

X216/301

NATIONAL
QUALIFICATIONS
2009

FRIDAY, 29 MAY
9.00 AM – 11.30AM

INFORMATION
SYSTEMS
HIGHER

Attempt **all** questions in Section I.

Attempt **all** questions in Section II.

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

Part A Applied Multimedia
Part B Expert Systems
Part C The Internet

Page 10
Page 14
Page 18

Questions 19 to 22
Questions 23 to 28
Questions 29 to 32

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

Attempt ALL questions in this section.

1. Part of a table from a kitchen manufacturer's database is shown below.

| Name | Address | Part No | Description | Cost |
|------------|--------------|---------|-----------------|---------|
| D. Aitken | 4 Rowan Road | Z445 | Corner cupboard | £79.99 |
| D. Aitken | 4 Rowan Road | Z449 | Glass cabinet | £149.99 |
| J. Stevens | 32 Ash Wynd | Y108 | Shelf brackets | £19.50 |
| J. Stevens | 32 Ash Wynd | Z445 | Corner cupboard | £79.99 |

(a) Describe **one** possible data modification problem with this table. 2

(b) A primary key cannot be created from the attributes shown.

Describe how a primary key could be created for this table. 2

2. Define the terms

(a) *entity integrity* 2

(b) *foreign key* 2

3. Describe the purpose of normalising from 2NF to 3NF. 2

4. A database stores details of rings available for purchase in a jewellery shop.

A customer query produces the following answer table.

| Product No | Description | Size | Cost (£) |
|------------|-----------------------------|------|----------|
| 1066 | Sapphire solitaire 9ct gold | P | 229.99 |
| 1882 | Diamond cluster 9ct gold | O | 229.99 |
| 1756 | Ruby and diamond band | M | 195.00 |
| 1883 | Emerald eternity 18ct gold | P | 195.00 |
| 1981 | Tanzanite cluster 18ct gold | M | 195.00 |
| 1611 | Diamond solitaire 9ct gold | L | 150.99 |

Describe how this data has been sorted. 3

5. State the *cardinality* of each of the relationships

(a) Zoo and Animal 1

(b) Teacher and Pupil 1

SECTION I (continued)

- | | | |
|-----|---|---|
| 6. | Describe how a consistent house style could be applied to a presentation. | 2 |
| 7. | Describe how a macro could be created and then used. | 2 |
| 8. | State two features of <i>project management software</i> . | 2 |
| 9. | Describe the distinction between the <i>cost</i> of information and its <i>value</i> . | 2 |
| 10. | Describe one use managers could make of an <i>Executive Information System</i> . | 2 |
| 11. | Viruses and other malicious software can present a security risk to information systems. Describe one other security risk to an information system. | 2 |
| 12. | A resident asks his local councillor how much money the council spends on rubbish collection. Is the resident entitled to this information? Justify your answer. | 3 |

(30)

[END OF SECTION I]

[Turn over]

SECTION II

Attempt ALL questions in this section.

13. Employees at StrathTrust Bank are required to undertake regular training. An employee can attend two courses on the same day. Courses are always taught by the same trainer although a trainer can teach more than one course. If an employee fails a course they can re-take the course at a later date. An employee record and two training certificates are shown below.

| StrathTrust Employee Record | |
|-----------------------------|-------------------------------|
| Employee No | AA10037 |
| Name | Donald McBruce |
| Address | 17 Garden Crescent Glasgow |
| Date of Birth | 17th Dec 1989 |
| Branch | Strathkelvin |
| Manager | Susan Newlands |
| Branch Address | 107 Partick Drive Glasgow |

| StrathTrust Training Certificate | | | |
|----------------------------------|----------------------|----------------|-----------------------|
| Employee No | | AA10037 | |
| Name | | Donald McBruce | |
| Date | Course Title | Trainer | Grade Achieved |
| 12/03/07 | Customer Relations 1 | H Samrai | B |
| 21/07/07 | Internet Accounts 1 | C Trueman | B |
| 21/07/07 | Investments 1 | G Miller | C |
| 23/02/08 | Customer Relations 2 | G Miller | A |
| 04/07/08 | Foreign Exchange 1 | D Black | D |
| 10/11/08 | ATMs | G Singh | B |

| StrathTrust Training Certificate | | | |
|----------------------------------|----------------------|----------------|-----------------------|
| Employee No | | AA10512 | |
| Name | | Karen Tsang | |
| Date | Course Title | Trainer | Grade Achieved |
| 24/02/08 | Customer Relations 1 | H Samrai | A |
| 10/05/08 | Customer Relations 2 | G Miller | D |
| 10/11/08 | ATMs | G Singh | A |
| 17/11/08 | Customer Relations 2 | G Miller | B |

SECTION II (continued)

Marks

13. (continued)

The data can be represented in un-normalised form as shown below.

