SCOTTISH
QUALIFICATIONS
AUTHORITY

2003 Information Systems

Higher

Finalised Marking Instructions

1. HolidaysUK is in the process of implementing a new database system to store details of the holidays they sell through six travel agents. The company has decided to trial this new system with holidays they offer in the summer season only. The summer season runs from 1 April 2003 to 30 September 2003. The new database system has a number of requirements. These requirements are listed below.

   1. Holidays are sold by travel agents.

   2. Each travel agent has a unique 4 digit agent code.

   3. Each holiday has a unique holiday code.

   4. The same holiday can be sold by many agents.

   5. Each airport has a unique number which determines the name of the airport.

   6. All holidays cost over £90 but less than £2000.

   7. Monthly reports are required on how much revenue each agent has generated for the company.

   8. Reports are required on how much revenue all agents have generated for the company over the summer season.

   9. Reports are required on how much revenue has been generated by each holiday.

   The data has been normalised. Some sample data is shown below.

Entity	Attribute	Type	Size	Validation	Required	Key
Agent	Agent Code	Text	4	A	Yes	Unique primary key
	Agent Name	Text	25	Lookup list	Yes	
Airport	Airport No	Number	2	Lookup list	Yes	Unique primary key
	Airport Name	Text	20	Lookup list	Yes	
Holiday	Holiday Code	Text	4		Yes	Unique primary key
	Cost	Currency	Auto	>90 and <2000	Yes	
	Airport No	Number	2	Lookup from Airport entity	Yes	Foreign key
	Departure Date	Date	Auto	B	Yes	
Booking	Booking No	Number			Yes	Unique primary key
	Agent Code	Text	4	C	Yes	D
	Holiday Code	Text	4	Lookup from Airport entity	Yes	Foreign key
	Quantity	Number	4		Yes	

Travel Agent

Agent Code	Agent Name
6573	Travelwide
3492	World Wide Travel
8916	Duncans Travel

Booking

Booking No	Agent Code	Holiday Code	Quantity
356	6573	C657	10
147	6573	G584	34
138	6573	F764	13
129	8916	C657	15
276	8916	F764	20
249	3492	H611	27

Airport

Airport No	Airport Name
1	Luton
4	Glasgow
8	Edinburgh
6	Newcastle

Holiday

| Holiday Code	Cost	Airport No	Departure Date
C657	£399	8	24/06/03
G584	£299	4	15/07/03
F764	£625	1	20/08/03
H611	£350	8	16/08/03

1. (*a*) Suggest a suitable entry for each of the **four** missing values.

(*a*)   A   > = 1000 and < = 9999, ≥ 0001 and ″ 9999; 9999; xxxx;
∅∅∅∅ ; LLLL; lookup list;
restricted choice; value "list or leave blank"
Also accept "between" the two values of the range check

4

    B   > = 01/04/03 and < = 30/09/03
    C   = Lookup from Agent entity
    D   = Foreign key

1 mark for each

(*b*) In order to meet the requirements of HolidaysUK, three processes are necessary to produce the three reports (numbered 7, 8 and 9) in the requirements list.

State the **entities** involved in

(i)   producing report 7;

(ii) producing report 8;

(iii) producing report 9.

3

(*b*)   i   Report 7   Booking, Holiday and Travel Agent (optional)   **(1 mark)**
ii   Report 8   Booking, Holiday and Travel Agent (optional)   **(1 mark)**
iii Report 9   Booking and Holiday   **(1 mark)**

(*c*) Each of these reports would require a process. The same **two** entities are required for each process. State these **two** entities.

1

(*c*)   Processes   Holiday and Booking   **(1 mark)**

(*d*) Explain **two** ways in which HolidaysUK could use the information in the required reports for *control* purposes.

2

(*d*)   They could monitor the performance of each agent against set targets.
(1 mark)

They could monitor the performance of each holiday against set targets.
(1 mark)

(Must have the idea of monitoring and targets)

2. Doonbrae Bicycle Company is a business which makes and sells bicycles. At the start of the year the company estimated how many bicycles were likely to be ordered every month. To maintain a constant work force the management decided that the same number of bicycles would be built every month. Excess (unsold) bicycles would be stored for sale in later months.

Figures for 2003 are shown in the table below.

