

X206/12/01

NATIONAL
QUALIFICATIONS
2014

FRIDAY, 23 MAY
9.00 AM – 11.30 AM

COMPUTING
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

Attempt **one** sub-section of Section III.

Part A	Artificial Intelligence	Page 12	Questions 24 to 27
Part B	Computer Networking	Page 19	Questions 28 to 30
Part C	Multimedia Technology	Page 25	Questions 31 to 34

For the sub-section chosen, attempt **all** questions.

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.



SECTION I

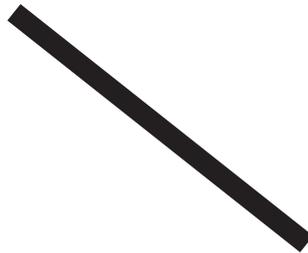
Marks

Attempt all questions in this section.

1. Convert this 8 bit *two's complement* binary number into its decimal equivalent.
11001110. 1

2. *Unicode* and *ASCII* can both be used to represent characters.
Describe **one advantage** of Unicode over ASCII. 1

3. This line has been created using a *vector graphics* package.



State **two** attributes that are required to store this line. 2

4. One *purpose of a register* is to hold *an instruction to be executed*.
State **one** other item that can be held in a register. 1

5. Name the term used to describe the concept of each memory location being identified
by a unique binary number. 1

6. *Solid state storage devices* contain no moving parts and are more robust than external
hard disk drives.

Describe **two** other reasons for using solid state storage instead of an external hard
disk drive. 2

7. One *function of an interface* is to convert a continuous temperature signal to a *digital*
signal. Name this function. 1

8. State **one** function of a *web server*. 1

SECTION I (continued)

Marks

9. Describe the function of a *bootstrap loader*. 1
10. State the type of system software of which a *disk editor* is an example. 1
11. Tian's computer is infected with a virus that is activated within a general purpose package.
- (a) State the *type of virus* that has attacked the system. 1
- (b) Describe how a *checksum* could be used to detect a virus. 2
12. The software development process is described as an *iterative* process.
Use an example to explain how the production of the software specification is an iterative process. 2
13. An App has been created which calculates the amount of annual interest earned on the money in a bank account. Here is the top level algorithm, including data flow for steps 1 and 3.
- | | |
|---|--------------------------|
| 1. get amount in bank and interest rate | (out: amount, out: rate) |
| 2. calculate annual interest | |
| 3. display annual interest | (in: interest) |
- (a) State which design notation is being used. 1
- (b) State **one** parameter, and its data flow, which is required at step 2. 1
14. During the implementation stage programmers may make use of a *module library*.
State **two** reasons why the use of a module library improves development time. 2

[Turn over

SECTION I (continued)

15. After software is written it must be evaluated against various criteria.
- (a) Name the criterion being described below:
 “program does not make unnecessary use of system resources such as RAM”. **1**
- (b) Name the criterion being described below:
 “program will run on other computer systems and operating systems with minimal changes required”. **1**
16. Many applications contain *scripting* languages which allow the creation of macros. State **one** benefit of using macros within an application. **1**
17. A program may make use of a 1–D array.
- (a) When declaring a 1–D array for use in a program, the array must be given a name.
 State **two** other items which should be specified when the array is declared. **2**
- (b) Explain why it is more *efficient* in terms of its use of system resources to pass an array *by reference* rather than *by value*. **2**
18. Software development companies employ *independent test groups* during the testing stage. These are made up of people who are **not** part of the software development company or employed by the client.
 State **two** reasons why the software development company uses an independent test group. **2**
- (30)**

[END OF SECTION I]

SECTION II

Marks

Attempt all questions in this section.

19. Michael is a personal fitness trainer and uses a computer to create and print leaflets that will advertise his classes.
- (a) When creating the leaflets Michael can make use of either *bit mapped graphics* or *vector graphics*.
- (i) State **one** advantage of using bit mapped graphics over vector graphics. **1**
- (ii) Other than file size, state **one** advantage of using vector graphics over bit mapped graphics. **1**
- (b) When printing the leaflets, Michael's computer system may make use of *spooling*.
Describe how spooling operates during printing. **2**
- (c) Michael recommends a piece of software that will guide his clients through exercises that can be completed at home.
Describe **two** *hardware compatibility issues* that his clients will have to consider before installing the software. **2**
- (d) Part of the software allows users to update a daily diary after each training session.
The *Memory Management* function of the operating system will allocate and de-allocate memory addresses as the diary is edited.
Describe **two** roles of *Memory Management* during the process of **saving** the diary to backing storage. **2**
- (e) Name the law that makes the unauthorised distribution of software illegal. **1**

[Turn over

SECTION II (continued)

Marks

20. Katerina runs a small business offering Internet access within an airport coffee shop. Each computer in the coffee shop is connected to a network.

