X216/201

INFORMATION SYSTEMS

INTERMEDIATE 2

Attempt Section I and Section II and **one** Part of Section III.

Section I – Attempt all questions.

Section II – Attempt all questions.

Section III – This section has three parts:

Part A – Applied Multimedia

Part B – Expert Systems

Part C – The Internet

Choose **one** part and answer **all** of the questions in that part.

Read each question carefully.

Write your answers in the answer book provided. **Do not** write on the question paper.

Write as neatly as possible.

Answer in sentences wherever possible.

SECTION I

Attempt ALL questions in this section.

1. Explain what is meant by the term *information system*.   **1**

2. The table below shows part of a train timetable.

Inverness (INV) to Aberdeen (ABN) Saturdays		
	Outward Journey	
Journey Number	1	2
Departure Station	INV	INV
Arrival Station	ABN	ABN
Departs	12:42	14:27
Arrive	14:54	16:41
Changes	0	0

(*a*) Identify **one** item of *data* from the table.   **1**

(*b*) Identify **one** item of *information* from the table.   **1**

3. One benefit of using an electronic database system is that *data analysis* and *reporting* can be carried out easily.

(*a*) State **one** other benefit of using an electronic database system rather than a manual system.   **1**

(*b*) Explain what is meant by a database *report*.   **1**

4. Here is part of a database showing the tracks on a CD.

> **Name of CD:** The Essential Album
> **Artist:** Bryce Summersteen
> **Date of Release:** 26 August 2009
> **Tracks:**
> 1. Thunder on the Streets
> 2. Born to Walk
> 3. The Stream
> 4. Jungle Territory
> 5. Dang

State the relationship that exists between this CD and the tracks. **1**

5. Spreadsheet software can be used for keeping business accounts.

State **one** other suitable type of application software for keeping business accounts. **1**

6. Describe what is meant by the term *data subject* with reference to the Data Protection Act. **1**

[Turn over

7. The following table shows details of flowers for sale.

Product Code	Image	Product Name	Price (£)	Category
FL24		Sunshine	26·99	Summer
FL10		Tulip Special	37·99	Spring
FL54		Tickled Pink	28·99	Celebration
FL55		Blue Heaven	23·99	Celebration
FL59		Red Roses	39·99	Celebration
FL25		Blaze of Glory	34·99	Summer

State which Product Code would be at the top of the table when the list is sorted by Category in ascending order and by Price (£) in ascending order. **1**

8. Explain what is meant by a *Boolean* data type. **1**

9. The *speed, accuracy* and *volume* of data processed all determine the *efficiency* of an information system.
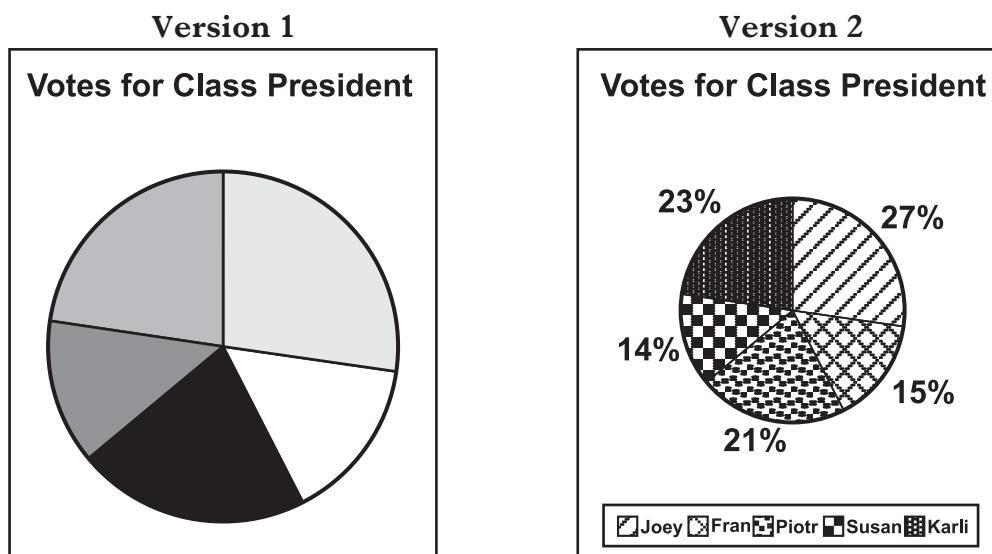
Explain what is meant by "speed" in relation to an information system. **1**

10. Explain why *validation* is used in a database system. **1**

11. The chart below shows the share of votes cast for each candidate in a class president election. In Version 1 of the chart, it was not clear who won the election so Version 2 of the chart was created.