Year beginning 01/01/2003				
Month	Orders	Running Total	Production	Running Total
January	122	122	220	220
February	124	246	220	440
March	129	375	220	660
April	246	621	220	880
May	353	974	220	1100
June	365	1339	220	1320
July	367	1706	220	1540
August	237	1943	220	1760
September	181	2124	220	1980
October	86	2210	220	2200
November	75	2285	220	2420
December	350	2635	220	2640
Total 2003	2635		2640	
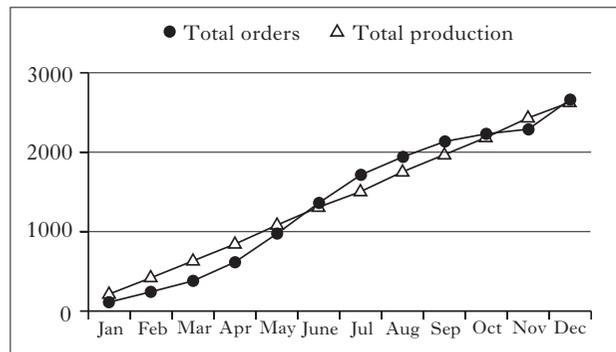
The same information about running totals for orders and running totals for production are shown in this graph.

2. (a) Define the terms *data* and *information* using examples from above to illustrate your answer.

(a)   Data is raw facts and figures eg 75
Information is data with a context eg we expect 75 bicycles to be ordered in November 2003.

2   *1 mark for each definition with example from supplied information/data.*

(b) Doonbrae Bicycle Company uses information for decision making and planning.

   (i)   Give **one** example, from above, of information which would be used for decision making. Justify your answer.

   (ii) Give **one** example, from above, of information which would be used for planning. Justify your answer.

(b)   (i)   **Decision making**. Any valid point from supplied information eg From June to October the number of cumulative orders (1339) exceeds the cumulative production (1320).
A decision will have to be made about the shortfall of bicycles in June— (turn down orders, employ more staff, work overtime.)

2

   (ii)   **Planning**. Any valid point from supplied information eg the number of bicycles produced per month is 220 this gives a total yearly production which closely matches expected orders. To maintain a constant work force the number of bicycles produced per month will have to be planned to avoid the supply problem in June.

2   **1 mark** *for each example,* **1 mark** *for each justification.*

(c) Some of the information above is *tactical* information and some is *operational* information. State the difference between tactical and operational information. Give **one** example of each of these types of information from above.

(c)   The difference between tactical and operational information is one of time scale or level of use.

Tactical information used for medium term purposes— eg to ensure total number of bikes built in the year closely matches total orders.

Operational used for short term purposes—eg how will 220 bicycles be produced per month?

3   **1 mark** *for difference or description of each* **1 mark** *for each example.*

(d) Compare the table and the graph in terms of *accuracy*.

(d)   Table is more accurate than graph as exact figures are easily seen
OR
Both are equally accurate as they represent the same information

1   **(1 mark)**

3. A Credit Reference Agency is updating its method of storing customers' bank and account details. At present it stores the bank details in one file and the customer account details in another file. Each branch of each bank is uniquely identified by its sort code. It is possible for an account number in one bank to be the same as an account number in another bank.

One example of Bank details and two examples of Customer Account details are shown below.

Bank Details

Bank Sort Code	860773
Name	HCBS
Address	1 Queen Street
Town	Glasgow
Post Code	GL67 9PR
Telephone No	0141 123 123

Customer Account Details

Customer ID	Customer Name	Address	Town	Post Code
761997	John Murray	46 Fenwick Lane	Glasgow	GL64 9YT

Account No	Bank Sort Code	Type of	Date Opened
675298	860773	Current	07/06/98
776598	860773	Postal	12/10/98
761298	839912	Internet	21/10/99
653910	860773	Savings	14/01/00

Customer ID	Customer	Address	Town	Post Code
448221	Sally Mutch	23 Grange Road	Clydebank	GL34 3KN

Account No	Bank Sort Code	Type of	Date Opened
458724	860773	Savings	12/04/99
499821	823895	Current	24/11/99
619985	839912	Internet	12/02/01

(*a*)

Bank Details	Customer Account Details
Bank Sort Code	**Customer ID**
Name	**Customer Name**
Address	**Address**
Post Code	**Town**
Telephone No	**Post Code**
Town	**Account Number**
	Bank Sort Code
	Type of Account
	Date Opened

(*a*) Identify the entities and their component data items in the existing system.

2

2 marks for 2 entities with correct attributes
*1 mark for 2 entities with **one** missing attribute*

3. (*b*) Convert the information in the Customer Account Details to first normal form.

Customer Details	Account Details
Customer ID	**Customer ID***
Customer Name	**Account Number**
Address	**Bank Sort Code***
Town	**Type of account**
Post Code	**Date Opened**

2 marks for correctly removing repeating group with correct attributes.
1 mark if Customer ID is not in Account Details.
give credit if (*b*) is correct but transferred it wrongly in (*c*).

2

(*c*) State the primary key and any foreign keys for all **three** entities (including the Bank details entity) after normalisation.

(*c*) Bank Details:　　　　primary key is Bank Sort Code
Customer Details:　　　primary key is Customer ID　　(*1 mark*)
Account Details:　　　　primary key is Customer ID (optional) + Account Number + Bank Sort Code.　　(*2 marks*)
Foreign keys are Customer ID and Bank Sort Code in Account Details entity.
(*1 mark*)

4

(*d*) Create an entity relationship diagram to show the relationships that exist between all **three** entities.

