

# X216/13/01

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NATIONAL THURSDAY, 3 MAY  
QUALIFICATIONS 1.00 PM – 3.30 PM  
2012

INFORMATION  
SYSTEMS  
ADVANCED HIGHER

Attempt **all** questions in Section I.

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

Part A	Information Systems Interfaces	Page 10	Questions 8 to 12
Part B	Online Database Systems	Page 16	Questions 13 to 17

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

Read all questions carefully.

Do not write on the question paper.

Write as neatly as possible.

**Each section should be answered in a separate answer book.**



## SECTION I

Marks

**Answer ALL questions in this section.**

1. A new information system is being developed.
- (a) A *feasibility study* is carried out at the start of the *analysis and design life cycle*.
- (i) State **one** benefit to a customer of carrying out a feasibility study. **1**
- (ii) A feasibility study report notes that the required method of input is not possible.  
State the aspect of a feasibility study that would have produced this particular note. **1**
- (b) A *project plan* is created.
- (i) The project plan shows the start date and duration of each task.  
State **one** other element that may be included in a project plan. **1**
- (ii) One task in the project plan is allocated the incorrect start date.  
State **one** issue that may arise when the project plan is implemented. **1**
- (c) *Investigative techniques* are used to gather information during analysis.
- (i) State **one** result that may be obtained by using investigative techniques. **1**
- (ii) Explain what is meant by the investigative technique *document sampling*. **2**

**SECTION I (continued)**

*Marks*

2. A development team is designing a new information system. Members of the team begin by reading through the *system specification*.
- (a) State **two** reasons why the team members read the system specification before beginning the design. 2
- (b) The development team is responsible for aspects of the *logical design* and the *physical design*.  
Explain the connection between the logical and physical design. 2
- (c) Screen design is an essential part of the design process.  
Name **one** tool that may be used to quickly develop the screen design. 1
- (d) *System design documentation* is created as part of the development.  
State **one** other type of documentation that will be produced. 1
- (e) *Systematic testing* of the system is carried out.  
Explain the term “systematic testing”. 2
- (f) Explain **two** features of a system that would be considered during its *evaluation*. 2

**[Turn over**

**SECTION I (continued)**

Marks

3. An information system is used to manage data about a football team. Read the description of the use made of the system by the team coach.

At the start of each season, the coach adds the details of any new players to the Player file. When notified of changes to any of his players' contact details, he updates the relevant details in the Player file. A player may notify the coach that he is unavailable. When this happens, the coach changes the player's status in the Player file to unavailable. When a player leaves the team, the coach deletes the player's data from the Player file.

The coach starts a new Match Sheet by:

- consulting a Fixtures list to find the date and the name of the opposition
- using details from the Opposition file to decide which strip his team should wear to avoid playing in the same colour
- consulting the Venue file to add name of the venue and its postcode to the Match Sheet
- consulting the Player file to add the names of his chosen players to the Match Sheet.

If a venue becomes unplayable due to poor weather conditions, the coach checks the Venue file for alternatives and then updates the Match Sheet with the new venue details.

Copy and complete the *Entity-Event Matrix* shown below. Base your solution on the description above.

Entity Event	Match Sheet	Player	Venue	Fixture	Opposition

**SECTION I (continued)**

*Marks*

4. Summersea Golf Club uses an information system to store data about its members. The club also stores details of golf professionals employed by the club to give golf lessons to its members.

- MEMBER (memberID, name, address, telephone number, e-mail address, type of member)
- PROFESSIONAL (proID, name, date of birth, gender, golf handicap)
- LESSON (date, time, memberID, proID).

Each of the golf professionals gives lessons to many of the club members; not all of the club members will receive golf lessons but those who do may receive one or more golf lessons from the same or different golf professionals.

(a) Draw an *Entity Relation Diagram (ERD)* to show the relationships between the entities MEMBER, PROFESSIONAL and LESSON. The diagram should indicate the cardinality of the relationships and whether the relationships are mandatory or optional. 3

(b) State **one weak entity** in your solution to part (a) above. 1

(c) A golf lesson costs £20 for members with membership type junior, otherwise a golf lesson costs £30.

