

- 1 Rosa has recently opened a new leisure centre. Currently she has 150 members, however, she is estimating that this will increase to around 10 000 members.

Rosa will store members' details in a database. She will also store gym class bookings and appointments with fitness instructors.

Rosa is considering using either a flat file database or a relational database.

Discuss the benefits and drawbacks of flat file databases and relational databases and which one would be the most suitable for Rosa.

You should include the following in your answer:

- the features of flat file databases and relational databases
- the benefits and drawbacks of each type of database
- which type of database would be the most suitable for Rosa.

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[9]

[2]

(b) OCRConfectionery is a sweet manufacturing company.

They want to use a relational database to store details of the orders their customers make.

One customer can order as many different products as they like in the same order. A customer can also place as many orders as they like.

One product can be ordered multiple times in the same order or ordered by multiple different customers.

Complete the entity relationship diagram to show the relationships between the Product, Customer and Order entities.



[2]

(c) The order table has these fields.

OrderID
OrderDate
OrderAmount
CustomerID
ProductID

i. State the difference between a primary key and a foreign key.

----- [2]

ii. State **one** foreign key in the order table.

----- [1]

iii. State why CustomerID would not make a suitable primary key in the order table.

----- [1]

3 Details of all users that have accessed a robot are stored in a database table called TblAccessLog. This table stores the username and user type of each user. When a user accesses the robot, the current date is added to the DateAccessed field for that user.

A selection of the data from this table is shown here. Username is the key field.

Username	UserType	DateAccessed
Mrphy003	User	08/05/21, 07/06/21, 08/06/21
Lwis076	Admin	17/04/21, 19/07/21
Bbby412	NotNeeded	01/06/21, 02/07/21, 14/07/21

TblAccessLog

- i. Write an SQL statement to delete all records from the table Tb lAccessLog for users who have a UserType of "NotNeeded".

----- [2]

- ii. State **two** requirements for a database to be in First Normal Form (1NF).

1 -----

2 -----

----- [2]

- iii. Explain why the structure of Tb lAccessLog means that this database is **not** in First Normal Form (1NF).

----- [2]

4(a) A relational database supports ACID transactions. ACID stands for Atomicity, Consistency, Isolation and Durability.

i. Describe what is meant by a transaction being durable.

[2]

ii. Give **one** way that durability can be achieved for a completed transaction.

[1]

iii. Explain how record locking can be used to ensure that the ACID principle of isolation is achieved when carrying out multiple transactions.

[3]

iv. Give **one** disadvantage of using record locking.

[1]

(b) A video streaming service uses a relational database. An extract of the data from two tables from this database is shown in Fig. 2.

Membership contains data about current memberships that customers hold and package contains data about different streaming packages available.

Username	FirstName	StartDate	PackageType
User001	Amaya	08/05/2016	Premium
User002	Amit	06/06/2019	Basic
User003	Tom	17/08/2019	Free
User004	Kareem	08/08/2017	Basic
User005	Sarah	25/03/2020	Premium

Membership

PackageType	CostPerMonth (£)	Adverts
Premium	12.99	false
Basic	7.99	true
Free	0.00	true

Package

Fig. 2

i. State what is meant by the term ‘primary key’.

[1]

ii. Identify the foreign key used in the database and the table name where this is a foreign key.

Foreign Key -----

Table Name -----

[2]

iii. Identify the data type of the `CostPerMonth (£)` field.

----- [1]

iv. Give the name of the field that could be stored using a Boolean data type.

----- [1]

- (c) The `Adverts` field indicates if customers will be shown adverts. `true` indicates that customers will be shown adverts, and `false` indicates that adverts are not shown.

Write Structured Query Language (SQL) to return the `Username` and `FirstName` fields for all customers who see adverts.

----- [5]

(d) When new customers join the streaming service, their name, email address and contact details are captured so that they can be entered into the database.

i. Identify **one** method of capturing a new customer’s personal data, describing why this method is suitable.

Method -----

Suitability -----

[3]

ii. Sometimes the company may need to move or backup its data they hold about customers.

Identify **two** methods of exchanging data with other computer systems.

1 -----

2 -----

[2]

5 Customers' details are stored in the flat file database table `Customer`. An extract of the table is shown below.

CustomerID	Surname	Title	Phone	CarReg
JJ178	James	Mr	(0121) 343223	DY51 KKY
HG876	Habbick	Miss	(01782) 659234	PG62 CRG
EV343	Elise	Mrs	(07834) 123998	HN59 GFR
PG127	Pleston	Mr	(07432) 234543	JB67 DSF

- i. State what is meant by the term 'primary key', identifying the primary key in the table above.

[2]

- ii. Write the SQL statement that would show only the `CustomerID` and `Surname` fields for customers with the `Title` "Miss" or "Mrs".