(*d*)
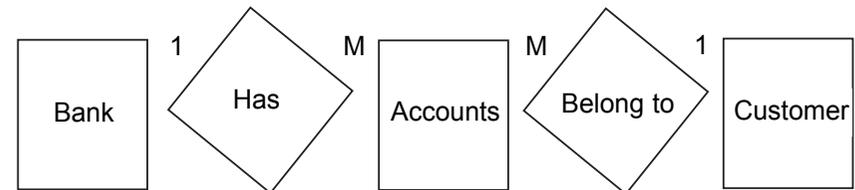
2 marks for correct diagram with two one-many relationships shown
1 mark for one correct relationship shown

2

4. Silver City Sounds is a company specialising in the sale of CDs and music DVDs by mail order and telephone. A stock of over 100 000 discs is currently held in the warehouse. The company is moving to new offices and wishes to install a networked information system. Information regarding stock level of any CD or DVD must be accessible to all members of the sales team at the same time and must be kept up-to-date on a sale-by-sale basis.

(*a*) Accessibility, timeliness and accuracy are three characteristics of information. Name **two** other characteristics of information and describe how each would be considered when the new system was being designed.

(*a*) *Presentation*—information presented to staff in such a way that finding specifics eg stock level of certain disc is easy.

Conciseness—no redundant information on screen so that required information is easily located.

Completeness—system designed so that all required "fields" or "records" are displayed.

Structured—such that navigation and searching are efficiently and effectively carried out.

(Appropriateness could perhaps have a case argued by candidates, if so, award a mark. Legality, cost and value are unlikely but if candidate makes a convincing case, award the mark.)

1 mark each for naming the two characteristics

1 mark for how each would be considered (not necessarily from above) **at the design stage**.

definition only—*1 mark*

3 must link to scenario for full marks

(*b*) Describe the information system which Silver City Sounds should install. You should give details of the:

(i) hardware;

(*b*) (i) hardware would probably consist of
  • server(s) and clients
  • network cards required
  • server with large storage capacity (backing and/or immediate)
  • Other relevant hardware feature

1 mark for two points—accept **one** expanded point

1 Do not accept LAN, Intranet, mainframe

4. (ii) search facilities;

(ii) *search*
- should be possible to search under several different criteria/fields (eg title, artist, year)
- complex searches possible
- wildcard/fuzzy searches perhaps possible.

1 mark for two points accept one expanded point

1

(iii) navigation features.

(iii) searching and navigation
- once results found should be able to navigate to a new query page.
- possibility to navigate to other related records/pages.
- Other relevant points.

1 mark for two points

A great deal of technical detail is not required—this is not a computing paper.

1

(*c*) Silver City Sounds decides to expand by advertising on the World Wide Web and accepting orders from the World Wide Web. The Web site would supply a track listing, pictures of the artist, cover art and short extracts from each track. The owner of Silver City Sounds does not wish to contravene any current legislation when providing this service.

Name **three** pieces of current legislation which should be considered in the implementation of an information system and describe how each may apply in this situation.

(*c*) Reference to each of:

Data Protection Act

Computer Misuse Act

Copyright, Design and Patents Act

An indication as to how each may (not) apply in this case. Must be relevant to scenario. If the three Acts are just named with no description award *1 mark*.

1 mark for each Act with relevant description.

2 marks for any two valid descriptions and application of how it applies to scenario.

Accept Freedom of Information Act, Health & Safety Act, Obscene Publications Act.

3

(*d*) Customers would be able to use the Web site to check the current availability of any CD and purchase the disks using credit cards.

The use of passwords is one method of keeping information secure. State **one** other method Silver City Sounds could use to keep credit card details secure.

(*d*) Idea of security—any one from firewall/encryption/password protected levels of access/PGP.

(1 mark)

1

[*END OF SECTION I*]

5. REdesign is a small company offering design and print services to the public. The company uses a number of types of application software including publishing software.

(*a*) Name **four** other types of application software that the company might use.

1

(*a*) Word processing, spreadsheet, finance, graphics, communications, database, reference *1 mark* for 4 correct.

(*b*) The company manager is considering upgrading the publishing software it uses and is evaluating a number of different software products.

(i) Name the **three** main factors affecting the choice of software.

1

(i) Compatibility, cost, functionality
1 mark for all 3

(ii) The manager selects a particular product and notices that there are **minimum** and **recommended** system requirements for the software.

State **two** implications for the users of the software of choosing to install the software on a computer system meeting only the minimum requirements.

(ii) The manager selects a particular product and notices that there are **minimum** and **recommended** system requirements for the software.

State **two** implications for the users of the software of choosing to install the software on a computer system meeting the minimum requirements.

