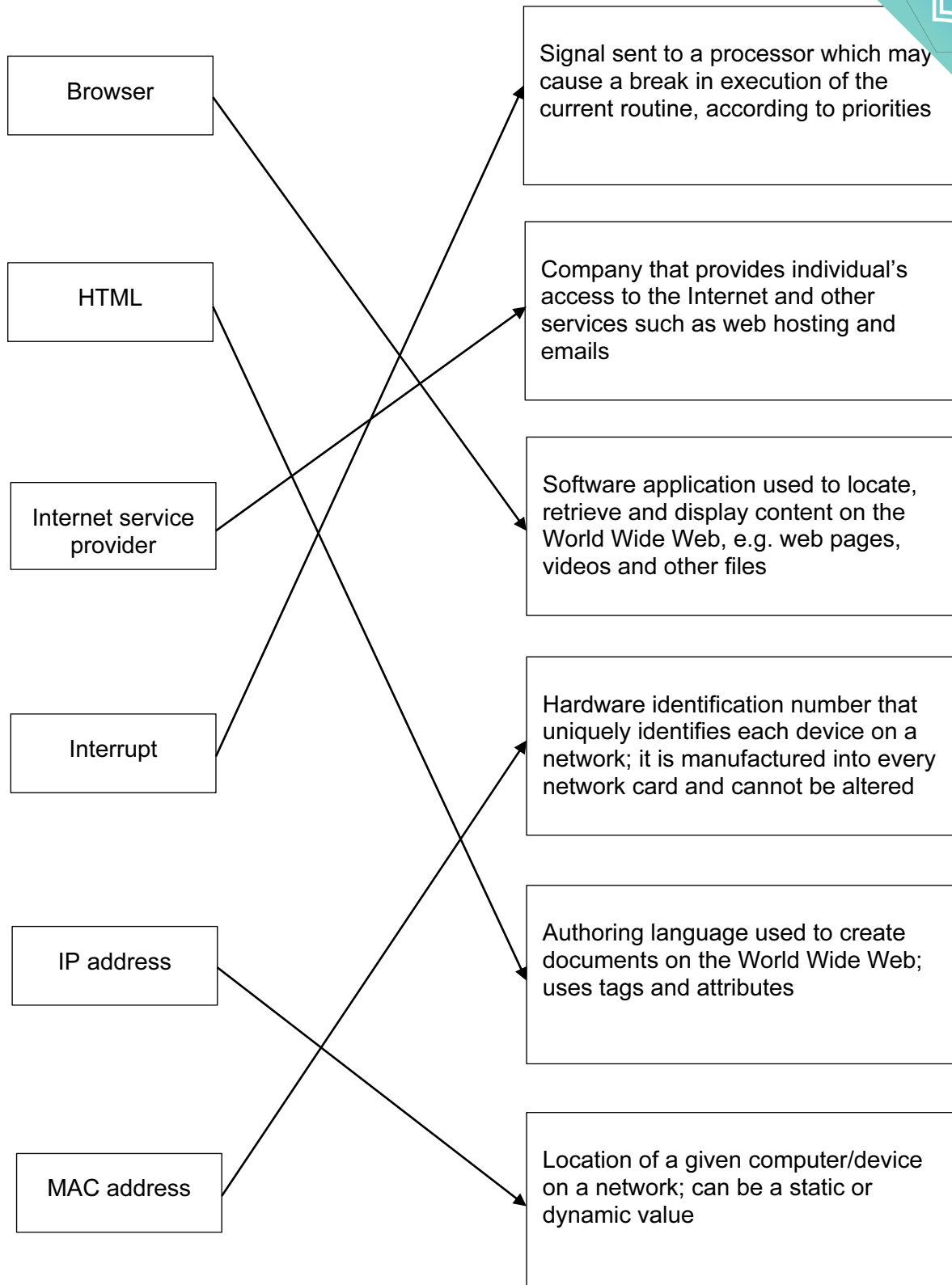
Any **two** from:

- control
- data
- address

[4]



4



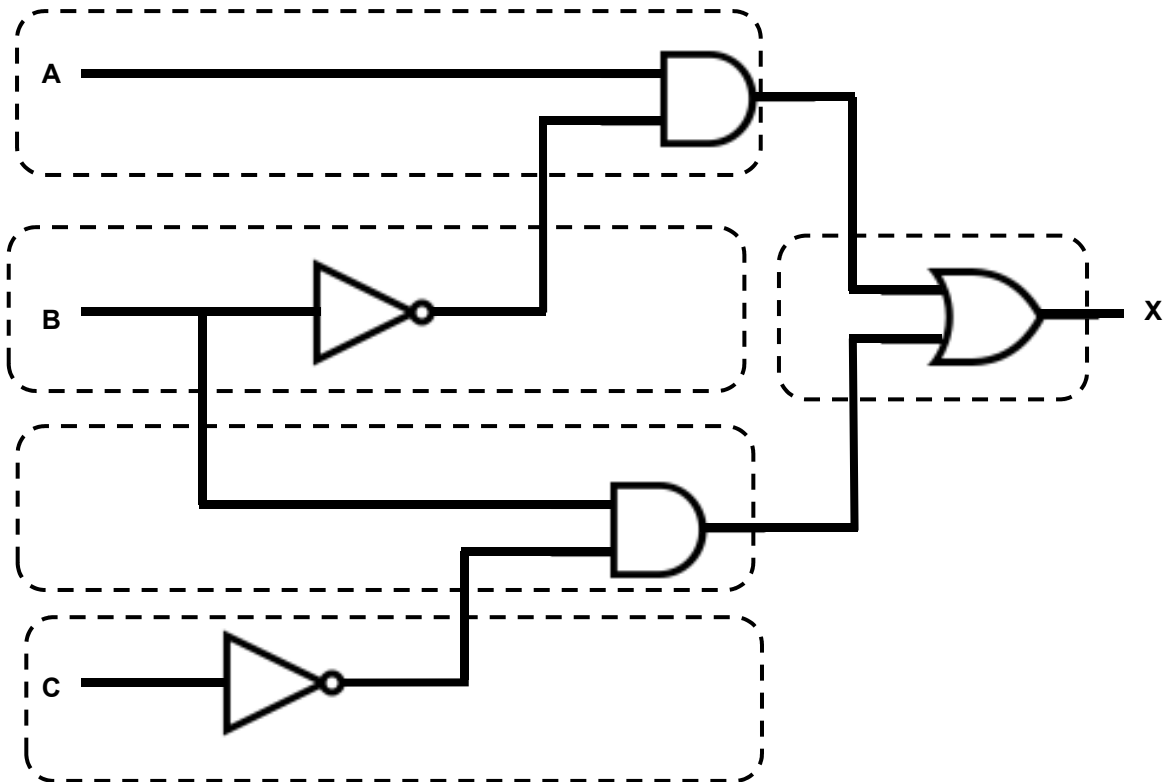
QUESTION 11.

Mark Scheme

Cambridge IGCSE – October/November 2016



5 (a) 1 mark per correct section.



[5]

(b) 4 marks for 8 correct values
3 marks for 6 correct values
2 marks for 4 correct values
1 mark for 2 correct values

A	B	C	Working space	X
0	0	0		0
0	0	1		0
0	1	0		1
0	1	1		0
1	0	0		1
1	0	1		1
1	1	0		1
1	1	1		0

[4]



(c) Register Z

(d) (i) (byte) 5

(ii) (column) 4

(iii) corrected byte is: **1 0 0 1 1 1 1 1**

(iv) that gives the value: **1 5 9**
(follow through applies)

(v) Any **two** from:

- The byte would be transmitted without having 5 consecutive 1's
- The fault condition would not be recognised

6 Any **two** from:

High level language

- easier/faster to write code as uses English-like statements
- easier to modify as uses English-like statements
- easier to debug as uses English-like statements
- portable language code

Any **two** from:

Low level language

- can work directly on memory locations
- can be executed faster
- translated program requires less memory

7 Any **four** from:

- reaches maximum brightness quickly
- colours are vivid
- good colour definition/contrast can be achieved
- screens can be thinner/thin
- more reliable as LED's are long lasting
- consume very little/less energy

QUESTION 12.