Write the *structured English* for the process which determines lesson cost. 3

(d) The structured English for a second process is provided below:

```
for each club member
    totalcost = lesson cost + VAT
    display member's name and totalcost
next member
```

Describe the output produced by this second process. 1

**[Turn over**

**SECTION I (continued)**

*Marks*

5. The organisers of the World Games will use an information system to store details of athletes, the countries they represent, the sports in which they participate and the results from each round in an event.

(a) A *script* is used to update the overall medal table as soon as the final results of a competition have been entered.

Describe **one** benefit of using a script for this purpose.

**1**

(b) The organisers of the World Games outlined their requirements for the user interface to the developers of the information system.

State and fully describe the *type of testing* that must be carried out to ensure that, once it has been developed, the user interface meets the organisers' needs.

Your description should indicate who would be involved in the testing and how the testing would be carried out.

**3**

(c) The RESULTS table contains athlete and event details. Sample entries are provided below.

RESULTS TABLE	
AthleteNo:	31492
EventID:	SWMFR100
Round:	1
Time (seconds)	48.8

RESULTS TABLE	
AthleteNo:	31492
EventID:	SWMFR100
Round:	3
Time (seconds)	48.5

(i) The AthleteNo and EventID attributes in the RESULTS table are foreign keys.

Write down a validation rule that could be used in the *data dictionary* entry for **both** of these attributes in the RESULTS table to ensure that only existing athletes and events can be entered.

**2**

(ii) All athletes competing in event SWMFR100 must achieve a qualifying time of 49.0 and the world record for the event is 46.91. Although the world record may be beaten at the World Games, organisers are sure that it will not be beaten by any more than 0.5.

Write down a validation rule that could be used in the data dictionary entry for the Time attribute in the RESULTS table to ensure that only permissible data can be entered.

**3**

(iii) AthleteNo and EventID attributes are indexed. Explain why it is also necessary to index the Round attribute in the data dictionary entry for the RESULTS table.

**1**

(d) The developers decide to introduce the information system using a *phased conversion* rather than a *direct conversion*. Comment on this decision by comparing staff training needs for both methods.

**2**

**SECTION I (continued)**

*Marks*

6. InfoSyst is a software development company that provides programmers to work on software development projects for other companies. The table below gives details of the hours worked by each of the InfoSyst programmers on several projects.

NIN	Project Number	Hours	Programmer Name	Company ID	Company Town
PB827462C	IS3824	69	G. Lowther	SC175	Glasgow
WK213840D	IS3824	84	G. Steele	SC175	Glasgow
RT526074B	IS3825	53	I. Shafiq	WL197	Cardiff
PB827462C	IS3825	53	G. Lowther	WL197	Cardiff
WK213840D	IS3826	27	G. Steele	SC175	Glasgow

Note that:

- National Insurance Number (NIN) is a unique identifier for each programmer
- Project Number is a unique identifier for each project
- Company ID is a unique identifier for each company.

(a) This table is in *First Normal Form*.

- (i) Write down the primary key for the table. 2
- (ii) Write down **one** attribute with full *functional dependency* on this primary key. 1
- (iii) Write down **two** *partial functional dependencies* on this primary key. 2

(b) Normalise the table to *Second Normal Form* (2NF). 4

(c) State **one** *transitive dependency* in the 2NF tables. 1

**[Turn over**

## SECTION I (continued)

Marks

7. A development agency helps clients find the funding needed to start up a new business.

Part of the system used by the development agency is described below.

### APPLICATION

Initially, a client submits an application form to the development agency identifying the funding needs. The development agency sends a response to acknowledge receipt of the funding request. Details of the funding request are stored in the application file.

### BACKGROUND CHECK

For each application, a credit check is carried out. To do this, the application must be retrieved from the application file and a credit agency is contacted and asked to perform the credit check. The credit agency replies by letter for legal reasons.

Once a response has been received from the credit agency, the application file is updated. Any client who has submitted an application that fails to pass the credit check is informed by post that their funding request has been denied.

### FUND ALLOCATION

All valid funding requests which pass the credit check are passed to the Fund Allocation process to be matched against the budget file which contains the details of available finance. A contract is then drawn up and sent to the client. The client signs the contract and returns it. A copy of the contract is stored in the contract file.