Katerina has decided to use a *ring topology* to structure the network.

- (a) Draw a **labelled** diagram of a ring topology. 2

For security reasons Katerina needs to take a photograph of each member of staff. Katerina uploads the files from her camera to a computer on the network.

- (b) *Handling Status Signals* is one function of an interface involved in this data transfer.

State **two** examples of status signals that the interface may have to handle when the data is transferred from Katerina's camera to the computer. 2

- (c) The camera is connected to the computer via a *serial* interface.

Explain why serial transmission can be described as more reliable than *parallel transmission*. 1

- (d) Katerina downloaded a file to her laptop computer on Monday. She downloaded the same file to her desktop computer on Wednesday. She used both computers to access her online banking service during the following week. Both computers began to show symptoms of a virus within an hour of the banking access. The computer in the bank does **not** have a virus.

Name and describe the *virus code action* that is demonstrated here. 2

- (e) Katerina is also concerned that the network may be subject to an attack from a *worm* or a *Trojan horse*.

Explain why Katerina might be more concerned about an attack from a worm rather than a Trojan. 2

SECTION II (continued)

Marks

21. JCN manufacture tablet computers. Yusif has recently started work with JCN. He is working on the development of processors for a new tablet computer.

(a) Some processors contain *cache memory*. Explain how cache memory can improve system performance. 2

(b) Yusif has learned that processors have to perform *memory write* operations. Describe the steps in a memory write operation. Your answer should make reference to the appropriate *buses* and *control lines*. 4

(c) Yusif has been asked to design a tablet computer that can support a **maximum** addressable memory of 64Gb. He has been told that the *address bus* width will be 32 lines.

Calculate the number of lines required for the *data bus*. 3

(d) Yusif is to measure the performance of a tablet computer. He will use FLOPS to measure the performance of the processor.

(i) Explain why Yusif may choose to measure processor performance using FLOPS. 2

(ii) Explain why Yusif **would not** use *application based tests* as a measure of processor performance. 1

[Turn over

SECTION II (continued)

Marks

22. Garthaven Council want a booking system, for use within the council offices, to assist with the booking of evening classes and activities. They employ LetUsWriteIt, a software development company, to write the software.

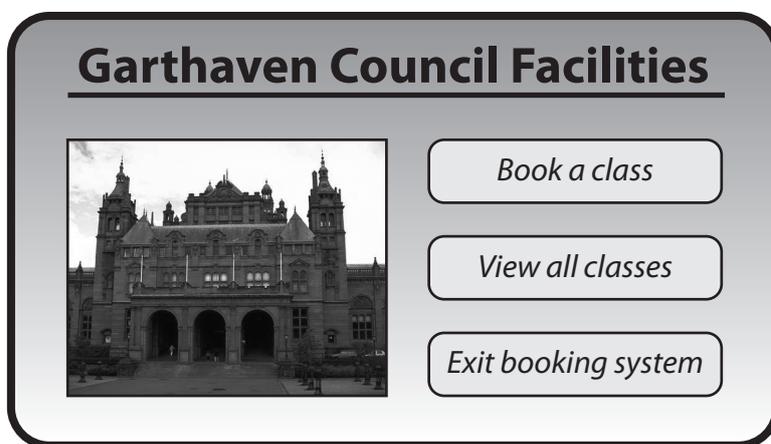
(a) Mark, the systems analyst, interviews council staff to try to find out exactly what is required within the system.

State **two** difficulties which Mark may encounter when using interviews to aid the analysis. 2

(b) When designing the structure and logic of a program, *top-down design* is used.

Explain what is meant by “top-down design”. 1

(c) It is decided that the user interface should look similar to the one shown below.



An *event driven language* is used to implement this software.

State **two** reasons why an event driven language has been chosen. 2

(d) A team of programmers start to create the code.

Explain **one** way the team can efficiently work together to create the code. 2

(e) The programmers carry out *systematic testing*.

State what is meant by the term systematic testing. 1

(f) The final version of the software is translated using a compiler and the compiled code is distributed to other offices.

Explain why the compiled code is distributed, rather than the program code. 2

22. (continued)

(g) State **two** characteristics of well written code which will help during *maintenance* of software.

