

# X216/201

NATIONAL  
QUALIFICATIONS  
2007

THURSDAY, 24 MAY  
9.00 AM – 10.30 AM

INFORMATION  
SYSTEMS  
INTERMEDIATE 2

Attempt Sections 1 and 2 and **one part** of Section 3.

Sections 1 and 2 — Attempt all questions within these sections.

Section 3 — This section has three parts:

Part A—Applied Multimedia

Part B—Expert Systems

Part C—The Internet

Choose **one** part of this section and attempt all of the questions within that part.

Read all questions carefully.

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

Write as neatly as possible.



## SECTION 1

*Marks*

**Attempt all questions in this section.**

1. What is an entity in a relational database? 1
  
2. A database has a field of type *link*.  
Give an example of what might be found in this type of field. 1
  
3. A car showroom keeps information about vehicles it has to sell in a database. Part of the database has been sorted as shown below.

Make	Model	Year of Registration	Mileage
Renoir	Chloe	2001	37564
Pursio	205	2001	36542
Jokeswagon	Tennis	2001	35004
Renoir	Magritte	2002	45089
Renoir	Chloe	2002	24659
Missan	Nicra	2004	15487

- Describe how the list has been sorted. 2
- 
4. An employee is entering data into a database but misses out one of the fields. As a consequence this message appears on the screen: “The field called ‘reference number’ cannot be left empty. A value must be typed into this field”.  
Explain why this message appeared. 1
  
  5. A company rents out cottages to holidaymakers. The list of cottages is updated regularly. For each booking the total cost is calculated and is printed in alphabetical order.

Name	Location	Rental Price	Weeks booked	Total Cost
Forrest View	Woodtown	£350	1	£350
Seaview Cottage	Brightpool	£450	2	£900
Shore Cottage	Blackon	£400	2	£800
TreeTops	Woodtown	£300	3	£900

You are asked to create the list using either word processing or spreadsheet software.

Which application type is more suitable for this job?

Justify your choice.

2

6. State **one** action an employer could take to reduce the risk of repetitive strain injury (RSI) for employees. 1
7. (a) What is meant by *information intellectual property rights*? 1  
 (b) Why is it important to safeguard such rights? 1
8. A hacker illegally accesses a bank computer system and transfers money out of some accounts. Which Act does this breach? 1
9. A travel agency closes its High Street shops and sells its holidays via its website.  
 (a) State **one** economic implication of this for the company. 1  
 (b) State **one** economic implication for employees. 1
10. Shoppers are asked to register on a website before purchasing goods. Here is part of the data input form used to gather information about each shopper.

Forename _____ Surname _____  Tick box if you wish to be added to our mailing list <input type="checkbox"/>  Date of Birth <input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/> / <input type="text"/> <input type="text"/>
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Suggest the most suitable data type for the following fields.

- (a) Mailing list 1  
 (b) Date of Birth 1

**Total for Section 1 (15)**

[END OF SECTION 1]

**[Turn over**

## SECTION 2

**Attempt all questions in this section.**

- 11.** The *efficiency* of an Information System is determined by the *speed*, *accuracy* and *volume* of the data that is processed.
- (a) What is meant by “volume” of information? 1
  - (b) Describe the role of a *knowledge worker*. 2
  - (c) State **one** example of a “knowledge worker”. 1
- (4)**
- 12.** An estate agency buys and sells property. It has a website to advertise the properties and networked computers in its main office to manage its information system. The network is connected to a centralised database.
- (a) What type of applications software should be used to
    - (i) create the website? 1
    - (ii) view the website? 1
  - (b) The estate agency has put in place a *network strategy* and a *security strategy*.
    - (i) State **two** reasons why the estate agency needs to have a “security strategy”. 2
    - (ii) State **two** other strategies that the estate agency would be advised to put in place. 2
  - (c) The data is held on one central computer. State **three** advantages of having a centralised database. 3
- (9)**
- 13.** (a) Explain **two** benefits of an electronic database compared with a manual database. 2
- (b) Explain what is meant by the term *data modelling*. 2
- (c) What is meant by a single valued field? 1
- It is very common to find duplication of data in a flat file database. This can lead to data becoming inconsistent.
- (d) (i) What type of database should be used to reduce duplication of data and inconsistency? 1
  - (ii) State **one** way in which it reduces duplication. 1
- (7)**