Version 1	Version 2
Votes for Class President	**Votes for Class President**

Identify **one** formatting function that has been carried out to create Version 2.   **1**

12. A concert venue sells tickets from their ticket office and online from their website. State **one** benefit to shoppers of buying tickets online.   **1**

13. Explain what is meant by the term *foreign key*.   **1**

Total for Section I   (15)

[*END OF SECTION I*]

[Turn over for SECTION II on *Page six*

SECTION II

Attempt ALL questions in this section.

14. Dox.com uses a range of software in different departments within their organisation.
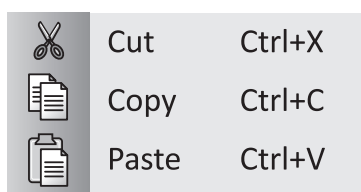
(*a*) The customer services department use a word processing application called WordExtra to write letters to customers.

Before purchasing WordExtra, the application was evaluated in terms of *data objects*, *data operations*, the *HCI* and *online help*.

(i) State **one** data object used in a word processing document. **1**

(ii) Describe what is meant by "online help". **1**

(iii) Dox.com evaluated the HCI offered by WordExtra by trying out some of the editing operations available. Part of the HCI is shown below.

Explain, giving **two** reasons, why Dox.com liked the HCI for editing operations. **2**

(*b*) Staff members send electronic messages to each other.

State **one** type of software application that staff could use for this form of communication. **1**

(*c*) The personnel department use a spreadsheet to work out if employees are entitled to a bonus.

	A	B	C	D	E	F	G	H	I
1	Forename	Surname	Monday	Tuesday	Wednesday	Thursday	Friday	Hours Worked	Bonus Due
2	Susie	Master	8	8	8	8	8	40	Yes
3	Sean	Murphy	8	7	7	8	8	38	No
4	Sasha	Ivanova	8	9	8	8	9	42	Yes
5	Samia	Anwar	8	7	7	8	9	39	No
6	Sandrine	Dupont	7	7	8	8	9	39	No

A bonus is paid to an employee if their total number of hours worked in a week is at least 40 hours. The **calculate** and **replicate** operations are used when creating the spreadsheet.

(i) Identify **one** cell reference from the spreadsheet above where a **calculation** has been used. **1**

(ii) Identify a range of cells in the spreadsheet above where **replication** may have been used. **1**

14. (continued)

(*d*) In the sales department, the sales assistants use cash tills.

(i) The sales assistant types the product code into the cash till when a customer buys an item.

Describe **one** other method that could be introduced to input data about an item sold. **1**

(ii) When the product code for a sale is entered, the item name and price is displayed on the screen.

Describe **one** other method of output that may be used in this system. **1**

(*e*) Describe **one** area of health and safety regulations, relating to using computers at work, that Dox.com should consider. **1**

(10)

[Turn over

15. A DIY warehouse stores details about its suppliers and products.

Some of the data held is shown below.

SupplierID	C34792
Supplier Name	Chark
Address	15 Mains Industrial Park
Town	Downhall
Telephone	01234567899

ProductID	Description	Price (£)	Department
AB123	Paving brush	4.98	Garden Tools
AB479	Dustpan set	5.50	Cleaning
AB604	Long handled broom	6.75	Cleaning
PT198	Wire cup brush	7.69	Power Tools
DC902	Wallpaper brush	1.55	Decorating

(*a*) The DIY warehouse has been advised to remove the multi-valued fields by *normalisation*.

State **two** reasons for normalising data. **2**

(*b*) Identify and remove the multi-valued fields from the above table and represent the data as two entities with suitable names.