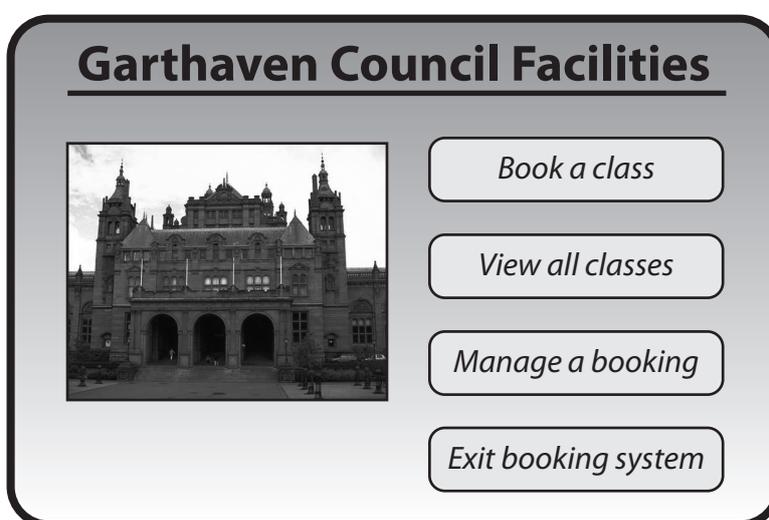
2

(h) Garthaven Council would now like the booking system to be made available as an App for use by residents.

State **two** reasons why *portability* of software is an important factor for developers to consider.

2

(i) After several months, the Council decide that they would like to include a “manage a booking” option.



Name the **type** of maintenance needed to include this feature in the software.
Justify your answer.

2

[Turn over

SECTION II (continued)

Marks

23. A sci-fi fan club allows its members to buy reduced price tickets for national events. A program is written to store, search and sort member details and to create IDs. A few of the fan club members' details are shown below.

<u>ID</u>	<u>Email</u>	<u>Region</u>
WalkJa	Jwalker12@basics.com	West
BrowHa	BrownH2@vmail.com	East
KhanSy	Jedi34@wmail.com	North
SmitAl	R2D3@mymail.com	West
HarvSa	C3P7@jmail.com	North

and so on . . .

- (a) Jack Walker was assigned the ID “WalkJa” using *concatenation*.
Explain what is meant by the term “concatenation”. 1
- (b) State the *data structure* and *data type* which could be used to store the **list** of IDs. 2
- (c) An event is being held involving both the East and West regions. The fan club needs to know the total number of people who could be involved.
- (i) Use *pseudocode* to design an algorithm to calculate this total. Your algorithm should include a *complex condition*. 5
- (ii) The algorithm is to be amended to display the contact e-mail for the East and West members.
State the line to be added and indicate where it should be placed in the algorithm. 2
- (iii) The program could be amended to count the number of members in each individual region.
Name a programming construct that uses *multiple outcome selection* to implement this. 1
- (d) The program uses *global* variables.
- (i) State the *scope* of a global variable. 1
- (ii) State **two** benefits of using parameter passing rather than global variables when programming. 2
- (60)**

[END OF SECTION II]

SECTION III

Attempt one sub-section of Section III.

Part A Artificial Intelligence	Page 12	Questions 24 to 27
Part B Computer Networking	Page 19	Questions 28 to 30
Part C Multimedia Technology	Page 25	Questions 31 to 34

For the sub-section chosen, attempt *all* questions.

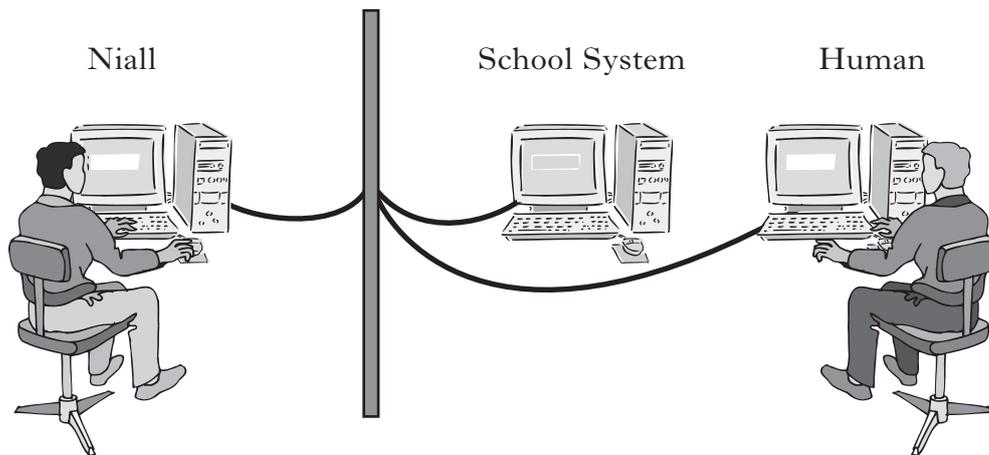
[Turn over

PART A — Artificial Intelligence

Attempt all questions.

