4 1 mark per correct word

1 protocol
2 web server name
3 file name

accept these three items in any order

HTML tags/text

firewall

proxy server

[6]

5 **1** mark per device, **1** mark per category

Description of storage device	Name of storage device	Category of storage		
		Primary	Secondary	Off-line
optical media which uses one spiral track; red lasers are used to read and write data on the media surface; makes use of dual-layering technology to increase the storage capacity	**DVD**			✓
non-volatile memory chip; contents of the chip cannot be altered; it is often used to store the start-up routines in a computer (e.g. the BIOS)	**ROM**	✓		
optical media which uses concentric tracks to store the data; this allows read and write operations to be carried out at the same time	**DVD-RAM**	✓		**(✓)**
non-volatile memory device that uses NAND flash memories (which consist of millions of transistors wired in series on single circuit boards)	**Solid State Drive/memory (SSD)**		✓	
	(SD/XD card) (USB storage device)			**(✓)**
optical media that uses blue laser technology to read and write data on the media surface; it uses a single 1.1 mm polycarbonate disc	**Blue-ray**			✓

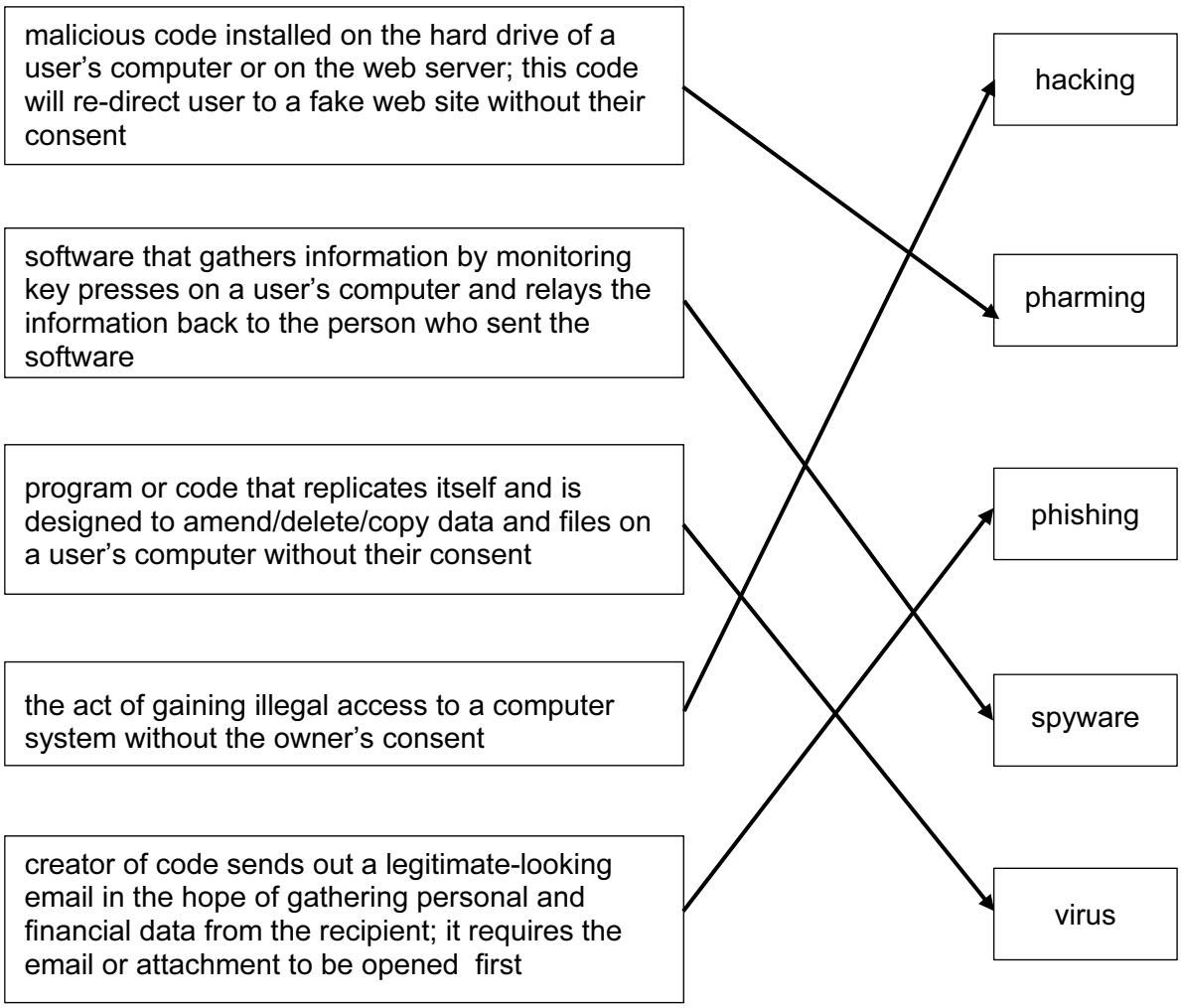
[10]