Identify all primary and foreign keys. **7**

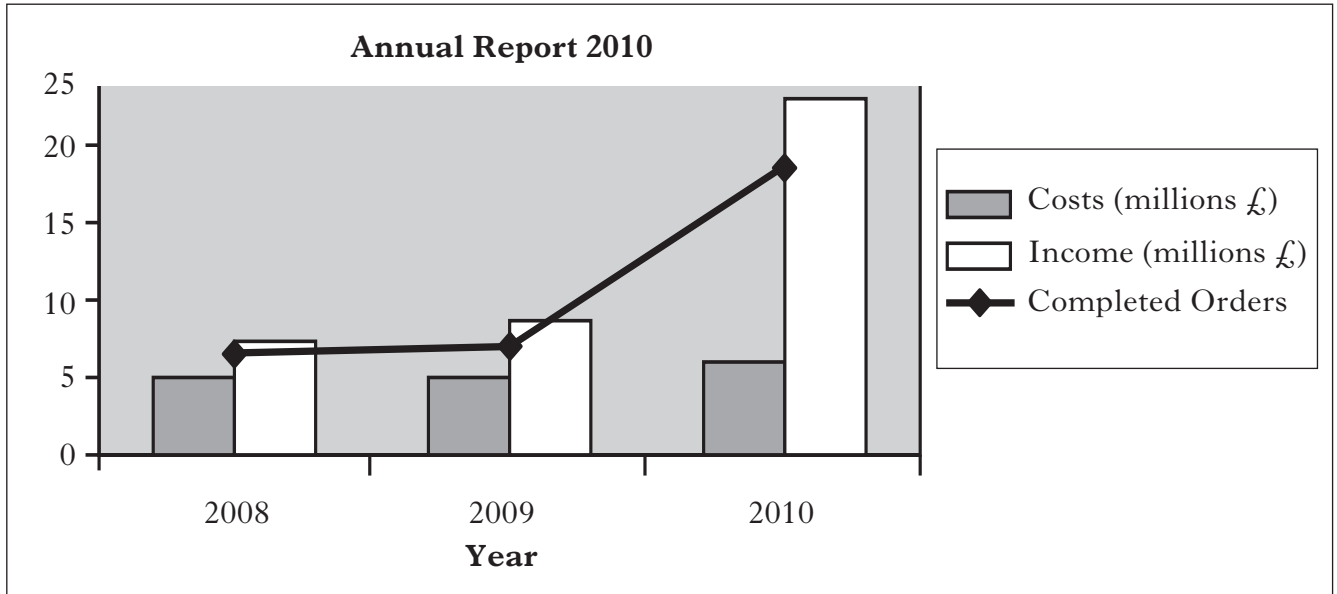(*c*) When setting up the new database, the field called Price (£) is created using a *real* data type.

Explain what is meant by a "real" data type. **1**

(10)

16. Mirkot is a mail order company that sells goods to customers. In 2009, Mirkot set up a computerised information system to handle orders.

    (*a*) Describe **two** costs involved in setting up a computerised information system.   **2**

    (*b*) Mirkot establish a *backup strategy* to avoid losing information in the system.

        State **one** reason why Mirkot need to avoid losing information.   **1**

    (*c*) After one year of using the information system, the chart below is created.

        Describe **two** economic benefits to Mirkot of introducing their computerised information system.   **2**

        (5)

[Turn over

17. A library uses a *flat file* database to store details about members and the books they borrow. Here is part of the file.

Membership Card ID	Member Name	Telephone	Book Reference	Book Title	Date Borrowed
KP102	Mary Smith	987265	BK234	Emma	12/3/09
KP982	James Main	967364	BK287	The Green Mile	12/3/09
KP102	Mary Smith	978265	BK290	Pride and Prejudice	02/4/09
KP982	Jimmy Main	967364	BK205	Blaze	14/4/09
KP982	James Main	967364	BK106	The Dark Tower	21/4/09
KP345	Jo Jones	911235	BK287	The Green Mile	15/5/09

A flat file database has a number of limitations. The same data is often entered several times. This duplication of data can lead to inconsistencies such as data being entered differently or incorrectly.

(*a*) Explain what is meant by the term "flat file database". **1**

(*b*) From the table above, give **one** example where data is duplicated. **1**

(*c*) James Main cannot remember which books he has borrowed from the library. The librarian enters the query James Main into the Member Name field.

  (i) Explain what is meant by a "query". **1**

 (ii) Explain why this query for James Main will not show all the information about books he has borrowed using his membership card. **1**

(iii) State a query that would find all the books borrowed by James Main. **1**

                                                              (5)

Total for Section II   (30)

[*END OF SECTION II*]

SECTION III

Attempt ONE part of Section III.

Choose **one** part and answer **all** of the questions in that part.