14. The table below shows an extract from a flat file database about sports.

Instructor and Class

Instructor ID	Instructor Name	ClassCode	SportClass	Level	CostPerclass
JS72	John Smith	JAV1	Javelin	1	£32
		SP1	Sprint	1	£32
		HD1	Hurdles	1	£34
MH82	Mary Hughes	LJ1	Long Jump	1	£28
		SP2	Sprint	2	£25
		TJ1	Triple Jump	1	£25
JG92	John Grant	HD2	Hurdles	2	£38
		JAV2	Javelin	2	£38
		HJ1	High Jump	1	£38

- (a) (i) Normalise the above table by removing the multi-valued fields, and show how it would be represented in two tables. Identify the Primary keys and Foreign key in the new tables. 7
- (ii) State the purpose of a *key* in a table. 1
- (b) State what the relationship is between the tables. 2

**(10)**

**Total for Section 2 (30)**

[END OF SECTION 2]

**[Turn over**

### SECTION 3

Marks

#### PART A—Applied Multimedia

15. A local museum plans to provide an electronic public information point. It will provide information about the museum and its displays.
- (a) (i) Recommend an appropriate delivery medium for the museum to use in this situation. 1
  - (ii) State **two** reasons why this could be the preferred choice of delivery by the museum. 2
  - (b) What input device would be most suitable for members of the public to use to access the information about the museum? 1
  - (c) The company constructing the multimedia application have to take account of more than the delivery media.  
State **two** other aspects that make up the analysis stage of development and state a reason for the inclusion of **each** aspect. 4
  - (d) The application includes audio files. Describe **two** methods by which the size of the files could be reduced. 2
- (10)
16. A business multimedia application allows users to navigate from any screen directly to any other screen.
- (a) Which type of navigation structure would be most appropriate for this application? 1
- Part of the application allows users to enter their personal details to be sent further information about products.
- (b) Which piece of legislation protects users' details submitted in this way? 1
  - (c) (i) Which type of user interface should the designer use to allow submission of users' details? 1
  - (ii) Give a reason for your answer. 1
  - (d) State **two** techniques that can be used to navigate through a multimedia application. 2
  - (e) The text in the application included a number of *lists*. State **two** other means by which text may be clearly displayed. 2
- (8)

17. A company is producing a multimedia application for children. They wish to include cartoon characters from popular TV shows.

- (a) The graphic designer is worried about the inclusion of these characters.

Explain why she should be worried about including these characters. 1

- (b) Some illustrations will be cartoon drawings and others will be full colour photographs. All the illustrations will require editing and manipulating. The designer has graphics software that can create *bitmapped* or *vector* graphics.

Which type of graphics software should be used for

(i) the cartoon drawings? 1

(ii) the full colour photographs? 1

- (c) The application includes over 1,500 photographs. The graphic designer has been instructed to reduce the overall storage requirements for these photographs. Describe **two** methods by which this could be done. 2

- (d) Once the application has been completed, extensive testing is carried out. Explain the purpose of:

(i) screen tests; 1

(ii) navigation tests. 1

(7)

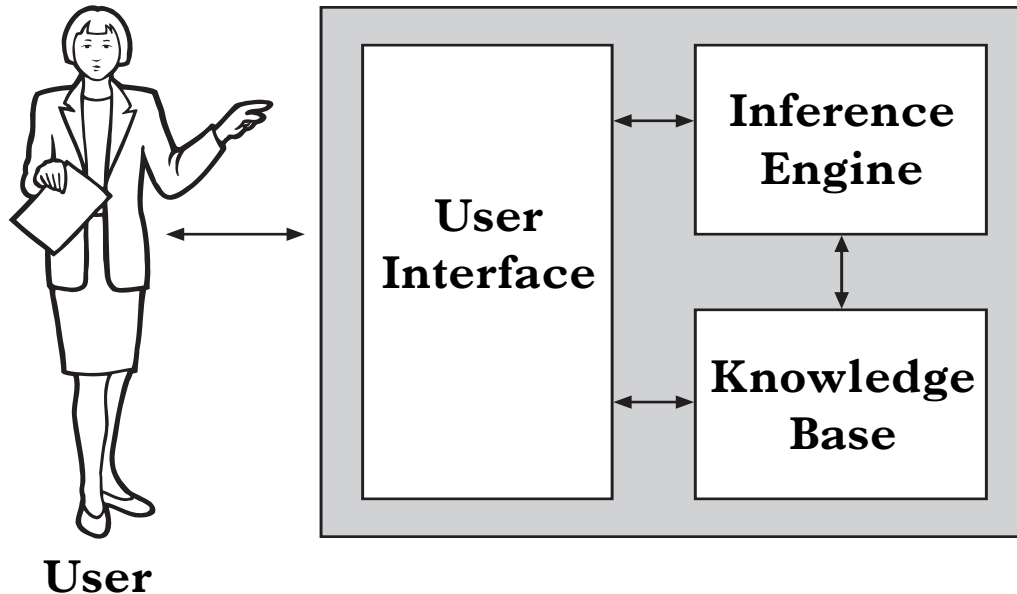
**Total for Section 3 Part A (25)**

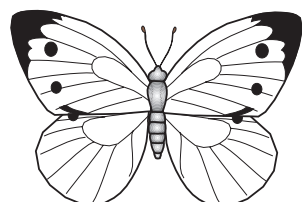
[END OF SECTION 3—PART A]