Software may not operate efficiently.

May still need the CD in the drive for some tasks.

May run out of hard disc space. (accept just space)

Any suitable alternative.

2

1 mark for each.

5.

(iii) When the manager installs the software he is given the choice of a "typical", "complete" or "custom" installation.

State **two** customisations that the manager should be able to make during a custom installation. **2**

(iv) The users of the new software make extensive use of electronic help facilities.

State **three** types of electronic help facility and give an example of a situation when each would be best used.

3

(iii) To only install some components of the software.
Not install online help
Not install training tutorials
Any suitable alternative
1 mark for each

(iv) *On-line help*—used on a daily basis when some problem arises

Wizards—used for cutting down on the time taken to create a document by using predefined layouts and formats.

Computer based training material—Online tutorial/Tutorial CD/Internet training—used when first learning to use the package

1 mark for each type and appropriate example that demonstrates understanding of the type. *1 mark* for all 3 types with no examples.

5. (*c*) The company regularly receives promotional literature for new software products. This literature gives details of the features of the new products. Some of the features of the products are described as "intelligent".

Describe **one** feature in **one** of the types of application software you identified in part (*a*) that could be classed as intelligent.   **1**

(*c*) A help system that anticipates what the user is about to do and suggests how to do it. Speech to text. Do not accept auto complete or auto save.

1 mark for any suitable example.

Accept autocomplete provided a detailed explanation is given

Accept context sensitive help.

6. Carol is a lecturer in history at a local college. At her yearly meeting with her manager she is advised to increase her ICT skills as part of her professional development.

(*a*) Carol decided to sell her home computer system and buy a new one. Carol wants to transfer all the software from her old computer system to the new one. Discuss the legal implications of this.

3

(*a*) Commercially purchased software needing to be deleted from the old system so that she can install in new system (**1 mark**).

Candidates then need to show some understanding of the legal position of shareware and freeware for the remaining two marks.

(*b*) A software package that Carol uses provides two methods of creating macros. These are:

• recording a sequence of actions;

• using a built-in scripting language.

(i) State a type of user each method is intended for and justify your answer.

2

(*b*) (i) *Recording*—used by a beginner or average user because it is easy to use and no coding skills are required .
Scripting—used by the competent user because it allows flexibility and the ability to do more powerful tasks
1 mark *for each user and reason.*

(ii) A possible use of a macro is to reformat paragraphs by changing margins, line spacing and font style, so that the paragraph appears as an extract from a newspaper article. Give **two** advantages of using a macro to perform this task.

1

(ii) *Repeatability*—the effect will be the same each time

Speed—the user will be able to work more quickly

Novice users can use the macro without having to know the various things it does.

1 mark *for both reasons*

(*c*) Creating a macro is one way of customising software once it has been installed. State **two** further ways of customising installed software. For **each** of these ways give **one** benefit to the user of the software.

2

(*c*) • Customising toolbar to include common commands enhances ease of use to the user.

• Programming the keyboard with common text or short cuts allows the user to improve productivity

• Changing colours can benefit the user by reflecting his or her personal preferences

• Others could include customisation of menus, editing such as autotext, viewing the page at different sizes, formatting paragraph style, etc.

• If template is given as an answer it must refer to default settings in order to gain the mark.

1 mark *for each feature and benefit—maximum two features and benefits*
1 mark *for two benefits—1 mark for 2 features*

6. (*d*) Carol's new computer comes with a free personal digital assistant (PDA). The PDA has a word processing package already installed. Due to the small amount of memory and size of the screen of the PDA, some of the features of the word processing package may not be present. State **two** of these missing features and justify your answer.

2

(*d*) line margins—small screen

spellchecker, grammar check, colours of fonts—small memory

1 mark for each feature and justification—1 for referring to memory and 1 for screen size—maximum 2 marks

OK if candidates answer in general terms eg automation and proofing.

Accept any formatting/proofing or layout feature

Part A—Computer Application Software (continued)

7.

The sales representatives of a pharmaceutical company use a laptop computer and a spreadsheet to provide detailed costs to their customers.

The unique item codes, item costs and the formulae for calculating discounts and totals are already entered. Sales representatives simply have to enter the number of items in Column C, and the various calculations are done automatically. A sample of the spreadsheet is shown below.