[Turn over

SECTION III

PART A—Applied Multimedia

Attempt ALL questions in this section.

18. Emily owns a jewellery shop.

(*a*) Emily employs a company to produce a catalogue of her jewellery on CD-ROM. This catalogue will be posted out to her customers.

  (i) During the analysis stage the user must be considered.

    Describe **two** factors about the user that must be considered. **2**

  (ii) Apart from the user, state **two** other aspects of the analysis stage that should be considered. **2**
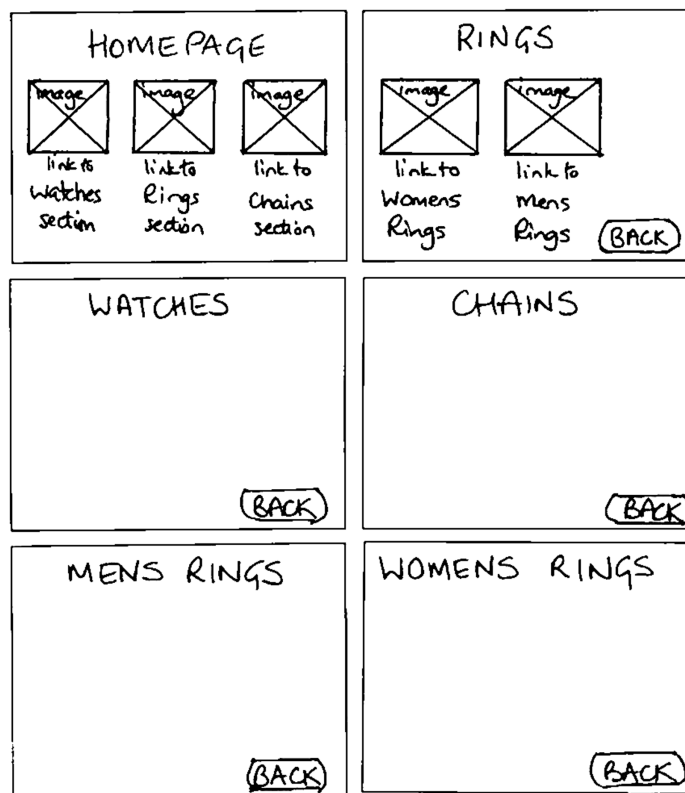
(*b*) Michael works for the company that Emily has employed to create her CD-ROM.

  (i) Michael sketches screens to be included in the CD-ROM.

    State Michael's job title. **1**

  (ii) Shown below are the first sketches made by Michael.

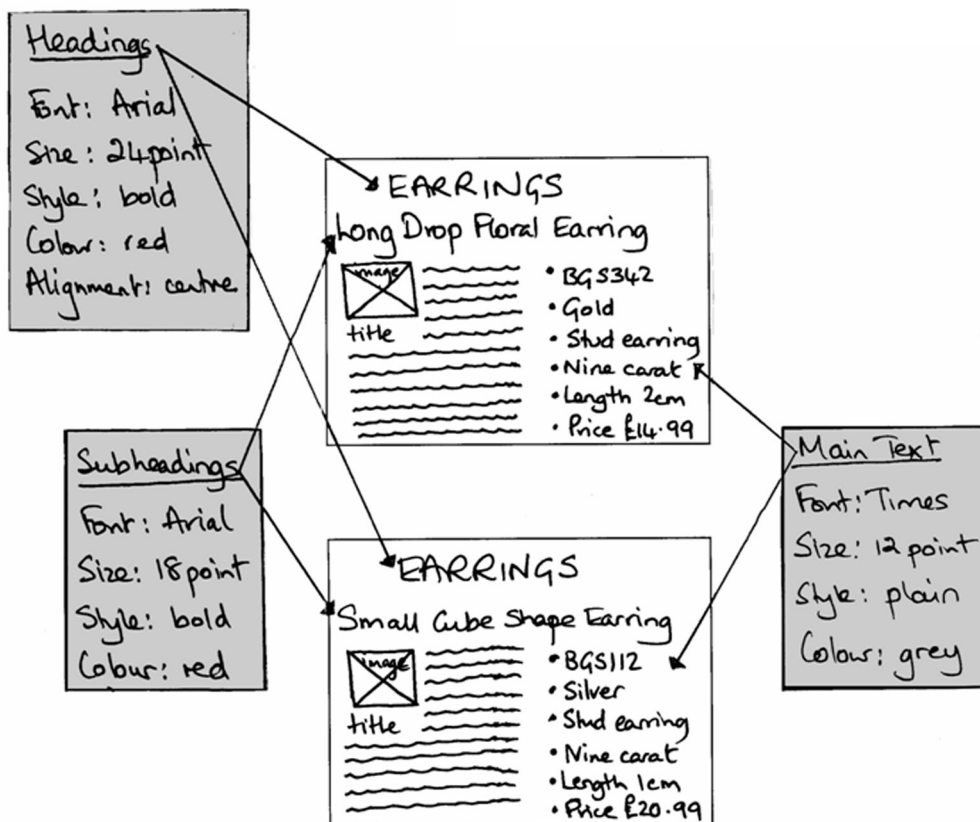   A   Draw the navigation map structure for the sketches shown above. **2**