[Turn over

## PART B—Expert Systems

18. The diagram below shows how a user interacts with an expert system.

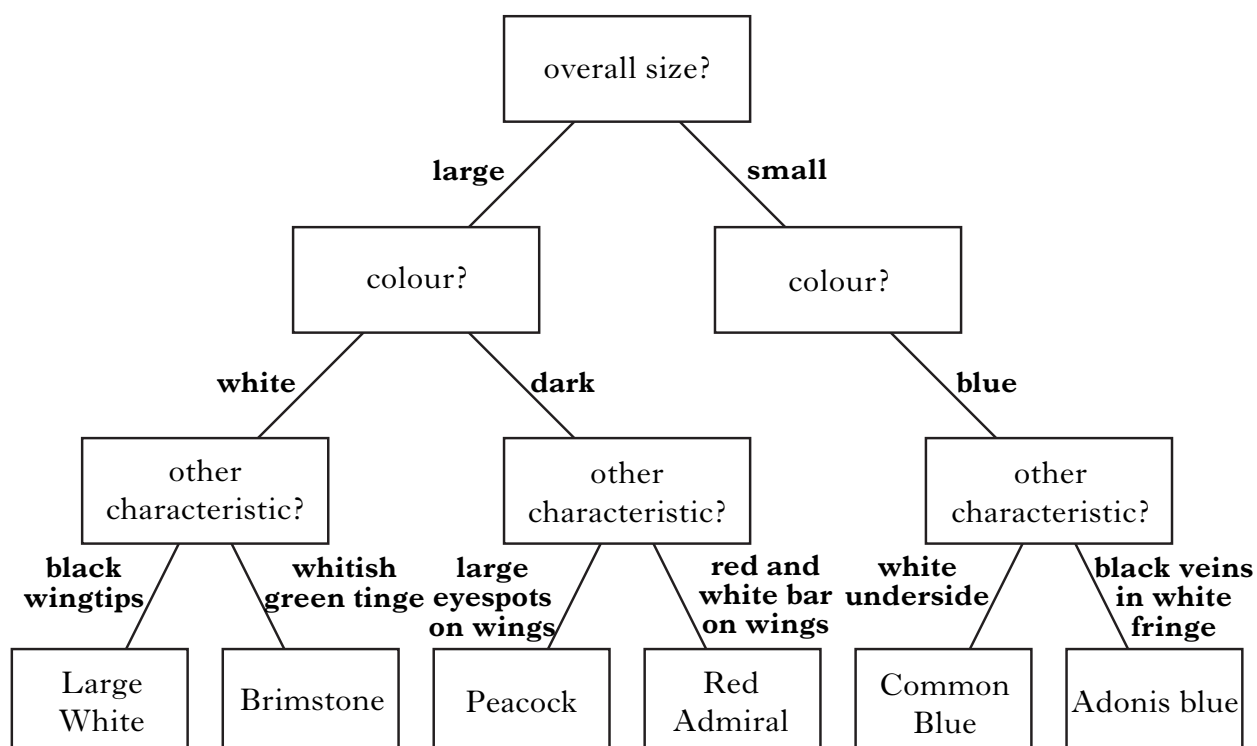


- (a) State **one** purpose of an expert system. 1
- (b) Describe the main features of the following components:
- (i) Knowledge Base 1
- (ii) Inference Engine 1
- (c) The User Interface is used to display questions to the user and obtain answers. It is also used to display advice and justification.
- Describe **two** features used to evaluate the quality of the user interface. 2
- (d) Describe **two** justification facilities which would be available in an expert system. 2
- (7)
19. A nature reserve currently provides information sheets to visitors to help them identify butterflies they can see around the nature reserve.
- An expert system is being introduced into the visitor centre to replace the information sheets.
- (a) What category of expert system would the nature reserve use to identify the butterflies? 1
- 
- Many people are involved in developing the expert system for the nature reserve.
- (b) Explain the roles of the following personnel in this situation:
- (i) domain expert 1
- (ii) knowledge engineer 1



## 19. (continued)

(c) Part of the knowledge is represented in a decision tree.