24. Two schools are taking part in a competition based on the Turing Test. The competition involves creating software capable of a realistic conversation with a human judge. Niall is the human judge and he will have to determine whether he is communicating with the school system or a human.

Niall will enter text using the keyboard and see responses on his monitor.



Annebank Academy is one of the two schools. Their school's system is a *chatterbot* based on *Eliza*.

- (a) Explain how the chatterbot will generate a response to Niall. 3
- (b) Niall decides to use a grammatically incorrect sentence as a strategy for identifying which is the Annebank chatterbot and which is the human. He types:

Cinema to the I went.

Explain how the incorrect grammar would affect the chatterbot's response. 2

- (c) The other school, Straiton High School, has created a system based on *Natural Language Processing* (NLP).
- (i) Name and describe the stage of Natural Language Processing that will process the typed input. 2
- (ii) Name the other stage of Natural Language Processing that would be part of this system. 1

PART A — Artificial Intelligence (continued)

24. (continued)

- (d) Natural Language Processing can encounter difficulties even though Niall is typing his responses instead of speaking them.

State **one** such difficulty using an example to illustrate your point.

2

- (e) Niall could use other strategies to identify whether he is communicating with the school system or the human.

Explain **one** other strategy that Niall could use in the identification.

1

- (f) When creating the software the schools chose between declarative and procedural languages. Other than the use of procedures, state **two** features of procedural languages that differ from declarative languages.

2

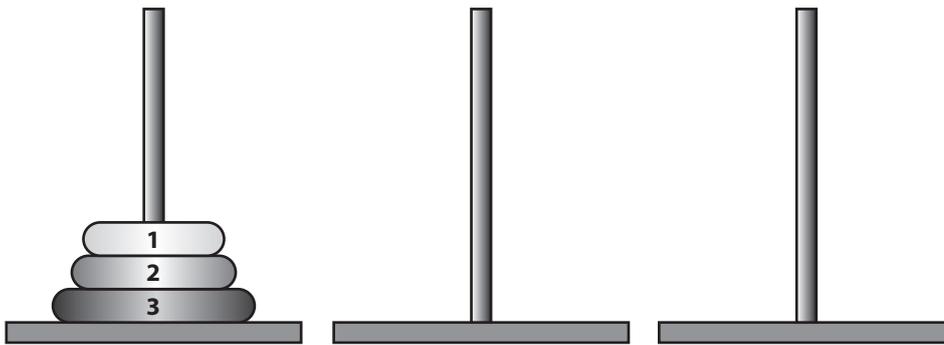
[Turn over

PART A — Artificial Intelligence (continued)

25. Artificial neural systems (ANS) are used in medicine for diagnosis. They use inputs such as gender, heart rate and blood count.
- (a) The *domain* for an ANS used in medical diagnosis would need to be restricted. Describe **two** ways in which the domain could be restricted. **2**
- (b) Describe how *layers* are used in an ANS. **1**
- (c) (i) Explain why the *weights* in an artificial neuron are altered during learning. **2**
- (ii) In addition to weights, state another value in an artificial neuron which may be altered during learning. **1**
- (iii) Explain why the learning process of an ANS is iterative. **1**
- (d) Explain how *parallel processing* could improve the performance of an ANS. **2**
- (e) Artificial neural systems demonstrate aspects of intelligence such as the ability to learn. State **two** other aspects of intelligence. **2**

PART A — Artificial Intelligence (continued)

26. The Towers of Hanoi is a puzzle that can be solved using search techniques. The object of the puzzle is to move a set of discs from one peg to another. Only one disc can be moved at a time and a larger disc cannot be placed on a smaller disc.

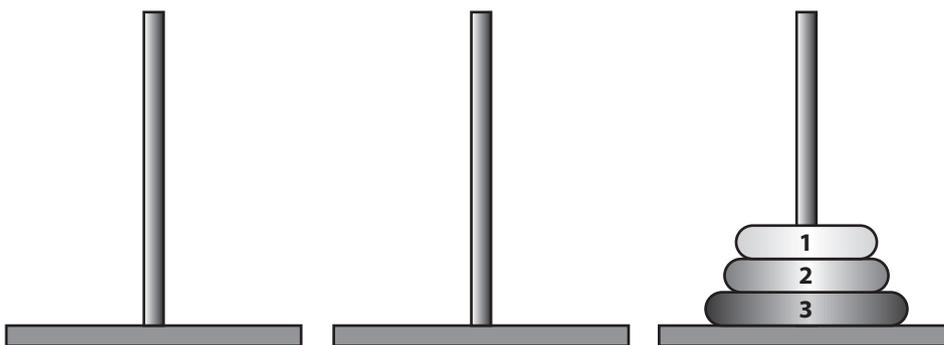


In this version of the puzzle the large disc is numbered 3, the middle size disc is 2 and the smallest disc is 1.