1 (a) 1 mark per correctly placed tick

Statement	True	False
they are a form of spyware		✓
they are used in advertising only		✓
they are used to track the browsing of a user	✓	
they act in the same way as a virus		✓

[4]

(b)



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

[4]

2 (i) Either of the three options, **resistive**, **capacitive** or **infra-red** must be chosen maximum of **two** marks from chosen technology:

resistive
- uses multiple layers of material …
- … that transmit electric currents
- when the top layer/screen is pushed/touched into the lower/bottom layer …
- … the electric current changes and location of "touch" is found

capacitive
- current sent/flows out from all 4 corners of the screen
- when finger/stylus touches screen, the current changes
- the location of "touch" is calculated

infra-red
- an "invisible" grid on the screen (pattern of infra-red LED beams)
- sensors detect where the screen has been touched through a break in an infrared beam(s)
- the position where the screen touched is calculated [2]

(ii) **1** mark for **benefit, 1** mark for **drawback**

Resistive

benefits:
- inexpensive/cheap to manufacture
- can use stylus/finger/gloved finger/pen

drawbacks:
- poor visibility in sunlight
- vulnerable to scratching
- wears through time
- does not allow multi-touch facility

capacitive

benefits:
- good visibility in sunlight
- (very) durable surface
- allows multi-touch facility

drawbacks:
- screen (glass) will shatter/break/crack (on impact)
- cannot use when wearing (standard) gloves

infra-red

benefits:
- good durability
- allows multi-touch facility
- can use stylus/finger/gloved finger/pen

drawbacks:
- expensive to manufacture
- screen (glass) will shatter/break/crack (on impact)
- sensitive to dust/dirt [2]

QUESTION 3.

Mark Scheme
Cambridge IGCSE – May/June 2016

1 **1** mark for each correct column

Software feature	**Free**	**Freeware**	**Shareware**
Software source code can be freely accessed and modified as required	✓		
All the features of the full version of the software are not made available; the full version needs to be purchased first			✓
The original software is subject to all of the copyright laws		✓	✓
It is possible to distribute modified versions or copies of the software to friends and family	✓		
	(1 mark)	(1 mark)	(1 mark)