Draw a *Level 1 Data Flow Diagram (DFD)* to represent the system described above.

7

[END OF SECTION I]



## SECTION II

Attempt ONE sub-section of Section II

Part A	Information Systems Interfaces	Page 10	Questions 8 to 12
Part B	Online Database Systems	Page 16	Questions 13 to 17

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

## Part A—Information Systems Interfaces

Answer ALL questions in this part.

8. uPhoto provides digital photo-printing kiosks used in the lobbies of international hotels.

The specialist kiosks consist of a touch screen, speakers, microphone, input slots for different types of camera memory cards and a colour photo printer. Payment for photos is by credit or debit card only.

Users of the kiosks can indicate their preferred language by selecting an icon of their national flag displayed on the start screen, or by using *command and control*.

- (a) Describe **two** features of a command and control system. 2
- (b) Justify why the kiosks could be considered to have a *multimodal interface*. 3
- (c) Explain how *paper prototyping* might be used in the design of the interface for the photo-printing kiosks. 2
- (d) Explain what is meant by the term *high fidelity prototyping* and how this might be used in the development of a system. 2
- (e) The Payment screens of the photo-printing kiosks are described below.

Screen 1

The user's bill is displayed at the top of the screen. Users can select the type of payment card and enter their PIN number. Options to Cancel the transaction or Confirm payment are presented.

Screen 2

Users are asked whether they wish to proceed with the transaction. Options to Proceed with payment or Return to screen 1 are presented.

Design a *storyboard* for the Payment screens based on the description above. Show all parts of each screen clearly. On screen 1 you should clearly indicate how the type of payment card will be selected. 3

- (f) Due to unforeseen delays in the development of the interface, the time available for inspection of the interface has been reduced. The developers must now choose to use **either** a list of *heuristics* **or** a *feature set* but not both.

Recommend which **one** of these techniques you feel to be more appropriate for inspection of the photo-printing kiosks and give **two** reasons to support your choice. 2

**SECTION II**  
**Part A—Information Systems Interfaces (continued)**

*Marks*

9. A program is being developed which will use an animated computer generated picture of a doctor (an avatar) to interact with patients and provide a link between them and their real doctors.



- (a) State the type of *intelligent interface* which uses an avatar. **1**
- (b) The avatar uses *natural language interaction* to speak to patients and partially understand their responses.
- (i) State **two** reasons why it might be difficult to fully understand a patient's spoken replies. **2**
- (ii) Explain why this type of interface has been chosen for use in this situation. **2**
- (c) During the development of the program, a *test plan* is produced. The test plan indicates the *test data* values to be used along with expected outputs.
- State **two** additional items contained in a test plan. **2**
- (d) After completion, the program is upgraded to allow the avatar to understand different spoken languages.
- State the type of *maintenance* that is carried out. **1**

**[Turn over**

SECTION II

Marks

Part A—Information Systems Interfaces (continued)

10. A three dimensional (3D) interface is being designed for desktop computers. The interface consists of a desktop with three vertical walls as shown in the picture below.



- (a) Describe **two** developments in computer hardware which have made this type of interface possible. 2
- (b) The design includes a menu which appears when the cursor is stationary over any point on the screen for a few seconds. The contents of the menu are determined by the position of the cursor.
- (i) State **one** *quantitative measurement technique* which could be used to determine how satisfied users are with this feature. 1
- (ii) Tests show that the menu adapts to regular selections made by individual users. Describe **two** ways in which an *adaptive menu* could respond to regular user selections. 2
- (c) To allow quick access to frequently used files, files can either be pinned to the desktop walls by dragging them there or they can be saved to a favourites folder. Compare the *syntax* and *semantics* of these two operations of the new interface. 3
- (d) The development of the interface has been managed using the *LUCID methodology*.
- (i) State the core principle of the LUCID methodology which makes it different from older, more traditional methods. 1
- (ii) Explain the *iterative nature* of the *analysis and design life cycle* by describing what happens when a problem arises at the *build* stage of any development. 2
- (iii) After its release, a fault is found in the interface code. State the type of maintenance that is required to fix this fault. 1