0478/13

Question	Answer	Marks
10(b)	1 mark per correct gate with correct inputs.	6

Question	Answer	Marks
11(a)	• Holds address of next/current instruction ... • ... to be fetched/processed/executed	2
11(b)	• Stores data/instruction that is in use ... • ... from address in MAR	2

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
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)	52	1								
4(b)	<table><tr><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td></tr></table>	1	1	0	1	0	0	0	0	1
1	1	0	1	0	0	0	0			
4(c)	It is multiplied by 4	1								

Question	Answer	Marks
5(a)	Four from: - A compression algorithm is used - Discards any unnecessary sounds using perceptual musical shaping ... such as removing background noise / sounds humans can't hear // or other suitable example - Reduces sample size / resolution // by example - Reduces sample rate // by example - Sound is clipped - The data is permanently removed	4
5(b)(i)	One from: - The file size will be smaller than lossless - Requires less storage space - Requires less time to transmit	1
5(b)(ii)	One from: - The quality of the sound will be reduced - The original file cannot be restored	1

Question	Answer	Marks
7(a)(i)	Three from: • RAM • Primary memory • Volatile memory • Holds currently in use data/instructions • Directly accessed by the CPU	3
7(a)(ii)	Two from: • Arithmetic and logic unit (ALU) • Memory address register (MAR) • Memory data register (MDR) // Memory buffer register (MBR) • Accumulator (ACC) • Immediate Access Store (IAS) • Control Unit (CU) • Program counter (PC) • Current instruction register (CIR) • Address bus • Data bus • Control bus • Input device • Output device • Secondary storage device	2

Question	Answer	Marks																		
7(b)	One mark for each correct row <table> <tr> <th>Statement</th><th>True (✓)</th><th>False (✓)</th></tr> <tr> <td>Interrupts can be hardware based or software based</td><td>✓</td><td></td></tr> <tr> <td>Interrupts are handled by the operating system</td><td>✓</td><td></td></tr> <tr> <td>Interrupts allow a computer to multitask</td><td>✓</td><td></td></tr> <tr> <td>Interrupts work out which program to give priority to</td><td></td><td>✓</td></tr> <tr> <td>Interrupts are vital to a computer and it cannot function without them</td><td>✓</td><td></td></tr> </table>	Statement	True (✓)	False (✓)	Interrupts can be hardware based or software based	✓		Interrupts are handled by the operating system	✓		Interrupts allow a computer to multitask	✓		Interrupts work out which program to give priority to		✓	Interrupts are vital to a computer and it cannot function without them	✓		5
Statement	True (✓)	False (✓)																		
Interrupts can be hardware based or software based	✓																			
Interrupts are handled by the operating system	✓																			
Interrupts allow a computer to multitask	✓																			
Interrupts work out which program to give priority to		✓																		
Interrupts are vital to a computer and it cannot function without them	✓																			

Question	Answer	Marks
8	Four from: • A hacker could have hacked the network ... • ... and downloaded the malware onto the network • Clicking a link/attachment/downloaded a file from an email/on a webpage ... • ... the malware could have been embedded into the link/attachment/file • Opening an infected software package ... • ... this would trigger the malware to download onto the network • Inserting an infected portable storage device ... • ... when the drive is accessed the malware is downloaded to the network • Firewall has been turned off ... • ... so malware would not be detected/checked for when entering network • Anti-malware has been turned off ... • ... so malware is not detected/checked for when files are downloaded	4