    B   State the type of navigation structure to be used in the CD-ROM. **1**

18. (continued)

(*c*) Michael has been asked to prepare storyboards for a new section on Earrings. He creates the storyboard shown below.

   (i) Describe **two** design principles relating to text demonstrated in the sketches above. **2**

  (ii) Describe **one** design principle relating to graphics demonstrated in the sketches above. **1**

(*d*) Some of the screens involve synchronising many complex multimedia objects.

State the most appropriate type of software for creating the CD catalogue. **1**

(*e*) Due to the large number of high quality graphics, the catalogue requires 3·4Gb of storage. The graphics specialist has been given the job of reducing the file size.

   (i) Without altering the physical dimensions of the graphics, describe **two** methods of reducing each graphic's file size. **2**

  (ii) After reducing the file size of the graphics, the catalogue still requires 1·2Gb of storage and will not fit onto a CD-ROM.

State the most appropriate delivery medium for posting the catalogue to customers. **1**

(15)

19. GoldRiver is a shopping and leisure complex. GoldRiver plans to provide electronic public information points. These points will provide information about shop locations, catering facilities and cinema listings.

    (*a*)   (i) State the most appropriate delivery medium for the public information points. **1**

          (ii) State **two** reasons for your answer to part (i). **2**

    (*b*) Before the information points can be used, testing must be carried out.

          (i) Explain the purpose of *screen testing*. **1**

          (ii) Explain the purpose of *navigation testing*. **1**

    (*c*) The information points make use of audio.

          (i) State **two** possible uses of audio in GoldRiver's information points. **2**

          (ii) Describe how the sampling rate affects the quality of the audio. **1**

    (*d*) The information points make use of logos from different shops on some of their screens.

          (i) The manager of GoldRiver is concerned about including company logos on their screens. Explain why she is concerned. **1**

          (ii) Describe what GoldRiver could do to ease the manager's concerns, while still including the company logos on their screens. **1**

(10)

Total for Section III Part A   **(25)**

[END OF SECTION III—PART A—APPLIED MULTIMEDIA]

PART B—Expert Systems

Attempt ALL questions in this section.

20. "My Little Helper" is an expert system that suggests which toys are suitable for different children.

    (*a*) Azim provided the knowledge for the expert system.

    State Azim's role in the development of the My Little Helper expert system. **1**

    (*b*) Four screens from the expert system are shown below.

My Little Helper	My Little Helper
Who is the gift for? ○ Boy ○ Girl [Explain]	What age is the child? ○ 0–6 months ○ 6 months–1 year ○ 1 year+ [Explain]

My Little Helper	My Little Helper
What is the child interested in? ○ Cars ○ Dolls ○ Books ○ Games [Explain]	Suggested Toys: ○ Timmy Truck ○ Callum Carr ○ Connect 7 [Reason]

    (i) Identify the component of the expert system shown above. **1**

    (ii) Describe the main function of the component you named in part (i). **1**

    (iii) From the screens above, identify the part used for *why* justification. **1**

    (iv) During the development, the following information was used.

No	Input	Expected Output	Actual Output
1	Boy Age – 3 months Interest – Cars	• Timmy Truck • Bath time buddies • Trucks 'n' Cars	• Timmy Truck • Bath time buddies • Trucks 'n' Cars
2	Girl Age – 1 year+ Interest – Books	• Gerry the Giraffe by P Glancy • Everyone loves a nut by A Tree	• Connect 7 • Hungry Elephants

    Identify the stage in the development process where this information would be used. **1**

    (v) State **two** criteria used to evaluate an expert system. **2**

    (7)

21. Darius is an expert on diamonds. Darius grades diamonds as follows.

- If the diamond is round, clear in colour with a rough texture and no imperfections then it is graded as grade 1.