Employee no

Name

Address

Date of birth

Branch

Manager

Branch address

Date

Course title

Trainer

Grade achieved

Using Employee no as the primary key, transform this un-normalised data to third normal form.

You **must** show the intermediate stages of first normal form and second normal form and identify all primary and foreign keys at each stage of normalisation.

17

[Turn over

SECTION II (continued)

14. Pets & Vets is a veterinary centre for the treatment of sick pets. It has set up a relational database to store details of treatments. The data is held in the following entities:

| Pet | Owner | Treatment | Vet |
|---------------|-----------------|----------------|-----------------|
| <u>Pet ID</u> | <u>Owner ID</u> | <u>Date</u> | <u>Vet ID</u> |
| Pet name | Owner name | <u>Pet ID*</u> | Vet name |
| Type | Owner address | Vet ID* | Phone extension |
| Date of birth | Owner phone | Description | |
| Gender | | Treatment room | |
| Photo | | Cost | |
| Owner ID* | | | |
| Insurance | | | |

- (a) Draw an *entity relationship diagram* to represent this data model. 6
- (b) The data entry forms shown below are used to enter pet details into the database.

PETS & VETS

Pet ID AB72105

Name Sevvy

Type Dog

Date of Birth 15 October 1999

Gender

☐ Male
 ☒ Female

Photo



Owner ID 5972

Insurance ☒

PETS & VETS

Pet ID CC33107

Name Goldie

Type Hamster

Date of Birth

Gender

☐ Male
 ☐ Female

Photo

Owner ID 5972

Insurance ☒

The following *data dictionary* represents the **Pet** entity. It has a number of missing entries which are highlighted as A, B, C, D, E, F and G. With reference to the data entry forms, state a suitable entry for each of the **seven** missing values.

| Name | Data Type | Validation | Required | Key |
|---------------|-----------|------------|----------|-----|
| Pet ID | A | | Y | PK |
| Pet name | Text | | Y | |
| Type | Text | | Y | |
| Date of birth | B | E | N | |
| Gender | Text | F | N | |
| Photo | C | | N | |
| Owner ID | Integer | G | Y | FK |
| Insurance | D | | Y | |

SECTION II (continued)

15. A supermarket chain uses a *Management Information System* to print reports on employees. An example of a daily report is shown below.

| | | | |
|---------------------|-----------|---------------|-------------|
| Till No | HH17 | Date | 20/02/09 |
| Employee No | DF4587 | Employee Name | Mr S Hutton |
| Start Time | 8.10am | Finish Time | 1.00pm |
| No of Customers | 476 | | |
| No of items scanned | 17841 | | |
| Total sales | £30479.57 | | |

- (a) Define the term Management Information System. 2
- (b) State the category of this information according to its:
- (i) *Level*; 1
- (ii) *Form*. 1
- (c) The type of information can be *detailed*, *sampled* or *aggregated*. Identify the type of information in the shaded part of the report above and justify your choice. 3
- (d) State **two** *characteristics* that affect the quality of information. 2
- (e) Comment on the ethics of producing daily reports on employees. 2

[Turn over

SECTION II (continued)

- 16.** Upgrading software is one aspect of a *software strategy*.
Describe **two** other aspects of a software strategy. **8**
- 17.** Setting up a username and password is one task involved in the creation of a *network account*.
State **three** other settings associated with a network account. **3**
- 18.** Chatrooms allow an individual to adopt a *persona* and exchange private messages with other individuals.
- (a) (i) Describe what is meant by a persona. **2**
- (ii) Explain why an individual might adopt a persona when communicating using the Internet. **2**
- (b) Two individuals use the Internet to communicate with their own private code. The police intercept part of the communication.
- (i) Comment on the legality of this action by the police. **2**
- (ii) Describe how the police would proceed to obtain a decoded version of the message. **2**
- (60)**

[END OF SECTION II]

SECTION III

Attempt ONE sub-section of Section III

| | | | |
|---------------|---------------------------|----------------|---------------------------|
| Part A | Applied Multimedia | Page 10 | Questions 19 to 22 |
| Part B | Expert Systems | Page 14 | Questions 23 to 28 |
| Part C | The Internet | Page 18 | Questions 29 to 32 |

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

SECTION III

Marks

Part A—Applied Multimedia

Attempt all questions.