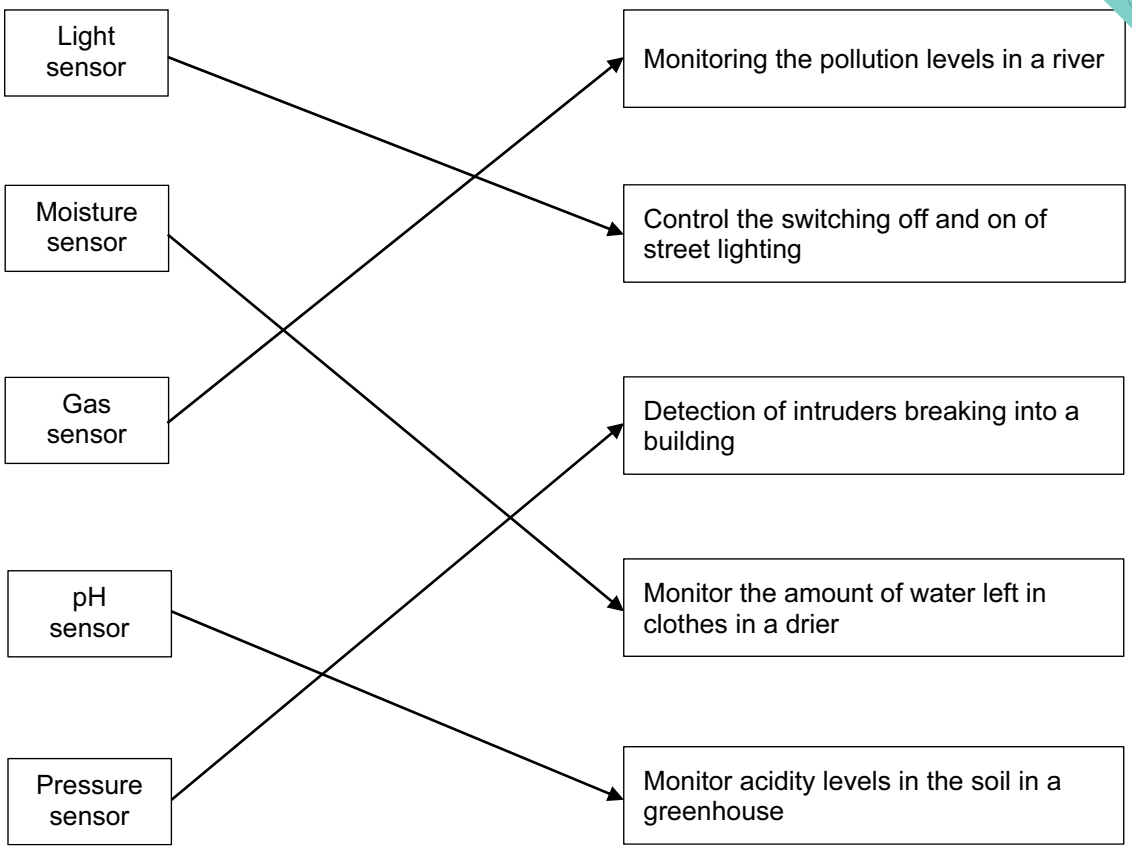
[3]

2 **(a)** **media access control** [1]

(b) Any **three** from:

- hardware/physical address
- unique address/number associated (with network card in) a device/computer
- usually 48/64 bits (12/16 hex digits)
- first 6/8 digits = manufacturer code/ID of device (NIC)
- last 6/8 digits = serial number of device (NIC) [3]

3 (a)



4/5 matches – 4 marks
3 matches – 3 marks
2 matches – 2 marks
1 match – 1 mark [4]

(b) Any **four** from:

- sensor(s) sends signal/data to microprocessor
- signal/data converted to digital (using an ADC)
- microprocessor compares signal/data with pre-set/stored value
- if sensor(s) signal/data indicates the presence of a person / the door needs to be opened / a match is found / door is closed …
- … microprocessor sends a signal to an actuator …
- … to operate/drive a motor to open the door [4]

QUESTION 4.