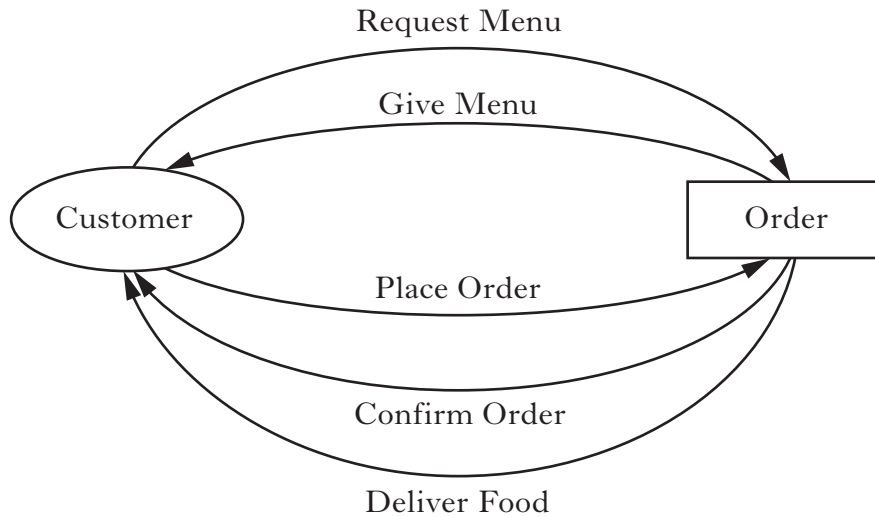
SECTION II

Part A—Information Systems Interfaces (continued)

Marks

11. An interface is being developed for a till in a café.

(a) Part of the café system is shown in the *Data Flow Diagram (DFD)* below:



(i) Name **one** physical flow shown on the DFD above.

1

(ii) Use **one** example from the DFD above to explain how the physical flow in part (i) differs from other *data flows* in the system.

1

(b) The order system in the café is described below.

The system begins with a welcome screen which shows the table number for each table in the café. To begin entering details of an order, the waiter selects the table number from those displayed on the screen.

The next screen provides two options: the first option allows the waiter to order food and drink items; the second option is used to cancel the order and return to the welcome screen.

When the food order option is selected, a new screen is displayed. This screen shows each of the food and drink items available. Order items continue to be selected until all required order items have been entered and the order is complete. The complete order is then listed on a new screen so that it can be checked. If there are any errors in the order, the waiter selects the edit order option to return to the food order screen; if the order is correct, the waiter selects the confirm order option and the system returns to the welcome screen.

Draw a *state transition diagram* to represent the café order system.

8

(c) Once the interface of the café till has been fully developed, the development team perform a *walkthrough* of the system with the manager and one senior worker to inspect the quality of the system.

Explain the use made of a walkthrough to inspect the quality of a system.

2

**SECTION II**  
**Part A—Information Systems Interfaces (continued)**

*Marks*

12. InverCabs is a taxi company operating in the Inverclyde area. Each taxi is fitted with a computer system which provides wireless access to the Internet.



The taxi driver can use the computer mounted on the dashboard to;

- track and plan their route using GPS navigation
- receive voice-guided navigation from their current location to unfamiliar destinations
- communicate with the despatch centre to receive important information such as pick up times and locations
- search for popular restaurants, hotels and attractions in the area that the passenger may be interested in.

The system provides a graphical display and drivers can interact with the system by;

- using the touch screen
- using a mobile phone style keypad to enter search criteria.

- (a) Many of the taxi drivers have considerable experience of using similar devices such as satellite navigation systems and mobile phones. Some drivers, however, have very little relevant experience that will help them become familiar with the dashboard mounted computer.

By describing the needs of **both** expert and novice users, explain why providing for both sets of needs will increase development costs. **3**

- (b) Once it has been developed, *usability testing* of the interface is carried out.

- (i) Developers use both *speed of task performance* **and** *user error rates* to evaluate the taxi information system. Explain the relevance of **each** of these techniques in this situation. **2**

- (ii) During usability testing, *user performance data logging software* is installed in the dashboard mounted computers. When compared with the feedback from *self reporting logs*, the feedback from the data logging software was found to be more informative to the developers. Suggest why this might be the case. **2**

**SECTION II**  
**Part A—Information Systems Interfaces (continued)**

*Marks*

**12. (continued)**

- (c) The information system used by InverCabs stores details of Customers, ChargeAccounts and Bookings in three separate entities with primary keys underlined as indicated below.