19. The drama department at Bankside Secondary School has produced a DVD of last year's school pantomime. Those who were able to attend the performance commented on the high quality of acting and singing, as well as the excellent special lighting effects. The DVD is now on sale and can be purchased from the school office.
- (a) State **one** health issue that should be considered when including certain special lighting effects in a video clip. 1
- (b) Video editing software can be used to add titles and transitions to video files before burning onto a DVD. While previewing, the drama teacher commented on the "jerky" appearance of the video clip.
Describe **one** setting within the software application that could have been altered to stop this from happening. 2
- (c) The pantomime video file had to be compressed to fit onto the DVD.
- (i) State an international compression standard for video file types. 1
- (ii) Explain why it may be very difficult to distinguish between the quality of the compressed video file and the original uncompressed version. 2
20. *Teleconferencing* can enable large companies to work and communicate more effectively.
- (a) Explain what is meant by the term teleconferencing. 3
- (b) State **two** examples of multimedia applications used in teleconferencing. 2
- (c) As part of a company's security strategy, virus protection is in place.
Name and describe **one** other method of implementing data security. 3

SECTION III

Part A—Applied Multimedia (continued)

21. Jim has just set up his own company, JimsJingles, which aims to provide themed music for customers to include in their own multimedia products. In order to advertise to as many people as possible, he decided to set up a website and employed a *multimedia developer* to help him do this professionally.

- (a) Two pages were created during the development process. Screenshot 1 shows the Home Page. Clicking on Client Reviews displays Screenshot 2.

The two pages below are to be evaluated with reference to the criteria used for good user interface design.

Identify the **two** relevant criteria that would be used in this case and use them to evaluate the screenshots.

6



Screenshot 1



Screenshot 2

SECTION III

Part A—Applied Multimedia (continued)

21. (continued)

- (b) Part of this website could be created using scripting based authoring software.

Describe **two** features of scripting based authoring software. 4

- (c) Customers can download and listen to samples from the completed website and if they like what they hear, they can request to buy the full jingle. Jim does not think that downloading is the most appropriate method of delivering audio samples to customers.

(i) State an alternative method and describe **two** reasons why it may be more appropriate in this case. 5

- (ii) The developer refused to make the changes to the method of delivering audio without charging an additional fee.

State whether the developer is correct in refusing to make these changes. Justify your answer with reference to any project development documentation. 3

- (iii) State **two** criteria the developer would have used to critically evaluate the website. 2

- (d) State **one** piece of user documentation that the developer should have supplied to Jim with the completed product. 1

- (e) A sample of party music can be found using the URL:

<http://www.jimsjingles.co.uk/samples/partymusic/party1.mp3>

Identify and name **two** parts of the structure of this URL. 4

- (f) Jim has been asked to create a 30 second piece of background music for a customer to use in a website advertising children's party entertainment.

Discuss the suitability of using a midi file with reference to file size, degree of compression and appropriate use. 6

SECTION III

Part A—Applied Multimedia (continued)

22. The job section in a local paper has a section dedicated to vacancies within the IT industry. Two vacancies are advertised by a company requiring personnel to join its multimedia development team. Part of each advert is shown below.

Job Title: ****

Description: . . . is involved in the scope and design of the application and works closely with the client. S/he requires high managerial and communication skills and will be able to ensure good teamwork throughout the process.

Advert 1

Job Title: ****

Description: . . . is responsible for creating the overall application to the design provided, incorporating all created media elements. S/he will be an expert in the chosen software authoring tool.

Advert 2

- (a) For each advert, state the correct job title that should be inserted. 2
- (b) Based on the adverts above, create an advert for a different job that would be required as part of a multimedia development team. You should clearly state the job title and describe **two** skills that person should have. 3

(50)

[END OF SECTION III—PART A]

[Turn over]

SECTION III

Part B—Expert Systems

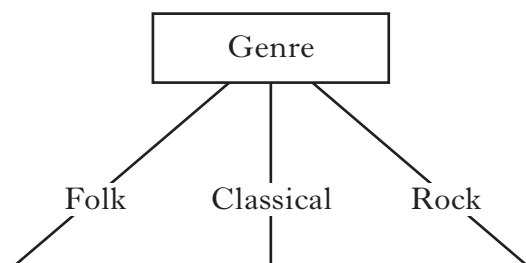
Attempt all questions.