The *start state* of the puzzle is shown in the diagram above and can be represented using the notation.

$$[(3, 2, 1), (), ()]$$

- (a) The puzzle is solved when the *goal state* shown below is reached.



Use the same notation to represent the goal state shown above.

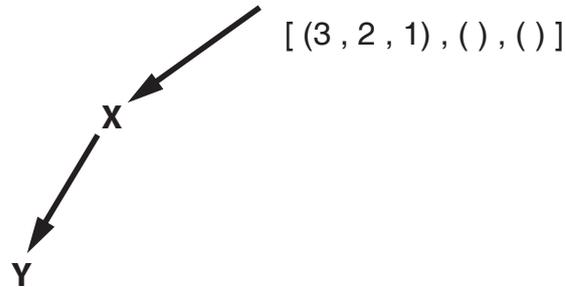
1

[Turn over

PART A — Artificial Intelligence (continued)

26. (continued)

(b) A *depth-first search* is being used to find a solution.



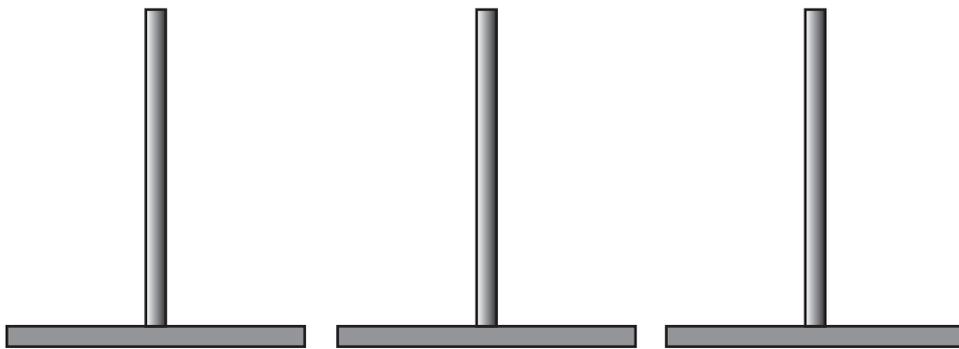
Copy and complete the search tree above showing **one** possible missing node at **each of X and Y** for the depth-first search.

2

(c) Explain why a depth-first search could be more efficient than a breadth-first search.

2

(d) (i) A node can be represented as $[(2, 1), (), (3)]$. Copy and complete the diagram below indicating the position of the discs for this node.



1

(ii) From this state, write down the missing two states leading to the goal state.

$[(2, 1), (), (3)]$	$[?]$	$[?]$	$[(), (), (3, 2, 1)]$
---------------------	-------	-------	-----------------------

2

PART A — Artificial Intelligence (continued)

26. (continued).

- (e) A *heuristic search technique* can reduce search times when puzzles result in *combinatorial explosion*.
- (i) Explain how a heuristic search technique can reduce search times. 2
 - (ii) Explain why *combinatorial explosion* is not a problem for this puzzle. 2
 - (iii) Other than parallel processing, state **one** improvement in hardware that could improve search times. 1

[Turn over

PART A — Artificial Intelligence (continued)

27. A knowledge base contains some information about the human body.

1. `is_part(inner_ear,ear).` *The inner ear is part of the ear.*
2. `is_part(middle_ear,ear).`
3. `is_part(outer_ear,ear).`
4. `is_part(cerebellum,brain).`

5. `is_part(cochlea,inner_ear).`
6. `is_part(vestibular,inner_ear).`
7. `is_part(eardrum,middle_ear).`
8. `is_part(ossicles,middle_ear).`

9. `function_of(balance,inner_ear).` *Balance is a function of the inner ear.*
10. `function_of(sound_transfer,middle_ear).`
11. `function_of(movement,cerebellum).`
12. `function_of (balance, cerebellum)`

13. `located_in(A, B) IF is_part(A, B).` *A is located in B if A is part of B.*
14. `located_in(A, B) IF is_part(A, C)
AND located_in(C, B).` *A is located in B if A is part of C
AND C is located in B.*

(a) State the solutions to the following query:

`? is_part(A, middle_ear)` 2

(b) State the query that would be entered to ask the question:

What is the function of the cerebellum? 2

(c) Use the line numbers to trace the following query as far as the **second** solution.