<b>CUSTOMER</b>	<b>CHARGEACCOUNT</b>	<b>BOOKING</b>
<u>(Customer ID</u>	<u>(Customer ID</u>	<u>(Booking Reference</u>
Customer Name	Account Number	Customer ID
Customer Address	Account Name	Pickup Place
Customer Tele Number)	Account Address)	Pickup Time
		Payment Method)

- (i) Consider the following facts:

Details of a Customer are stored the first time that the Customer makes a booking.

Some Customers who make Bookings with the company may have a ChargeAccount.

A ChargeAccount may be created without a Booking having been made.

**4**

Show how these facts would be represented in an *Entity Relationship Diagram*.

- (ii) Look at the *Entity Event Matrix* extract shown below:

	Booking
Customer with ChargeAccount makes a Booking	C
Customer without ChargeAccount makes a Booking	C
Customer changes pickup time of regular Booking	M
Booking details archived monthly	D

Use the information provided in the matrix above to create an *Entity Life History* for the Booking entity.

**3**

[END OF SECTION II — PART A]

## SECTION II

Marks

### Part B—Online Database Systems

Answer ALL questions in this part.

13. An online insurance company offers car insurance to drivers. The company makes use of a *content management system*.
- (a) Describe **two** features of a content management system. 2
- (b) The content management system may be developed using *commercial* software or *open source* software.  
Recommend **either** commercial or open source software. You should justify your choice by making **two** valid points that refer to the *security* of the data being stored in the system. 2
- (c) When a driver applies for insurance, the insurance company uses *Electronic Data Interchange (EDI)* to check driver details with the Driver and Vehicle Licensing Authority (DVLA) and the Police.  
Explain the need for *transaction standardisation* in any EDI application. 2
- (d) When a driver renews his insurance, the existing policy details need to be edited to show the new start date.  
State the role of *Data Manipulation Language (DML)* in editing the details of an existing database table. 1
- (e) The system is upgraded to enable users to communicate with the system using different human languages.  
State the type of *maintenance* that must be carried out. 1



**SECTION II**  
**Part B—Online Database Systems (continued)**

*Marks*

- 14.** HapiHols is a new online business. Customers can use the HapiHols website to book last minute flights and hotel rooms. Once a booking has been made, HapiHols exchanges passenger data with the airlines and hotels concerned using Electronic Data Interchange (EDI).
- (a) State **one** method of EDI *communication* and describe the benefit of this method to a new business such as HapiHols. **2**
- (b) Explain **one** *legal restriction* that applies when exchanging data using EDI. **2**
- (c) HapiHols provides a free application called HapiTrak that can be downloaded from the website to mobile devices. This application allows relatives of airline passengers to track expected arrival times of any flights booked with HapiHols by simply entering the booking reference. The application was developed from a rival flight tracking application that was released as open source software.
- (i) Assess the benefits of using open source software to develop the free HapiTrak application. Your answer should **not** make reference to security issues but should indicate **one** benefit for users of the application and **two** benefits for its developers. **3**
- (ii) During development of any application, a *test plan* is produced. The test plan indicates the *test data* values to be used along with expected outputs. State **two** additional items contained in a test plan. **2**
- (iii) Explain the *iterative nature* of the *analysis and design life cycle* by describing what happens when a problem arises during the implementation of any development. **2**
- (d) After its release, an error is found in the application code. State the type of maintenance that is required to fix this fault. **1**

**[Turn over**

**SECTION II**  
**Part B—Online Database Systems (continued)**

Marks


15. Pricestorm is an online supplier of electrical and electronic equipment.

(a) Pricestorm stores its product catalogue on a secure database server.

(i) State **two** components of an *e-commerce platform*, **other than** a product catalogue, required to allow Pricestorm and their customers to sell and buy online.

2

(ii) Consider the following users who regularly access the product catalogue.




User 1: Tom

Tom is a customer of Pricestorm.

Tom would access the product catalogue on the secure database server to .....

User 2: Jenny

Jenny is the IT manager of Pricestorm.