- Square diamonds that have a smooth texture and have a few imperfections are graded as grade 2 as long as they are clear.

The first paragraph can be represented using the following attribute-value pair Grade1(shape=round, colour=clear, texture=rough, imperfections=no)

(*a*) Create an attribute-value pair for grade 2 diamonds. **2**

(*b*) Darius has been asked to work with the *knowledge engineer* to develop the expert system.

Explain the role of the "knowledge engineer". **2**

(*c*) Darius is considering using this expert system to grade his diamonds.

State the category of this expert system. **1**

(5)

22. PC Planet is a large computer shop. It uses an expert system to select the most appropriate computer for a customer.

(*a*) The first stage in developing PC Planet's expert system was *knowledge acquisition*. Describe what is involved in "knowledge acquisition". **1**

(*b*) State the second stage in developing the expert system. **1**

(*c*) The following advert was shown in a computer magazine.

PC Planet's Amazing Prices!!!

Basic PC

Memory – 4Gb

Hard Drive – 500Gb

Ultimate PC!!!

Memory – 8Gb

Hard Drive – 1000Gb

Internet Ready – YES!!!

In the expert system, the rule for the Basic PC is:

Computer   IS   Basic   IF
Memory   IS   4Gb   AND
Hard Drive IS   500Gb.

  (i) Identify the method of inferencing that has been used in the above rule. **1**

 (ii) Explain your answer to part (i). **1**

(iii) Create a rule for the Ultimate PC as described in the advert above. **3**

(7)

[Turn over

23. "HotHair" is an expert system used by hairdressers. The information from the expert system is shown in the following decision tree.
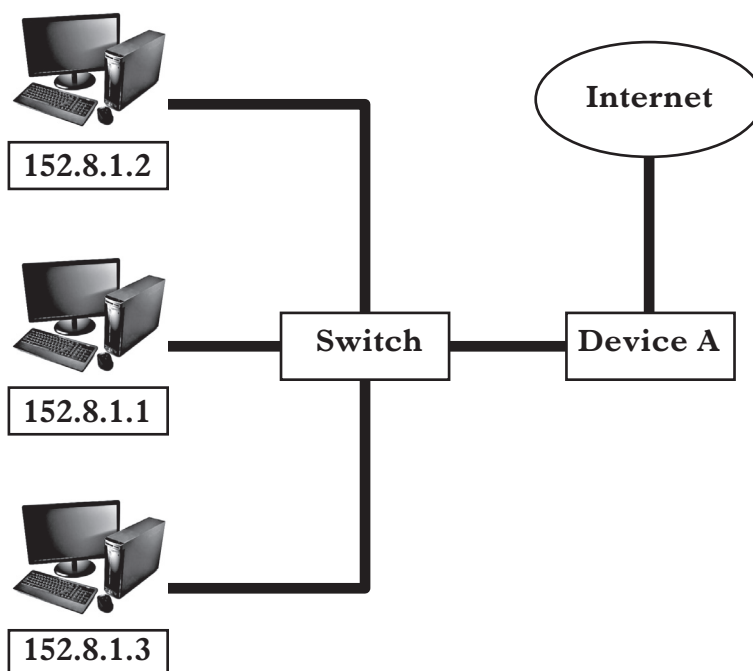

(*a*) One reason for using the HotHair expert system is to advise clients on which shampoo to buy.

Describe **two** other reasons for using HotHair. **2**

(*b*) Zach has highlights in his hair and needs to wash it every day but hates to use conditioner.

Identify the shampoo the HotHair expert system would recommend for Zach. **1**

(*c*) The HotHair expert system is going to be published on the Internet. The company are concerned about their *Information Intellectual Property Rights*.

Explain what is meant by "Information Intellectual Property Rights". **1**

(*d*) An alternative way to store this information is in the form of a database.

  (i) How many records would the database have? **1**

  (ii) How many fields would the database have? **1**

(6)

Total for Section III Part B (25)

[*END OF SECTION III—PART B—EXPERT SYSTEMS*]

SECTION III

PART C—The Internet

Attempt ALL questions in this section.