23. Strathcraig Music Centre hosts an annual Music Festival. The centre has several venues and hosts several genres of music each year. The proposed program for this year is shown below.

| Genre | Week | Price | Performer |
|-----------|------|-----------|---|
| Folk | 1 | Cheap | Paul Bennett @ Banner Hall |
| Folk | 2 | Cheap | The Purdie Family @ The Port |
| Classical | 1 | Cheap | Aiko @ The Kane Rooms |
| Classical | 2 | Cheap | Guitar Ensemble @ The Kane Rooms |
| Classical | 1 | Expensive | Warsaw Concert Orchestra @ The Auditorium |
| Classical | 2 | Expensive | Edison String Quartet @ Banner Hall |
| Rock | 1 | Cheap | China Cats @ The Port |
| Rock | 2 | Cheap | Diesel @ The Auditorium |

- (a) Use the table above to complete the following *rule tree* using Genre as the root.

8



- (b) David has been asked to create an expert system to assist staff at the Music Centre advise customers which performance meets their needs.

Write rules to represent the knowledge for Classical music.

8

24. (a) Name and describe **two** conflict resolution strategies.

6

- (b) Explain why conflict resolution strategies are required.

2

SECTION III

Marks

Part B—Expert Systems (continued)

25. The orders taken in a restaurant can be represented as a series of predicates, as follows.

| Predicate | Statement |
|-------------------------------|---|
| main(john, lasagne, red_wine) | John orders lasagne for his main course and is having red wine to drink |
| dessert(mary, fruit_salad) | Mary orders fruit salad for dessert |

Represent the following statements in predicate logic.

- (a) Martin orders steak for his main course, apple pie for dessert and is having beer to drink. 2
- (b) Any customer who orders chicken nuggets for a main course and a milkshake to drink is given ice cream for dessert. 3

26. Holidays International is a members-only holiday firm. Members logging on to the company's website see a web page similar to the following.

Holidays International

Welcome back Mr and Mrs Reid:

Your last three holidays arranged by us were:

1. Intercontinental Hotel, Sri Lanka
2. Hotel Superbe, Goa
3. Five Palms Resort, Fiji

Based on previous holidays arranged by us we would recommend:

1. Hotel Ritz, Maldives
2. Club Paradise, Mauritius
3. Excelsior Club and Resort, Seychelles

This web page is produced using a *deductive database* making use of an expert system and a relational database.

- (a) Describe the part played by the expert system and the relational database in producing the above page. 3
- (b) Describe **one** limitation of using an expert system like this to recommend holidays. 2

SECTION III

Marks

Part B—Expert Systems (continued)

27. Describe the MYCIN expert system in terms of its *category*, *domain* and *main characteristics*. 4

28. Professor Slessor is exploring in the mountains of Crossandra. He has discovered a sack of ancient Crossandran coins.

Ancient Crossandran coins:

- were made of silver or pewter, which looks very much like silver;
- had pictures of transport methods on one side;
- were inscribed with the emperor's name on the other side.

Using an expert system on his laptop the professor is trying to identify the coins. Here are some of the rules from the expert system which are used to determine the type of coin:

IF metal IS silver
AND picture IS ship
AND inscription IS "Kraax"
THEN coin IS crown CF 90.

IF metal IS silver
AND picture IS ship
THEN coin IS coronet CF 70.

IF metal IS silver
AND inscription IS "Kraax"
THEN coin IS helm CF 80.

After examining one of the coins Professor Slessor decides the following facts with the certainty factors given.

The coin is made of silver 80%
The picture is a ship 60%
The inscription is Kraax 40%

(a) (i) Calculate the certainty of the coin being identified as a crown. Show your working. 2

(ii) Based on the rules and facts above, which type of coin would the expert system conclude Professor Slessor is examining. Explain your answer. 4

SECTION III

Marks

Part B—Expert Systems (continued)

28. (continued)

- (b) The diagram below represents a screen from the expert system used to identify the coins. Text generated by the expert system is shown in normal style and user responses in bold style.