This is used to write the following production rule.

IF overall size IS large  
 AND colour IS white  
 AND other characteristic IS black wingtips  
 THEN butterfly type IS large white

- (i) Design production rules for **two** other types of butterflies using the information in the decision tree. 4
- (ii) Identify the method of *inferencing* that has been used in the rule above. 1
- (d) The final stage of developing the expert system is *system validation*. Describe **one** technique used to carry out “system validation”. 1

(9)

[Turn over

20. A printer manufacturer wants to develop an expert system to use on their helpdesk to determine the nature of problems with ink jet printers. Here is some of the knowledge to be included in the system.

“Each printer has two lights—a red one and an amber one. If the red light is flashing and the amber light is off then the problem is the paper is jammed. When the red light is on and the amber light is off then the paper tray is completely empty and must be refilled. The amber light flashes to indicate the ink cartridge is low, while an empty ink cartridge is indicated by the amber light on. In both these cases, the red light is off. If both the red light and amber light are on, then the service engineer needs to be called to attend to the problem.”

Represent the knowledge about the printer problems as a factor table.

(5)

21. Here is a table showing information about snowboards.

Shape	Flexibility	Size	Type of Snowboard
Directional	Soft	Narrow	Freerider
Directional Twin	Very Soft	Wide	Freestyle
Directional	Stiff	Very Narrow	Racing

The information could be put into an expert system or into a database.

- (a) How many records would be in the database?
- (b) How many rules would be in the expert system?
- (c) How many fields would make up each record in the database?
- (d) How many conditions would each rule have in the expert system?

(4)

**Total for Section 3 Part B (25)**

[END OF SECTION 3—PART B]

## SECTION 3

## PART C—The Internet

22. A family are planning a weekend break and wish to book a hotel room on-line. Their favourite hotel chain is called the Valiant Group which owns hundreds of hotels throughout the UK and abroad. Each hotel has different facilities.
- (a) They use an Internet search engine to find a Valiant hotel with a swimming pool, anywhere except London. Write down a Boolean search that would produce the required results. 3
  - (b) When they make their reservation with the hotel their details are stored in a database and they receive a booking reference number.
    - (i) What piece of legislation protects information stored in this way? 1
    - (ii) Why is the booking reference number required? 1
  - (c) They wish to download a file containing a map showing directions to the hotel. Which protocol will they use? 1
  - (d) They notice that their browser is showing the *IP address* of the server containing the file. What is an “IP address”? 1
  - (e) Communication takes place between the family and the hotel by e-mail. Name the protocols used for:
    - (i) sending e-mails; 1
    - (ii) receiving e-mails. 1(9)
23. A multinational company is holding a conference at one of the Valiant hotels.
- (a) Some people attending the conference have laptop computers but all of the attendees need to access the Internet. Name **one** other portable device they might use to access the Internet. 1
  - (b) The attendees communicate with each other using *newsgroups* and *chat*. Describe the difference in communication method between “newsgroups” and “chat”. 2
  - (c) On the second day of the conference, a group of attendees intends to participate in a *video conference* with company employees in Berlin.
    - (i) What extra piece of hardware would the participants require? 1
    - (ii) State **one** advantage to the company and **one** advantage to the employees of using “video conferencing”. 2(6)

[Turn over for Question 24 on Page twelve

24. The Valiant group has a centralised booking system, and each hotel has its own website.

Helen Pertwee's job is to create, maintain and update each of the hotel websites.

- |  |             |
|--|-------------|
| (a) She uses web authoring software to create the web pages. The software has a <i>hyperlink tool</i> . What is the purpose of the "hyperlink tool"? | 1           |
| (b) She has to decide whether the hyperlinks use <i>absolute page addressing</i> or <i>relative page addressing</i> .                                |             |
| (i) Describe how "absolute page addressing" works.   | 1           |
| (ii) Describe <b>two</b> advantages of "relative page addressing".   | 2           |
| (c) Helen finds that her page with a photograph on it takes a long time to load. What could Helen do to the photograph to make it load faster?       | 1           |
| (d) Each hotel has its own intranet with workstations, a <i>multiplexer</i> and a <i>router</i> . Through this, guests can access the Internet.      |             |
| (i) Describe the purpose of a "multiplexer".   | 1           |
| (ii) Describe the function of the "router".  | 2           |
| (e) What must Helen do to keep the computers protected from <i>viruses</i> ?   | 2           |
|  | <b>(10)</b> |
| <b>Total for Section 3 Part C</b>  | <b>(25)</b> |

[END OF SECTION 3—PART C]

[END OF QUESTION PAPER]