Jenny would access the product catalogue on the secure database server to .....

Explain the differing needs of Tom and Jenny by stating **one** reason why **each** user would need to access the product catalogue on the secure database server.

2

(iii) Explain how *server-based database management tools* can facilitate these differing user needs.

1

(b) Consider the following information:

Server name: `http://www.pricestorm.co.uk`  
Database name: `psmaincat`  
User: `Eric`  
Password: `sdf745kla`

Use the information provided above and a *server-side scripting language* with which you are familiar, write the script needed to connect to the server and select the correct database.

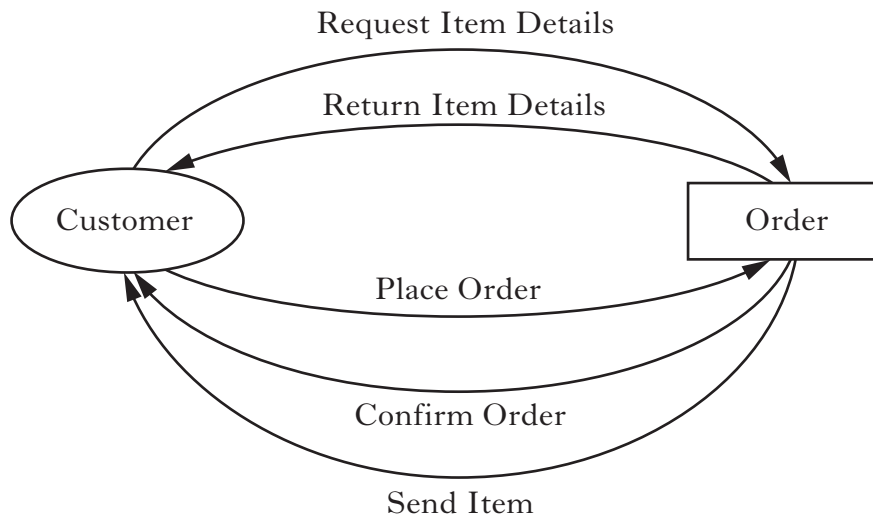
4

**SECTION II**  
**Part B—Online Database Systems (continued)**

*Marks*

**15. (continued)**

(c) Part of the online ordering system is shown in the *Data Flow Diagram (DFD)* below:



- (i) Name **one** *physical flow* shown on the DFD above. **1**
- (ii) Use **one** example from the DFD above to explain how the physical flow in part (i) differs from other *data flows* in the system. **1**

**[Turn over**

**SECTION II**  
**Part B—Online Database Systems (continued)**

*Marks*

16. A company called Scotband arranges for music bands to make appearances at venues around Scotland.

The company information system is a relational database. The table below shows several records in the BANDS table of the database.

**BANDS**

BAND_ID	BAND_NAME	GENRE	DATE_FORMED	AGENT
L100	Lollipops	pop	14-Dec-08	543
M219	MyScotia	ceilidh	23-Jan-00	
M124	Massive	heavy metal	01-Nov-92	313
D001	DrimDram	ceilidh	09-Sep-81	515
P489	Purple Heather	rock	30-Sep-09	313
P486	Peak	rock	07-Jul-09	543

- (a) The band named “Peak” changes its name to “Full Throttle”. The following SQL code is used to update Peak’s record in the database.

```
UPDATE BANDS
SET (BAND_NAME = 'Full Throttle');
```

The code runs without errors but does not do what is expected. State the result of running the above code.

**1**

- (b) (i) Copy and complete the SQL code below to display the date that the band named “Minted” was formed.

```
SELECT DATE_FORMED
FROM BANDS
.....;
```

**1**

- (ii) Using the code developed in part (i) above, write the SQL command to display the name and genre of all bands formed **before** the date that the band named “Minted” was formed.

**3**

**SECTION II**  
**Part B—Online Database Systems (continued)**

Marks

**16. (continued)**

- (c) Details of the agent for each band are held in a related table called AGENTS as shown below.