Is the metal silver?
?? **yes 60**

Is the picture a chariot?
?? **yes 70**

Advice:
Coin is a circlet 54.

Describe the role played by each of the components of this expert system in producing the screen above.

6
(50)

[END OF SECTION III—PART B]

[Turn over

SECTION III

Part C—The Internet

Attempt all questions.

Marks

29. Buchan High School is developing some web pages which will be accessible only within the school. One of the pages will display information regarding after-school clubs. Part of this page is shown below.

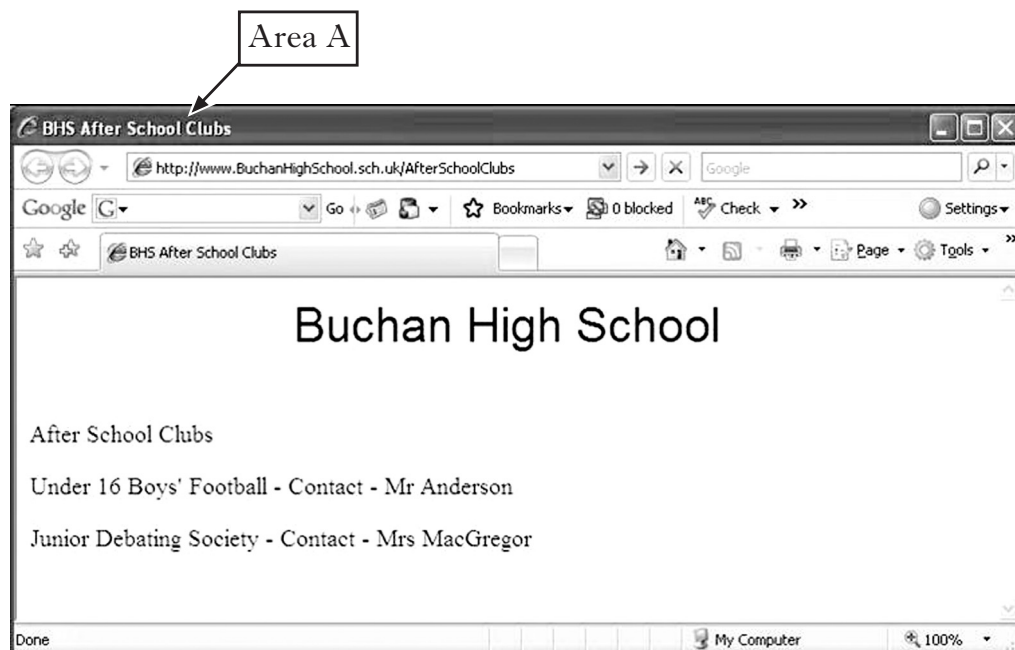


Diagram 1

- (a) (i) Describe the purpose of <meta> tags in HTML code. 2
- (ii) Explain why the use of <meta> tags is not necessary if the web pages are only accessible within the school. 2
- (b) Part of the HTML code for the test page is shown here.
1. <head>
 - 2.
 3. <style type="text/css">
 4. .style1 {font-family: Arial, Helvetica, sans-serif;
 5. font size: 36px;
 6. }
 7. </style>
 8. </head>
 9. <body>
 10. <p align="center" class="style1">Buchan High School</p>
 11. <p> After School Clubs</p>
 12. <p>Under 16 Boys' Football - Contact - Mr Anderson</p>
 13. <p>Junior Debating Society - Contact Mrs MacGregor</p>

SECTION III*Marks***Part C—The Internet (continued)****29. (b) (continued)**

- (i) Complete the HTML code required in line 2 to display “BHS After School Clubs” in Area A of Diagram 1. **2**

- (ii) The school management would like a user to be able to click on a member of staff’s name to contact them by e-mail. Mr Anderson has the e-mail address

“mranderson@BuchanHighSchool.sch.uk”.