24. Multivalley is a new energy drinks company. The layout of their network is shown below.
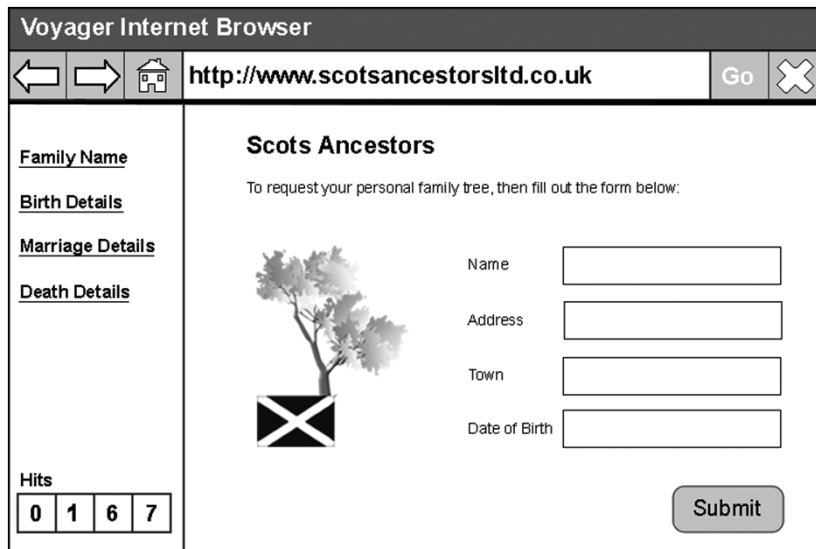

(*a*) Describe the function of a *switch*.   **1**

(*b*) Device A is used to connect the network to the Internet.

State the name of device A.   **1**

(*c*) Identify an *IP Address* from the diagram above.   **1**

(*d*) The *TCP/IP* protocols are used to transmit data across a network.

   (i) Describe the function of the TCP protocol.   **1**

   (ii) Describe the function of the IP protocol.   **1**

(*e*) The directors of Multivalley are concerned about a damaging program that an employee has downloaded. The program is deleting files from the hard drives.

Describe how Multivalley could have protected itself from this program.   **2**

   (7)

[Turn over

25. Scots Ancestors Ltd is an Internet company that helps customers trace their ancestors. The company used web authoring software to create their website making use of *icon-based* features and *web tools*.

(a) State **one** reason why "icon-based" features are easy to use. **1**

(b) The contacts page of their website is displayed using the Voyager Internet Browser.

(i) Identify **one** navigation feature present in the Voyager Internet Browser. **1**

(ii) Explain the purpose of the navigation feature you identified in part (i). **1**

(iii) The *hyperlink tool* was used in creating the Scots Ancestor Ltd contacts page.

Identify a hyperlink in the above web page. **1**

(iv) Identify **two** features of the above web page that were created using specialist *web tools*. **2**

(c) The website contains high quality graphics. *Picture compression* has been used on the graphics.

(i) Explain why "picture compression" is required. **2**

(ii) State a development in communications technology that has made picture compression less necessary. **1**

(d) The website design is subject to *Information Intellectual Property Rights*.

Explain what is meant by "Information Intellectual Property Rights". **1**

(10)

26. Help for Africa is a charity which provides technology for use in African countries.

(*a*) The charity's slogan is "Helping those who are information poor".

Explain why many parts of Africa are classed as *information poor*. **1**

(*b*) The charity is working on their latest project sending mobile phones to farmers. They create a list of farming communities in Africa that are not in mountainous regions.

State a Boolean search that could be used to create this list. **3**

(*c*) The charity publishes the following article on their website.

"*The original principle of the Internet was to allow individuals from all over the world to freely exchange information. However, we have become concerned that some governments are discussing the possibility of blocking access to certain websites. Furthermore, there is now proof that some police forces are using spyware to monitor the Internet activity of people in their country.*"

  (i) From the above article, identify an example of *censorship*. **1**

 (ii) From the above article, give an example of an issue that affects *privacy*. **1**

(*d*) The charity communicates with their workers in Africa using e-mail. E-mail uses the SMTP and POP protocols.

  (i) State the purpose of the SMTP protocol. **1**

 (ii) State the purpose of the POP protocol. **1**

(8)

Total for Section III Part C   **(25)**

[END OF SECTION III—PART C—THE INTERNET]

[END OF QUESTION PAPER]

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