	A	B	C	D	E	F	G	H	I	J
1										
2		Item code	Quantity ordered	Cost per item	Discount code	Discount rate	Cost after discount	Total cost of item		
3		A100S230		£15.90				£0.00		
4		A100S231	35	£10.50	D	10%	£9.45	£330.75		
5		A100S232		£20.75				£0.00		
6		A100S233	15	£5.90				£88.50		
7		A200T420	5	£18.60				£93.00		
8		A200T421		£1.50				£0.00		
9		A200T423	2	£8.00				£16.00		
341		V100S230	20	£15.75	D	10%	£14.18	£283.50		
342		V100S231	15	£12.50				£187.50		
343		V100S232		£20.75				£0.00		
344		V100S233	12	£4.80				£57.60		
345		V200T420	25	£18.60	D	10%	£16.74	£418.50		
346		V200T421		£1.50				£0.00		
347		V200T423	5	£18.00				£90.00		
348										
349		Totals	285					£4,835.00		
350										

(*a*) If a buyer orders 20 or more of one item they get a 10% discount on the cost of that item. This is indicated by the letter "**D**" for a discount in Column E of the spreadsheet. Design a formula for cell G3 to show the discounted cost of an item, depending on the value in cell E3.

1

(*a*) If (E3 = "D"; D3 * 0·9 ; D3) **OR** If (E3 = "D"; D3 − (D3 * F3); D3)
1 mark for correct formula–the formula must contain "if"
if + condition + then = 1 mark
exact syntax is not important to get the mark

7. (*b*) Buyers get a 10% discount on the cost of **every** item if the total amount of units ordered is 300 or more. Only one of the discount options can be given to an item. Describe a formula for cell E3, so that a **D** is entered if a discount should be applied.

(*b*) **1 mark** *for some indication of* **'OR'** *and* **1 mark** *for description of a workable formula.*
actual answer is: if (or (C 3 > = 20, C 349 > = 300), "D", "D", "")
If + *or* = **1 mark**
2 conditions = **1 mark**

2

(*c*) Describe **two** ways of ensuring the data in the spreadsheet is secure and well managed.

(*c*) Specific cells in the spreadsheet can be locked eg price of each item, the code of the item.
There could be a password added to each spreadsheet or to the laptop.
The sales representative should make regular backups of the data.
The sales representative could have a different folder for each of his customers.
1 mark *for each*

2

(*d*) When the sales representative was using the spreadsheet package he found that several of the options on the menus were unable to be used and were greyed out. Give **two** examples of options that may not be available to the sales representative and explain your answers.

(*d*) The Cut and Copy options will be greyed out if the user has not highlighted or selected text, table or picture first.
The Paste option will be greyed out if the user has not cut or copied first.
The Print option may be greyed out because there is no printer attached.
1 mark *for appropriate example with* **1 mark** *for explanation.*

2

(*e*) The final spreadsheet design had over 300 item codes and prices entered. The sales team found that much of their time was spent scrolling through all the items to find the ones required by the buyer. They also pointed out that since buyers seldom bought more than 10 different items at a time there was no need to have all the item costs listed in the spreadsheet. The sales team would rather type the item and the number of items ordered and have the rest of the information appear **automatically**. In this way, the whole order could be seen on the screen at once.

This could be achieved by using the advanced features of the spreadsheet or by using a database package.

Describe how this could be done in both a spreadsheet and a database package.

[*END OF SECTION II—PART A*]

(*e*) In the spreadsheet the codes and base prices could be held in a large off screen table, code and quantity could be entered into columns B and C, lookup entry in column D would retrieve cost from table.
In the database lookup tables will be used.
3 marks *for description*

Alternatively

Spreadsheet
- referral to another table/area/sheet
- macro/if statement/lookup/formula to connect to the table

Database
- linked or related table
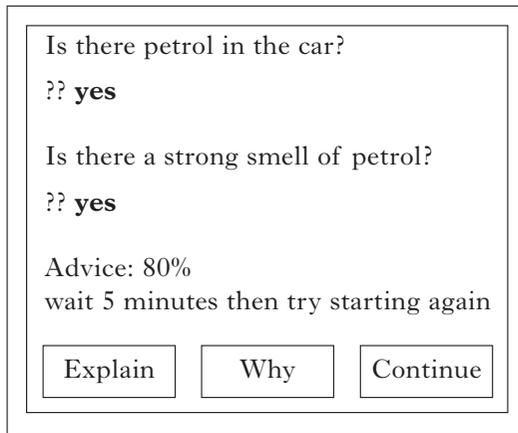- Subforms/portals/calculated fields
- Macro is okay for both

Any three bullets, but must have at least one from spreadsheet or database to gain full marks

3

8.

Part B—Expert Systems

Attempt ALL questions in this part.

The diagram below represents a screen from an expert system used to help diagnose faults in motor vehicles. Text generated by the expert system is shown in normal style and user responses in bold style.

Is there petrol in the car?

?? **yes**

Is there a strong smell of petrol?

?? **yes**

Advice: 80%
wait 5 minutes then try starting again

| Explain | Why | Continue |

(*a*) Expert systems are made up of three components.

    (i)   State which component generated the questions and advice shown on the screen and justify your answer.

    1

    (ii)   State which component was responsible for displaying the text on the screen and justify your answer.

    1

    (iii)   State which component would be altered when additional knowledge is added to the expert system and justify your answer.