Rewrite the HTML code in line 12 to create this e-mail link for Mr Anderson. **4**

- (iii) Complete the code required in line 6 to display the heading “Buchan High School” in blue. **2**

- (c) A further piece of code for this page is as follows:

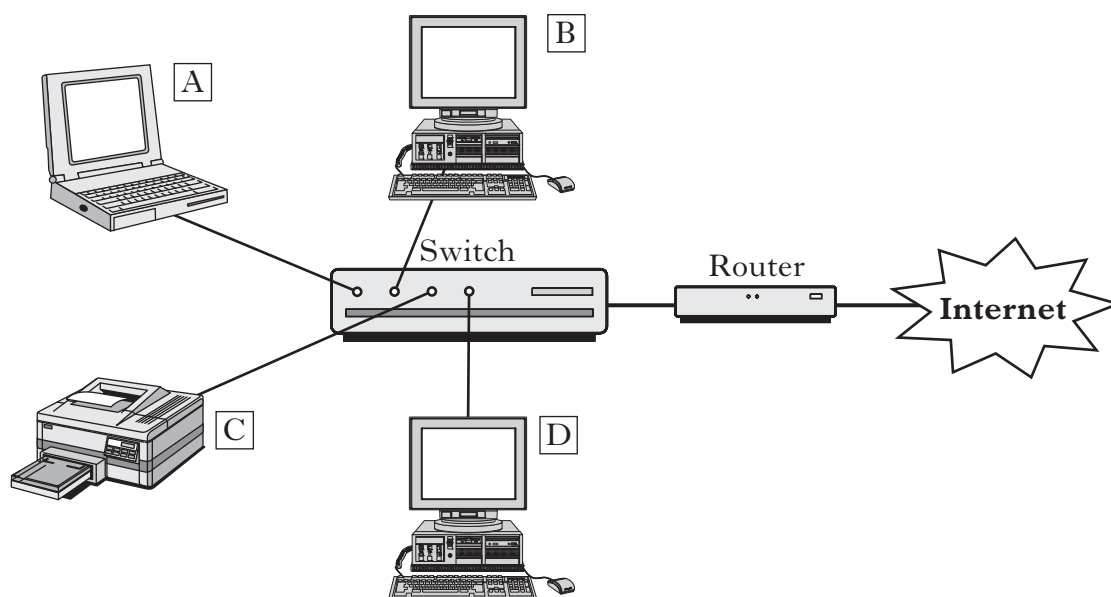
```
14. <table width="100%" border="1">
15. <tr>
16.     <td></td>
17.     <td>Trial Page</td>
18.     <td></td>
19. </tr>
20. <tr>
21.     <td>Buchan High School </td>
22.     <td></td>
23.     <td>Tel 555 5555 </td>
24. </tr>
25. </table>
```

Sketch the output which would be produced by this code.

6**[Turn over**

Part C—The Internet (continued)

30. The diagram below represents a small network which James has installed at home.



Host Addresses

A 192.168.0.2

B 192.168.0.3

C 192.168.0.4

D 192.168.0.7

Subnet mask 255.255.255.0

Gateway address 192.168.0.1

- (a) State the number of hosts that James could connect to his home network. 2
- (b) (i) Describe what is meant by a *gateway address*. 2
- (ii) Explain why a gateway address is needed on James' network. 2
31. Ayisha is starting up a small business from home buying and selling DVDs and CDs online and is developing a website for this purpose.
- (a) Describe **two** characteristics of *site design* that Ayisha should consider. 4
- (b) Ayisha wishes to use the domain name, buynselldvd.co.uk.
- (i) State the organisation to which she should apply to use this name. 1
- (ii) She must also register this domain name on a *Domain Name Server*. Explain why she must do this. 2
- (c) Ayisha would like to include extracts from DVDs and CDs on her website. Comment on the legality of this. 2
- (d) Ayisha has created her website. After a few months she decides to add a new web page offering high definition DVDs. Describe how she would make this page available on the WWW. 3

Part C—The Internet (continued)

32. Jim has just set up his own company, JimsJingles, which aims to provide themed music for customers to include in their own websites. In order to advertise to as many people as possible, he has to set up a website professionally.

(a) *Web authoring software* or text editing software can be used to create web pages.

(i) Describe how web pages can be created using a text editor. 2

(ii) State **two** advantages and **two** disadvantages of using web authoring software rather than a text editor. 4

(b) A sample of party music can be found using the URL:

<http://www.jimsjingles.co.uk/samples/partymusic/party1.mp3>

Identify and name **two** parts of the structure of this URL. 4

(c) A page from JimsJingles website is shown below.



Comment on the *bias* of the information displayed in this screenshot. 2

(d) State **two** ways in which data security could be implemented by the company hosting Jim's website. 2

(50)

[END OF SECTION III—PART C]

[END OF QUESTION PAPER]

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