**AGENTS**

AGENT_ID	FIRSTNAME	LASTNAME	TOWN
313	Joe	Sleeze	Aberfin
543	Mandy	Snow	Portpool
515	Marilyn	Moore	Coltsmouth

Copy and complete the SQL query below which will be used to display the details (band name, date formed and the agent's last name) for the band called "DrimDram".

```

SELECT BANDS.BAND_NAME, BANDS.DATE_FORMED, AGENTS.LASTNAME
.....
.....
..... BANDS.BAND_NAME = 'DrimDram';
    
```

4

- (d) Scotband's information system is held on a database server so that their staff can log into it remotely. State **two** requirements, **other than** username and password, that a user will need to know in order to make the connection. 2
- (e) The online database can be accessed using a web browser. Part of the HTML code for the logon screen is shown below.

```

<form method= "post" action="dblogin.php">
.
.
<p> Username <input name="username" type="text" value="*****" /> </p>
<p> Password <input name="Password1" type="password" value = "*****"/> </p>
.
.
</form>
    
```

- (i) Produce a sketch to show what will be displayed by this code in the web browser before the user starts to log on. 2
- (ii) Explain the purpose of the **action** attribute in the above code. 1

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**SECTION II**  
**Part B—Online Database Systems (continued)**

17. InverCabs is a taxi company operating in the Inverclyde area. Each taxi is fitted with a computer system which provides wireless access to the Internet.



The taxi driver can use the computer mounted on the dashboard to;

- track and plan their route using GPS navigation
- receive voice-guided navigation from their current location to unfamiliar destinations
- communicate with the despatch centre to receive important information such as pick up times and locations
- search for popular restaurants, hotels and attractions in the area that the passenger may be interested in.

The system provides a graphical display and drivers can interact with the system by;

- using the touch screen
- using a mobile phone style keypad to enter search criteria.

The taxi information system uses an HTML form to capture search criteria from the driver.

**InverCabs**

Search for ...

**Venue Type**

Restaurant       Hotel       Attraction

**Location**

Ayrshire       Glasgow       Inverclyde

Clear      Search

**SECTION II**  
**Part B—Online Database Systems (continued)**

*Marks*

**17. (continued)**

- (a) Consider the following segment of HTML code.

```
<BUTTON type="reset">
```

State whether the segment of HTML code above is associated with the Clear button or the Search button on the form. Explain your answer.

**2**

- (b) When search criteria are submitted as part of an SQL query, they are sent to a *server-side script* for processing.

- (i) Describe the purpose of the SQL query below.

```
SELECT location, COUNT(venueName) FROM venue  
WHERE venueType = 'Restaurant'  
GROUP BY location;
```

**2**

- (ii) Using a server-side scripting language with which you are familiar, write the script needed to execute the SQL query in part (i) above.

**2**

- (c) The owner of InverCabs has been told that the introduction of a *Customer Relationship Management* or *CRM* system would bring many benefits to the company. The owner, however, is concerned about the initial costs of a CRM system.

Justify the expense of a CRM system to a small business such as InverCabs.

**2**



**SECTION II**  
**Part B—Online Database Systems (continued)**

*Marks*

**17. (continued)**

(d) The information system used by InverCabs stores details of Customers, ChargeAccounts and Bookings in three separate entities with primary keys underlined as indicated below.

<b>CUSTOMER</b>	<b>CHARGEACCOUNT</b>	<b>BOOKING</b>
<u>(Customer ID</u>	<u>(Customer ID</u>	<u>(Booking Reference</u>
Customer Name	Account Number	Customer ID
Customer Address	Account Name	Pickup Place
Customer Tele Number)	Account Address)	Pickup Time
		Payment Method)

(i) Consider the following facts.

Details of a Customer are stored the first time that the Customer makes a booking.

Some Customers who make Bookings with the company may have a ChargeAccount.

A ChargeAccount may be created without a Booking having been made.

Show how these facts would be represented in an *Entity Relationship Diagram*.

**4**

(ii) Look at the *Entity Event Matrix* extract shown below.

	Booking
Customer with ChargeAccount makes a Booking	C
Customer without ChargeAccount makes a Booking	C
Customer changes pickup time of regular Booking	M
Booking details archived monthly	D

Use the information provided in the matrix above to create an *Entity Life History* for the Booking entity.

**3**

[END OF SECTION II — PART B]

[END OF QUESTION PAPER]

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