    1

(*a*)   (i)   Interference engine **(1 mark)**

        Justification—auto questioning, order of rules/tries to establish truth of rules

    (ii)   User Interface   **(1 mark)**

        Justification—interacts with the user

    (iii)   Knowledge Base   **(1 mark)**

        Justification—facts and knowledge

        (if 3 components listed with no justification then award **(1 mark)**

8.

(*b*) The advice given by the expert system includes the figure 80%. Explain why the advice includes this figure and what it represents in this case.

2

(*b*) *Certainty Factor* **(1 mark)**
Used to express the degree of confidence that the advice
wait five minutes then try starting again is correct **(1 mark)**

(*c*) The boxes labelled *Explain*, *Why* and *Continue* represent clickable buttons. Explain the reasons for including each of these buttons on the output screen.

(*c*) *Explain*—Used for how justification ie how the expert system arrived at the advice.

OR

Shows which rules and answers were followed to determine advice. **(1 mark)**

Why—Used for Why justification ie why the system is asking a particular question.

OR

May show the hypothesis being tested and how answer will affect this. **(1 mark)**

Continue–There may be more than one piece of advice given, possibly with different certainty factors. **(1 mark)**

3

(*d*) Diagnosis systems and advice systems are two categories of expert system. Name **one** other category of expert system and give **one** example of a possible use of this category of expert system. Suggest why your chosen domain is suitable for representation in an expert system.

2

(*d*) *Plan*—eg route planning software
Suitable since it is a limited domain with a limited number of alternatives
Classify—eg plant identifier
Limited domain, each species has unique identifying characteristics.
Any suitable answer as to why domain is suitable.
1 mark *for each of 2 above*

9.   **Part B—Expert Systems (continued)**

Acme Artefacts is a large commercial organisation. A management restructuring exercise is being carried out in which all posts are to be regraded. Employees are interviewed and their responses to a series of questions regarding their present job entered into an expert system. This expert system then decides upon a suitable job grade for that employee.

(*a*) State **three** reasons why the company would use an expert system for this task.

(*a*) Expert system may combine knowledge of several experts.

Expert system will be impartial/show no bias to individuals.

Expert system may be trusted more by employees/employers than human.

Expert system can justify decision.

Expert system readily available when needed.

Once developed may be cheaper than employing consultant/expert.

Any other appropriate answer

3 *Any three of the above for **1 mark** each*

(*b*) Pat works as an area accounts manager in the sales office. After her interview the expert system graded her as "Manager Grade 4" with a salary of £34 500. Pat discovers that all other area accounts managers have been regraded as "Manager Grade 3" with salary of £30 800.

State **three** possible reasons why Pat was regraded differently from the other area account managers.

(*b*) Pat's job may have slight differences from others

Pat supplied incorrect information to system

Incorrect knowledge was coded into knowledge base

Knowledge base was incorrectly coded

Interviewer entered responses incorrectly

Any other appropriate answer

3 *Any three of above for **1 mark** each*

(*c*) After one of the interviews, a manager of Acme Artefacts finds a diary on the office floor. The manager opens the diary and finds out who it belongs to. Inside the diary are the name of the employee, an e-mail user name and password and the e-mail address of a competitor firm. The manager uses the user name and password and discovers that the employee has been e-mailing confidential information to the competing firm. As a result of the manager's actions the employee is sacked.

Discuss the ethical and legal implications of information technology with reference to the above paragraph.

(*c*) Candidates are unlikely to present a reasoned, balanced discussion. Award 2 marks for 2 valid points in each of ethical and legal implications.

Ethical and legal answers may overlap and it may be difficult to separate these.

(4 marks)

Legal has to relate to IT—ethical doesn't

Legal—passing on information/using username & password

4 sensible points. Could be 3 ethical 1 legal

1 legal 3 ethical

2 ethical 2 legal
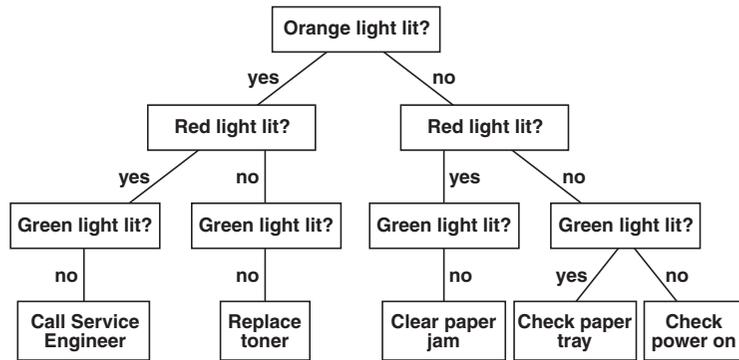
4

10.　　　　　　　**Part B—Expert Systems (continued)**

A printer has three status lights (red, orange, green) which can be used to help diagnose problems with the printer.