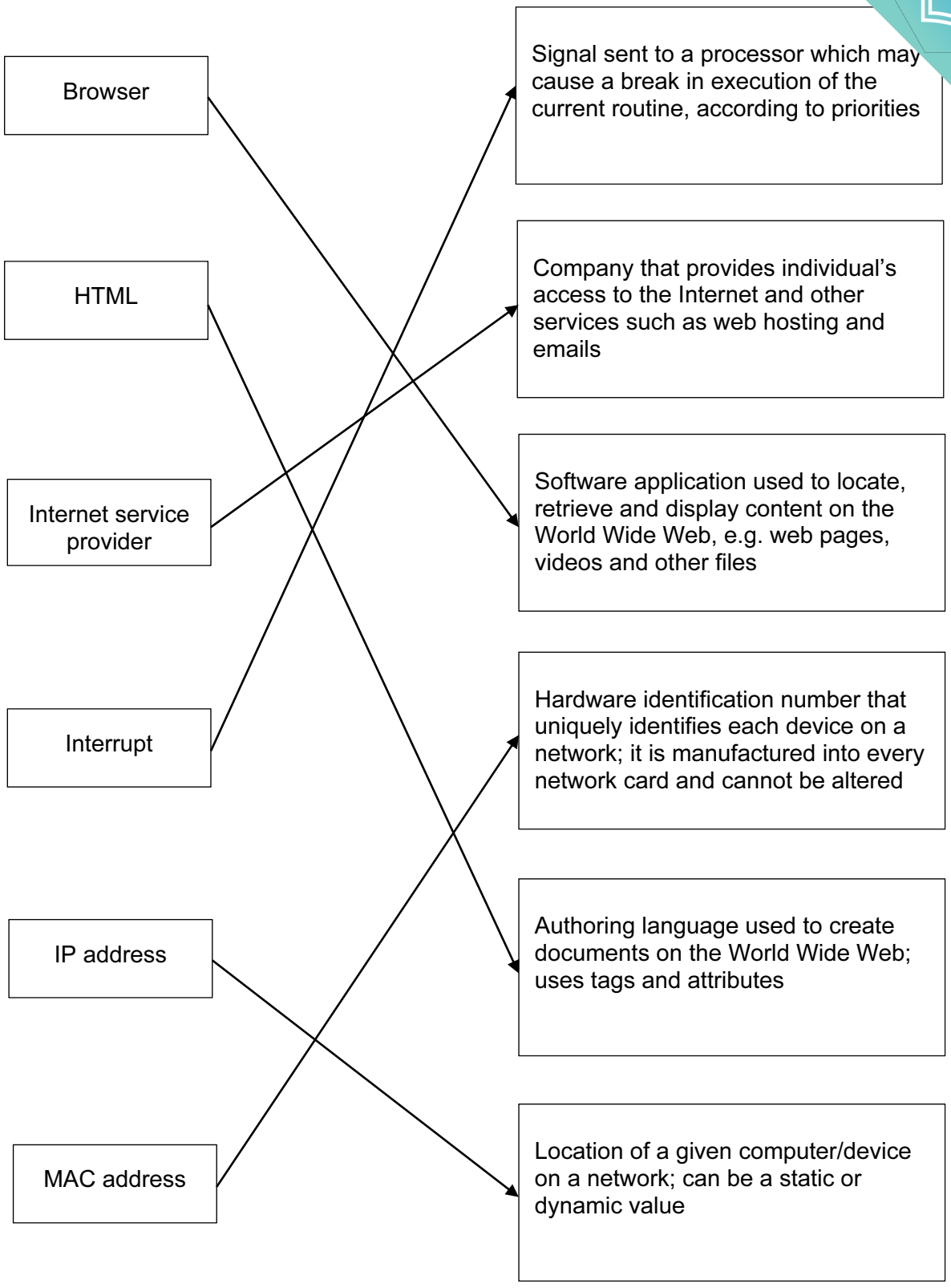
Question	Answer	Marks
2(b)	– Input – Black – White – Sensors – Binary **One** mark for each correct term in the correct place	**5**

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 webserver – 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	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**

4


Browser
HTML
Internet service provider
Interrupt
IP address
MAC address
Signal sent to a processor which may cause a break in execution of the current routine, according to priorities
Company that provides individual's access to the Internet and other services such as web hosting and emails
Software application used to locate, retrieve and display content on the World Wide Web, e.g. web pages, videos and other files
Hardware identification number that uniquely identifies each device on a network; it is manufactured into every network card and cannot be altered
Authoring language used to create documents on the World Wide Web; uses tags and attributes
Location of a given computer/device on a network; can be a static or dynamic value

[5]

5 (a) (i) Inkjet printer

Any **four** from**:**
- uses cartridges/liquid ink
- makes use of thermal bubble/piezoelectric technology
- sprays ink in droplets on the paper
- uses a moving print head
- suitable for low volume (high quality) output, e.g. a photo