`? located_in(ossicles, B)`

In your answer you will be given credit for the correct use of the term *sub-goal*. 7

(d) Explain what is meant by *backtracking* in the evaluation of a query. 2

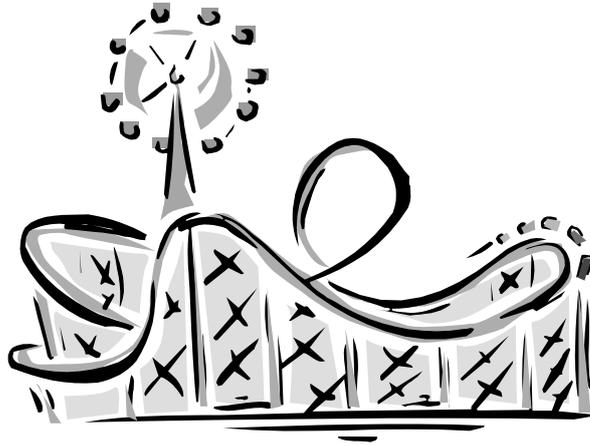
(50)

[END OF SECTION III—PART A]

PART B — Computer Networking

Attempt all questions.

28. FunPark is a new theme park in Scotland. All ticket booths are connected to the central network server.



The server also hosts the FunPark website and manages e-mail.

- (a) Several *protocols* are used by this network. State which protocol should be used for each of the purposes below.

(i) A sales person sending an e-mail to their manager. 1

(ii) The manager uploading photos to the web server. 1

(iii) A customer accessing the FunPark website. 1

- (b) The IP address of a computer in one of the ticket booths is:

178.21.8.245

State the *class* of this IP address. Justify your answer. 2

- (c) The network manager adds a new computer to the network and allocates this IP address:

172.21.6.247

An error message is displayed.

State **one** reason why this IP address is incorrect. 1

- (d) The FunPark website has the address www.funpark.com.

When a customer enters the address into a browser, it is sent to a *domain name server* (DNS) to be resolved.

Describe what happens during a successful *domain name resolution*. 2

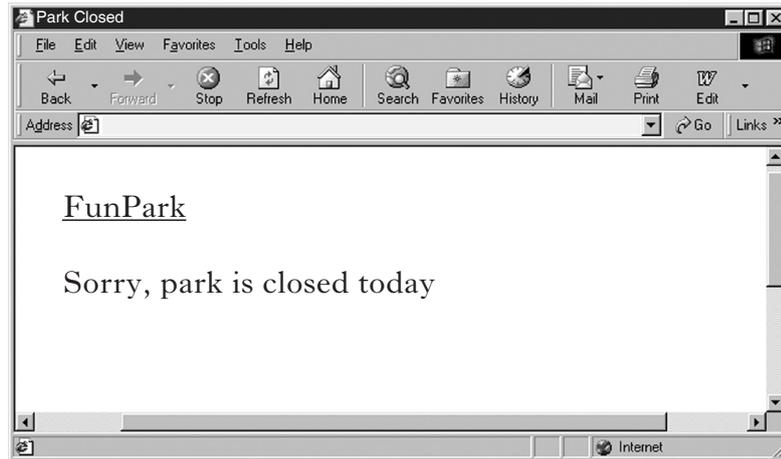
PART B — Computer Networking (continued)

28. (continued)

(e) Unexpected weather has caused the theme park to close.

The webpage shown has to be added to the website.

It has the title “Park Closed” and displays two lines of text.



Copy and complete the table, showing the *HTML* code that is required for this webpage.

<html>
<p>Sorry, park is closed today</p>
</html>

PART B — Computer Networking (continued)

28. (continued)

- (f) The FunPark website was created using HTML and cannot be displayed on some mobile phones.

The website is re-written using WML.

- (i) Name the protocol that must be used to allow the WML website to be viewed on mobile phones. 1
- (ii) Explain why the re-writing of the website code is an example of *adaptive maintenance*. 1
- (iii) Describe **one** feature of WML that differs from HTML. 1
- (g) A customer uses a *meta-search engine* to search for the FunPark website. Describe how a meta-search engine would find the FunPark website. 2
- (h) The home page of the FunPark website includes the following HTML code:

```
<meta name= "keywords" content="FunPark Scotland Theme Park Rollercoaster"/>
```

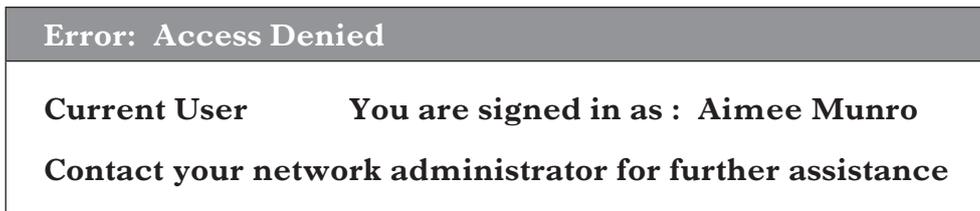
State the search engine method that would use this line of code and explain what the code is used for. 2

[Turn over

PART B — Computer Networking (continued)

29. Aimee works in a local branch of a multi-national bank. All of the computers in the branch are linked to a Wide Area Network.