 The printer manual includes the following trouble shooting guide.

```
                        Orange light lit?
                   yes/              \no
              Red light lit?        Red light lit?
           yes/        \no        yes/        \no
    Green light lit?  Green light lit?  Green light lit?  Green light lit?
         |no              |no              |no          yes/      \no
    Call Service     Replace          Clear paper   Check paper   Check
    Engineer         toner            jam           tray          power on
```

The manufacturer intends replacing this trouble-shooting guide by a small expert system. Two of the rules have been written below.

　　　　IF orange light lit AND
　　　　NOT red light lit AND
　　　　NOT green light lit
　　　　THEN replace toner.

　　　　IF NOT orange light lit AND
　　　　Red light lit AND
　　　　NOT green light lit
　　　　THEN clear paper jam.

10.

(*a*) Write the rules required to produce the other **three** outcomes.

(*a*)   A IF orange light lit AND
Red light lit AND
NOT green light lit
Then call service engineer.

B IF NOT orange light lit AND
NOT red light lit AND
green light lit
THEN check paper tray.

C IF NOT orange light lit AND
NOT red light lit AND
NOT green light lit
THEN check power on.

All A, B and C correct—**4 marks**
B and C OR A and B OR A and C correct—**3 marks**
B OR C correct—**2 marks**

4

A correct **1 mark**

(*b*) The two main methods of inferencing used in expert systems that use production rules are *backward chaining* and *forward chaining*.

(i) Describe the difference between these methods of inferencing.

(*b*) (i) *Backward chaining*—start with hypothesis and work backwards seeking evidence to support hypothesis.   **1 mark**

Forward chaining—starts with proven facts and draws conclusions from these facts.   **1 mark**

2

(ii) State which method is demonstrated in the example above.

1

(ii) Forward chaining. **1 mark**

10. (*c*) An employee suggested that the information could be stored in a database rather than in an expert system. When testing the database system it was found that a user could, in error, enter combinations of lights which could not occur.

(i) State **two** of these combinations.

(i)

Orange	Red	Green
On	On	On
On	Off	On
Off	On	On

2

Any two possible combinations. **1 mark** *each*

(ii) Give **one** reason why this error could not occur when using the expert system.

1

(ii)   rules only exist for possible combinations of lights   **1 mark**

11.

Part C—Hypermedia

Attempt ALL questions in this part.

One of the major hotels in the island resort of Seascape has just set-up a hypermedia system in the form of an interactive kiosk to promote the tourist attractions in the resort. The Jamieson family decides to book a holiday at this hotel. To find out as much information as possible about the hotel, Mr Jamieson accessed the hotel Web site prior to booking the holiday. When they arrive, their children, Rachel and Mark, make use of the interactive kiosk to find information about the resort and the hotel.

First menu screen

Interactive kiosk

(*a*) Describe **two** benefits of this interactive kiosk to the guests in the hotel.

(*a*) • Provides the visitors with a greater degree of involvement in looking for places of interest.
 • Provides detailed information on tourist attractions.
 • Presents information in a variety of different ways eg photographs, video, sound commentaries.
 • Allows the user to search for specific information using predefined choices if no keyboard present with system.
 • Allows the user to follow a trail of items related to the topic or place of interest.
 • Any other suitable answer
 (any 2 bullet points for *2 marks*)
 (Must be benefits—not uses)

2

11. (*b*) The first menu screen is illustrated above. State the most suitable input device for this system. Justify your answer.

2

(*b*) Touch screen **(1 mark)**

Very simplistic interface which can be easily used by a wide range of people from young children to the elderly (Don't accept easy to use)

OR

Large buttons will ensure users cannot possibly go wrong with their use of the system **(1 mark)** Accept tamper resistant.

(*c*) By selecting the Activities option on the first menu screen, Rachel is presented with the screen shown below which gives her a list of the activities that are on that day.

Comment on the *timeliness* and *value* of the information that will be presented to Rachel.

2

(*c*) Information will have to be timely (input before 8 am every morning) so that Rachel can see which activities are on that day and what time each activity starts. **(1 mark)**

The information will be of value to Rachel as she can plan her day by deciding in which activities she would like to participate. **(1 mark)**

(*d*) Describe the structure of information in this interactive kiosk.

2

(*d*) The structure is hierarchical with each selection leading to further choices or menus with the option of returning back to the previous screen or to the main menu at any time. **(2 marks)**

Accept picture/diagram—also linking/anchors—don't accept navigation (back/home)

(*e*) The Jamieson family makes use of **two** information systems. Describe the use of these **two** information systems in terms of *operational* and *tactical* information.