[4]

(ii) Laser printer

Any **four** from**:**
- uses powdered ink/toner cartridges
- uses a (charged) printing drum
- makes use of static electricity charges
- uses a fuser to fix/melt ink onto the paper
- uses a discharge lamp to remove static charge from the drum
- useful for high volume (high quality) output, e.g. leaflets

[4]

(b) Any **three** from:
- produces solid, 3D objects/prototypes
- used in CAD/CAM
- makes use of tomography/slices of an object
- solid built up in thin layers
- uses resin, powdered metal, paper, plastic…

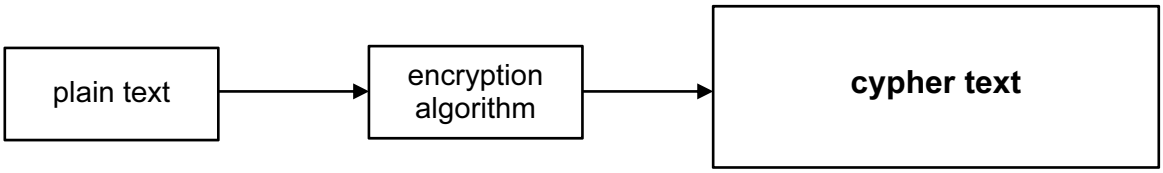
[3]

6 (a) Any **one** from:
- jumbling up/scrambling characters so that message makes no sense
- requires an encryption key to encrypt data
- need decryption key to decipher encrypted message

[1]

(b) Uses the same key to encrypt and decrypt message [1]

(c) 1 mark for correct name in box



[1]

6 (a) Any **three** from:
- hypertext mark-up language
- used to create/develop/author webpages
- translated by a browser to display webpages
- uses (opening and closing) tags to display/format content

(b) **Structure:**
- instructs how the layout of the content is displayed

Presentation:
- instructs how the content will be formatted e.g. colour/style/CSS [2]

(c) Any **three** from:
- displays web page
- interprets/translates the HTML document
- interprets/translates embedded scripting, for example JavaScript
- provides functions, such as bookmarks and history
- identifies protocols, such as https, SSL [3]

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

(4 × 1) + (2 × 2) + (4 × 3) + (1 × 4) + (5 × 5) + (0 × 6) + (8 × 7)

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

105/11 = 9 remainder 6

check digit is: **6** [2]

(ii) **1 mark**
- No/incorrect check digit

2 marks
- Total is 78
- 78/11 …
- … gives 7 remainder 1
- check digit should be 1 [3]

(ii)

MAR	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**

MDR	**0**	**1**	**1**	**1**	**1**	**0**	**0**	**1**

[2]

(iii)

Address	Contents
1000 0000	0110 1110
1000 0001	0101 0001
1000 0010	1000 1101
1000 0011	1000 1100
1000 1100	
1000 1101	
1000 1110	**0111 1001**
1000 1111	

[1]

(b) – CIR (Current Instruction Register)
– PC (Program Counter)
– Acc (Accumulator) [3]

(c) – Controls operation of memory, processor and input / output
– Instructions are interpreted
– Sends signals to other components telling them "what to do" [3]

4 **(a)** **(i)** Free software / open source software [1]

(ii) Any **three** from:
– Set of principles / laws that regulate the use of computers
– Covers intellectual property rights (e.g. copying of software)
– Privacy issues (e.g. accessing personal information)
– Impact of computers on society (relevant examples can be credited) [3]

(b) 1 mark for each CORRECT row

Statement	Firewall	Proxy server
Speeds up access of information from a web server by using a cache		✓
Filters all Internet traffic coming into and out from a user's computer, intranet or private network	✓	✓
Helps to prevent malware, including viruses, from entering a user's computer	✓	
Keeps a list of undesirable websites and IP addresses	✓	✓

[4]

(c) **one** mark for method + **one** mark for linked reason (maximum 6 marks)