- (a) Part of Aimee’s job is to update customer files. However, when opening a file, the error message “Access Denied” is displayed.



Describe what the network administrator should do to allow Aimee to open this file.

1

- (b) The bank is concerned about *passive* and *active* network security attacks. Describe **two** examples of active attacks that could take place within the bank network.

2

- (c) Data is transferred around the bank’s network using *asynchronous data transmission*.

(i) Describe asynchronous data transmission.

2

(ii) Explain **one** way in which asynchronous data transmission could **decrease** network performance.

2

- (d) The *TCP/IP* protocol is used within the bank network when transmitting data.

(i) State **two** operations carried out by the TCP part of the protocol.

2

(ii) State **one** operation carried out by the IP part of the protocol.

1

- (e) Aimee can access the Internet from her work computer. However, Internet access is restricted by *Internet filtering software*.

(i) State **two** methods that the Internet filtering software would use to restrict Internet access.

2

(ii) The bank manager thinks that a *walled garden* would be a more suitable method to restrict Internet access.

Describe how a walled garden would stop access to all unsuitable sites.

1

(iii) Explain **one** reason why Internet filtering software could not stop access to all unsuitable sites.

1

PART B — Computer Networking (continued)

30. Eldor is a travel agency that has many branches nationwide.

(a) Eldor's computer network uses a *packet switched* network rather than a *circuit switched* network.

(i) Describe what happens to the packets when data is being transferred over the packet switched network. 2

(ii) Other than cost, explain **one** advantage of packet switching over circuit switching for the Eldor network. 2

(b) A sales representative uses a *Wireless Personal Area Network* (WPAN) to connect his laptop, mobile phone and tablet computer together. These devices could have been connected using Eldor's *Wireless Local Area Network* (WLAN).

State **two** differences between a WPAN and a WLAN. 2

(c) All computers linked to the Eldor network use the Open Systems Interconnection (OSI) Model.

Each device on the network has a network interface card which has its own MAC address.

(i) State **one** reason why the OSI model was developed. 1

(ii) Explain why it is necessary for each device on the network to have a unique MAC address. 1

(iii) Name the layer of the OSI model which makes use of the MAC address. 1

(d) *Parity checks* are carried out on the data being transmitted around the Eldor network.

(i) The data below has arrived at its destination and a parity error has been found.

Data before being sent	Data at destination
1001 1000	1001 1001

State which type of parity is being used here. Explain your answer. 2

(ii) Other than parity, name another method that could be used to detect errors in data transmission. 1

(e) A 25 megabyte file is transferred over the Eldor network in 5 seconds.

Calculate the transfer rate in megabits per second used to transfer this file. Show all working. 2

SECTION III

Marks

PART B — Computer Networking (continued)

30. (continued)

(f) Eldor has a website that allows customers 24 hour access to buy holidays online.

(i) State **one** benefit to the customer, other than 24 hour access, of buying holidays online.

1

(ii) Some customers are worried about making online payments when buying holidays online.

Name two **visual** features that should be displayed on the payment page to show that the website is secure and uses encryption.

2

(50)

[END OF SECTION III—PART B]

PART C — Multimedia Technology

Attempt all questions.

31. Pupils from a school ICT club have created a website.
- (a) The pupils used *authoring software* with a *WYSIWYG* editor and text editor to create the web pages.
- (i) State **one** benefit, other than faster creation, for the pupils in using the WYSIWYG authoring software features. 1
- (ii) State **one** advantage for the pupils in using the text editor to create a web page. 1
- (b) Some web pages display differently depending on the browser used.
- State the type of maintenance required to try to correct the differences. 1
- Many web pages in the website contain video clips. Some video clips are *streamed* while others are *embedded*.
- (c) Explain **one** advantage of streaming files rather than embedding files. 2
- (d) Explain **one** advantage of embedding data when playing video clips. 2
- (e) One of the video clips plays for 32 seconds and was recorded at 25 fps. Each frame has a resolution of 1280 x 720 and a colour depth of 24 bits. Calculate the storage requirement for this uncompressed video clip. Write your answer in Gigabytes. Show all working. 3
- (f) Many video clips are stored in the MPEG file format.
- Describe how MPEG achieves compression of the video clip. 2
- (g) Some of the web pages have links to *synthesised* sound files.
- (i) State the most common file type used to store synthesised sounds. 1
- (ii) Explain why synthesised sounds stored in this file format may play differently when played on different computers. 2

[Turn over

PART C — Multimedia Technology (continued)

32. Helen regularly uses slide shows to present her work. She wants to personalise her slide shows by displaying some text in her handwriting rather than a standard font. Helen uses a scanner to input a handwritten copy of her name. The edges on the first scan look jagged.