2

(*e*) The Jamieson family used the Web Site prior to booking the holiday to acquire all the necessary information about the hotel, facilities available, etc which would be tactical information. **(1 mark)**

Rachel and Mark use the interactive kiosk once they have arrived at the hotel to gain further or additional information to plan their days. This would be operational information. **(1 mark)**

12. **Part C—Hypermedia (continued)**

In any hypertext system, there must be a method of referring to items within an individual component.

(*a*) With reference to the Dexter Model, name this method and describe the way in which it does this.

(*a*) The method is anchoring or the use of anchors **(1 mark)**. The Dexter Model uses anchoring to communicate or interface between the within-component layer and the storage layer **OR** links can be made between specific items of information within components as well as between components themselves. **(1 mark)**

2

Accept anchor ID and anchor value explanation

(*b*) In the Dexter model, an interface links the storage layer with the run-time layer.

(*b*)

(i) What is the name of this interface?

1

(i) Presentation Specifications layer **(1 mark)**

(ii) Describe the purpose of this interface using a suitable example to illustrate your answer.

(ii) The purpose of this layer is to allow information about how a component is to be presented to the user. **(1 mark)**

An example of this would be where an animation component can be reached via two different links: if it is accessed via a student's link it appears as a running animation, but if accessed via the teacher's link it appears in editing mode, ready to be amended.

OR any similar example where the same component can be viewed in different formats. **(1 mark)**

Anchoring is possibility for part (ii).

2

Should not be penalised for not knowing (i)

12. **Part C—Hypermedia (continued)**

(*c*) The hypermedia system illustrated below is based on the Amsterdam Model. The user has selected the link for shopping and is presented with the shopping screen. When the user selects "Play", a video of the shopping mall begins along with a spoken commentary.

(i) Explain how this system is able to play the video along with a commentary at the same time.

2

(i) It uses a synchronisation arc (optional) **(1 mark)** to synchronise components by passing details of synchronisation to the run-time system **(1 mark)**.

Accept coarse–grained synchronisation explanation

(ii) State what would happen if the user clicked on "Outlet Malls" while the video and the commentary were still running.

1

(ii) The commentary and the video would stop and a new screen showing the outlet malls would appear. **(1 mark)**

(iii) Explain how this system is able to provide a choice of two commentaries, one in English and the other in French.

2

(iii) Channels **(1 mark)** can be regarded as abstract output devices for playing the contents of a component. **(1 mark)**

13.   **Part C—Hypermedia (continued)**

(*a*)   In the World Wide Web model, pages consist of three basic data structures—nodes, links and anchors. Links are unidirectional.

    (i)   Describe **two** problems that unidirectional links could present for hypermedia developers.

               2

    (ii) State **two** ways in which an anchor can be identified within a node in a hypermedia system.

               1

(*b*)   When working their way through a hypertext system, different users follow different strategies for navigation. Describe **two** of these strategies.

               2

(*c*)   When accessing a World Wide Web page, a user finds that not all of the media types can be accessed. Suggest a reason for this problem and a possible solution.

               2

(i)   • Difficult to maintain documents as there is no way of finding all the documents that point on a certain document given only the destination document.
- Dangling links can result from moving nodes from one place to another as the physical location of documents is hidden in URLs.
- There is no way of informing all links of the change in the destination address.

(*Two bullets for **2 marks***)

(ii)   Anchors are often highlighted by
- Colour or
- Boldface or
- Underlining or roll over or where cursor changes

(*Two bullets for **1 mark***)

(*b*)   **Breadth-first navigation**

Prudent users explore the neighbourhood of the node before moving further away. **(1 mark)**

Depth-first navigation

Daring users jump straight into hypertext, moving further and further away by following links forwards and only backing out when they reach a node with no outgoing links. **(1 mark)**

(*c*)   **Problem**

The browser does not have the capability **OR** the browser does not recognise these file types. **(1 mark)**

Solution

Update browser

Install plug-in software

Download appropriate application software **(1 mark)**

13. **Part C—Hypermedia (continued)**

(*d*) DVDWorld offers the sale of their DVD movies over the World Wide Web. The system they use for this is a hypermedia system and a relational database.

Explain how these **two** technologies (hypermedia and relational database) are used to provide this service.

(*d*) All the data from the customer order would be held in a relational database. For example, there would be an entity containing the customer details, entity containing the details of the order and an entity containing details of the transaction with information such as credit card number, etc.
(*Candidates must refer to structure of a relational database storing data in separate entities for **2 marks**)

The front end of the database would consist of a hypermedia system in the form of a web page to provide a familiar user interface. This interface will make it very easy to follow the on-line instructions on how to purchase the product.
(*Candidates must refer user-friendly interface for **1 mark**)

Alternatively

[END OF SECTION II—PART C]

- structures of relational database **1 mark**

- Front end—form to relate the two technologies
- Front end—easy to follow instructions
- Front end—additional links to video clips
  *Any two of these bullets for **2 marks***

3

[END OF MARKING INSTRUCTIONS]