– back up files…
– …on a regular basis / to another device / to the cloud

– set data to read only…
– …to prevent accidental editing

– save data on a regular basis…
– …to prevent loss / corruption of data in unexpected shutdown / failure

– use correct shut down / start up procedures…
– …to prevent damage to components / stored files

– use correct procedures before disconnecting portable storage device…
– …to prevent damage to device / data corruption

– keep storage devices in a safe place…
– …away from fire hazards [6]

5 **(a)** – Memory card / SSD / HDD / magnetic tape
– Suitable description of device given [2]

(b) 2 hours = 120 minutes
120 × 180 = 21 600
21 600 / 1024 (or 21 600 / 1000)
= **21.1 GB (or 21.6 GB)**

(1 mark for correct answer and 1 mark for correct calculation) [2]

6 Any **two** from:
– facial recognition software / biometric software used to scan face
– face image converted to digital format / data by the camera
– digital image formed from scanned photo / biometric data stored in passport
– key features of the face are checked / compared [2]

10 (a) Any **three** from:

- hyper text mark-up language
- uses both structure and presentation
- web-authoring language/software // used to create websites/webpages
- uses tags to define e.g. colour / font / graphics / layout

[3]

(b)

File name:	ComputerSciencePapers
Protocol:	http(://)
Web server name:	www.cie.org.uk

[3]

11 (a) 1 mark per nibble

0010 1010 1111

[3]

(b) 1 mark for identification of each sensor, max 2 for each description

Infrared/motion sensor

- Receives infrared rays/heat
- Sends data to microprocessor
- Receives microwaves
- Placed in the corner of a room, across a doorway
- Used to detect the heat of an intruder // used to detect if an infrared beam has been broken by an intruder

Pressure sensor

- Receives current if circuit created // stops receiving current if circuit is broken
- Sends data to microprocessor
- Placed on a window/door, at the entrance
- Used to detect a change in pressure

[6]

QUESTION 9.

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**

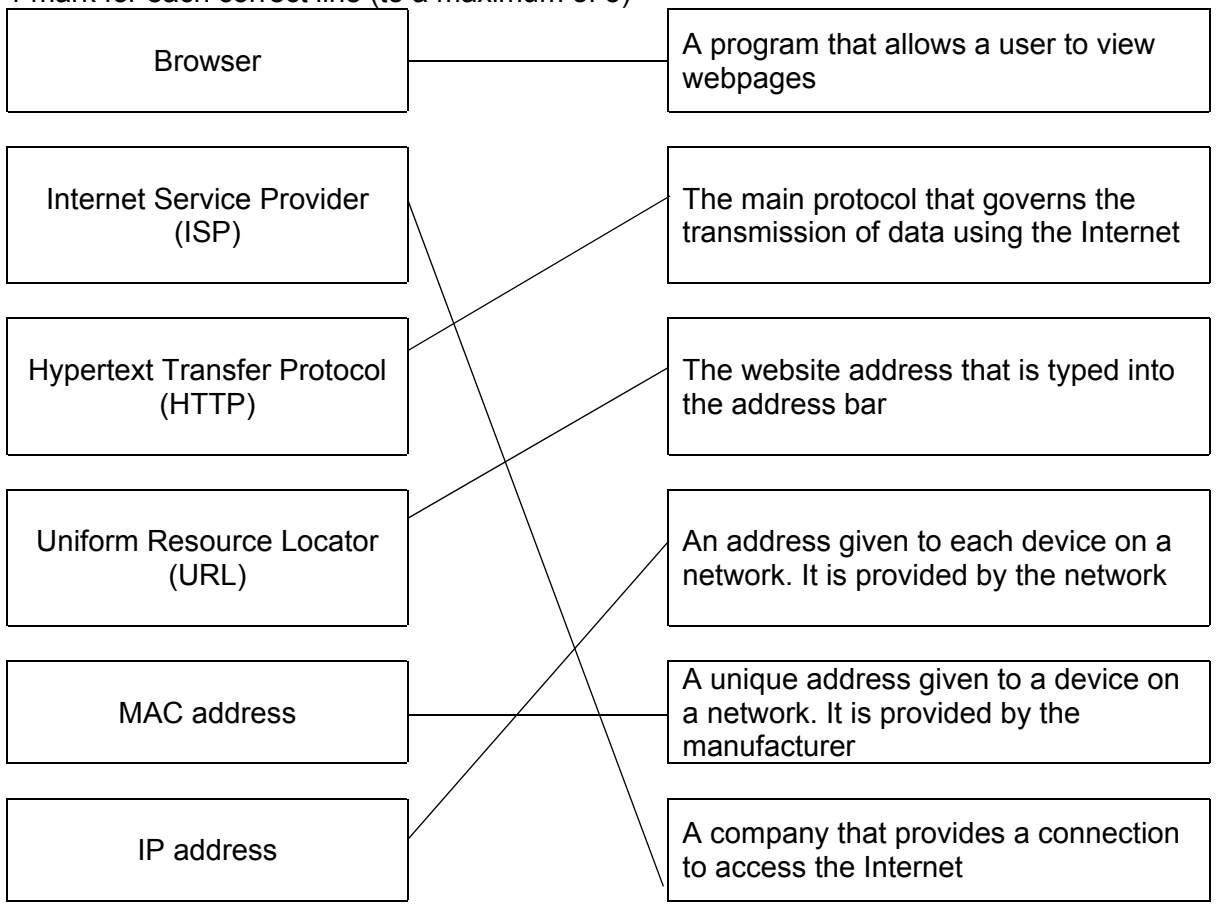
Question	Answer	Marks
8	1 mark for each correct answer, in the given order: • browser • webpages • Internet Service Provider (ISP) • Internet • protocol • IP address	**6**