A large, handwritten word 'Helen' in black ink on a white background. The edges of the letters are noticeably jagged and irregular, characteristic of a low-resolution scan of a handwritten document.

- (a) Explain how altering the scanner settings could make the edges of the image smoother. 2
- (b) Name **one** software technique Helen could also use to try to correct the jagged edges and describe how this technique achieves a smoother image. 2
- (c) Helen stores the scanned image in the JPEG file format and inserts the image on a slide.
- (i) Explain why saving the image as a JPEG has resulted in the image being surrounded by a white box as shown.



- (ii) Name a file format Helen could use to store her scanned image to remove this problem. 1

PART C — Multimedia Technology (continued)

32. (continued)

(d) Helen would like to animate her image.

Name a file format suitable for storing animated graphics.

1

(e) Helen uses her digital camera to take photographs for inclusion in her presentations.

Digital cameras and scanners both use CCDs to capture images.

Explain the difference in how the CCDs in a digital camera and a scanner are arranged.

2

(f) Helen considers creating a font based on her handwriting. Fonts can be stored using a *vector graphic* or *bitmapped* file format.

(i) Explain why a vector file format might be preferred to a bitmapped file format when storing a font.

2

(ii) Explain **one** reason why some fonts might be stored in bitmapped file format.

1

[Turn over

PART C — Multimedia Technology (continued)

33. Image A was stored as a 2D vector graphic. It was then altered to be in 3D.

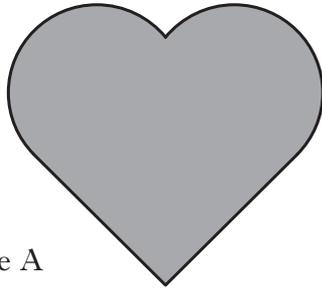


Image A

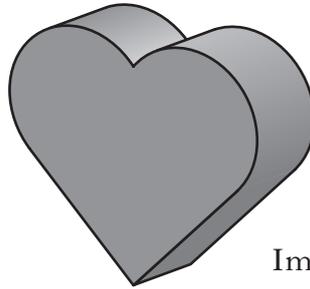


Image B

- (a) Name **two** additional attributes that are required to be able to create the 3D representation shown in image B. 2
- (b) Name a suitable file format for the 3D image. 1
- (c) 3D imaging has become more popular in recent years.
State **two** hardware developments, other than increased storage capacity, which have contributed to this. 2
- (d) Research into holographic storage has continued due to the demand for increased storage capacity in small devices.
State how holographic storage would achieve increased storage capacity. 1

SECTION III

Marks

PART C — Multimedia Technology (continued)

34. AQSound is a business which creates sounds for games software.
- (a) Calculate the storage required for an uncompressed 12 second sound which has been created by AQSound at a frequency of 48 kilohertz with a sampling depth of 2 bytes and 6 channels.
Write your answer in megabytes. Show all working. 3
- (b) State the feature of a sound card required to play this sound effect properly. 1
- (c) Explain why the use of 6 channels allows more realism than stereo. Your answer should include an example. 2
- (d) Many of the sounds are created by AQSound with a *bit rate* of 320 kilobits per second.
Explain the term bit rate. 1
- (e) AQSound do not usually normalise sound files used in a game.
- (i) Describe **one** purpose of normalising sound files. 1
- (ii) Describe **one** limitation of normalising sound files. 1
- (f) AQSound often use a container file to store sound files for games.
- (i) Describe **one** benefit of storing the sound files in a container file. 1
- (ii) Describe **one** possible issue with storing the sound files in a container file. 1
- (g) Sound cards include a DAC and a DSP.
- (i) The DAC converts digital data into analogue data. Explain why a sound card has a DAC. 1
- (ii) The DSP compresses and decompresses sound files. Describe **two** other tasks performed by the DSP. 2
- (h) WAV and MP3 are compressed sound file formats.
- (i) Explain how ADPCM achieves compression in the WAV file format. Your explanation should include an appropriate level of technical detail. 2
- (ii) One technique used in the MP3 format is to remove sounds outside the hearing range of humans.
State **one** other way in which MP3 file sizes are reduced. 1

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

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