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 10.

Question	Answer	Marks
7	1 mark for each correct line (to a maximum of 5)	**5**



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 11.

Question	Answer	Marks
8(a)	Uniform Resource Locator	**1**
8(b)	**Four** from: • The web browser sends URL to DNS • DNS stores an index of URL and matching IP address • DNS searches for URL to obtain the IP address • IP address sent to web browser, (if found) • Web browser sends request to IP of webserver • Webserver sends web page to web browser • Web browser interprets HTML to display web page • If URL not found DNS returns error	**4**

Question	Answer	Marks
9	**Four** from: • ROM is permanent … • … RAM is temporary • ROM is non-volatile • … RAM is volatile … • ROM is read only … • … RAM can have read/write operations • ROM holds instructions for boot up … • … RAM holds files / instructions **in use**	**4**

QUESTION 12.

Question	Answer	Marks
7(a)	**Four** from: • Membrane / matrix / circuit board present at base of keys • A key is pressed that presses a switch • When a key is pressed it completes a circuit // changes the current in a circuit • The location of the keypress is calculated • An index of characters is searched to find the corresponding keypress • Each character has an ASCII / Unicode value • The ASCII / Unicode value has a binary value • Keypress generates an interrupt • Each character / keypress is added to a buffer to wait to be processed • The binary can then be processed by the CPU to action the key press	**4**
7(b)	**Three** from: • Display a web page • Sends a request to the web server • Receives data from web server • Translates HTML files • Processes client-side script, e.g. JavaScript • Store favourites • Store history • Navigation forward and backward • Check security • Store / access cookies • Find specific text within a web page • Downloading file from the web • Allows a homepage • Allows multiple tabs / web pages to be opened • Stores data in its cache	**3**

Question	Answer	Marks
7(c)	**Three** from: • Hypertext Transfer Protocol Secure // It is a protocol … • … that is a set of rules/standards • Secure version of HTTP • Secure website // secures data • Uses TLS / SSL • Uses encryption	**3**

Question	Answer	Marks
8(a)	• X = 1 if (A is 1 XOR C is 1) OR (B is 1 NAND C is NOT 1) • X = (A XOR C) OR (B NAND NOTC) **One** mark for each bullet: • (A XOR C) • OR • (B NAND NOTC)	**3**