[4]

- iii. Describe **one** problem that would arise with the flat file database structure if a customer wanted to insure more than one car at the same time.

[2]

- iv. Describe how the flat file database structure could be altered to efficiently allow each customer to insure multiple cars at the same time. (You may assume each car is insured to only one customer.)

[5]

6(a) A hotel uses a computer system to keep track of room bookings. The hotel staff are able to query a database to discover which rooms are booked or which rooms are free.

The hotel’s computer network uses a client-server model.

i. Describe what is meant by the term ‘client-server’ in this context.

[3]

ii. Give **two** advantages of client-server compared to peer-to-peer.

1 .-----

2 .-----

[2]

- (b) The hotel's network uses multiple switches.

Explain the purpose of a network switch.

[3]

[3]

- (c) * The hotel is concerned about the security of its computer network.

Discuss the threats which potentially exist to the hotel's computer network and how these threats could be eliminated or reduced.

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Blank lined paper for writing.

(d) The hotel stores data about rooms, customers and bookings in a database. Each customer can book multiple rooms and each room can be booked multiple times.

i. Draw an Entity Relationship Diagram for this database.

[4]

ii. Define what is meant by the term ‘foreign key’, giving **one** example of where a foreign key would be used in the hotel booking database.

Definition

Example

iii. Describe **two** different ways that hashing could be used in this database.

1 .

2 .

[4]

(e) The hotel booking database enforces referential integrity.

Explain what is meant by the term 'referential integrity' and how this could potentially be broken.

[2]

7(a) RestaurantReview is a website that allows users to leave reviews and ratings for different restaurants.

The website uses a database with the following structure.



The database management system ensures referential integrity is maintained.

Explain what is meant by referential integrity, giving an example which refers to the database described above.

[3]

(b) Whenever a review is added to the system, the restaurant’s average rating is updated. This transaction is ACID.

The A in ACID refers to Atomic.

Describe what is meant by the term ‘Atomic’ in the context of ACID transactions. You should refer to the example of a review being added.

[2]

(c) Whenever a review is added to the system, the restaurant's average rating is updated. This transaction is ACID.

The A in ACID refers to Atomic.

State what the letters CID refer to in ACID.

C -----

I -----

D -----

[3]

i. Describe why the database can be considered to be in First Normal Form.

ii. Describe why the database can be considered to be in Second Normal Form.

iii. Describe why the database can **not** be considered to be in Third Normal form.

Created in ExamBuilder

FlightID	FlightNumber	DestinationCode	DestinationName	DepartureDate	DepartureTime
1355	OC0089	JFK	John F. Kennedy	03/07/18	09:50
1453	CS1573	LHR	Heathrow	03/07/18	10.30
1921	OC7750	JFK	John F. Kennedy	04/07/18	8.30
1331	AM0045	YHZ	Halifax	04/07/18	14.25
1592	HB0326	RTM	Rotterdam	04/07/18	19.10
1659	CS0123	LHR	Heathrow	04/07/18	07.20

```
SELECT FlightNumber FROM Flight WHERE DestinationCode='JFK'
```

[2]

END OF QUESTION PAPER

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
1	Mark Band 3-High Level (7-9 marks) The candidate demonstrates a thorough knowledge and understanding of databases. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. <i>A mark band 3 answer will cover benefits and disadvantages of both flat file and relational databases. The expansions will relate to Rosa's needs and will go on to evaluate why a relational database is most appropriate.</i> Mark Band 2-Mid Level (4-6 marks) The candidate demonstrates reasonable knowledge and understanding of databases; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. <i>A mark band 2 answer will cover features of both flat file and relational databases and will expand the points, relating these to benefits and drawbacks and size of Rosa's data set although these may not be balanced. There will be an attempt to recommend which type is suitable.</i> Mark Band 1-Low Level (1-3 marks) The candidate demonstrates a basic knowledge of databases; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to	9	Points may include but aren't limited to: AO1 Knowledge and Understanding A flat file database stores data in a single table, often in a plain text file. Usually, each line will hold a single record and delimiters such as commas are used to separate this into different fields. Benefits: • They are easy to set up as only one table is needed • All records are stored in one place Drawbacks: • Tables can contain lots of redundant data which increases the amount of storage space needed • Searching the database can be slower as there is more data to search • The database can be more difficult to manage and possibly expand in the future A relational database stores data in multiple different tables. These are linked together using relationships created by primary and foreign keys. Benefits: • There is less duplication of information so less redundant data which can reduce the file size • The database is easier to manage and easier to expand in the future • Searching the database may be faster as there is less data / not all tables need to be searched • It can be more secure as different tables means different people could have different access Drawbacks: • They are generally more difficult to set up and need more technical knowledge to do things like normalisation. • Data is spread out between multiple tables. Some tables may be link tables which only display key fields /

Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
	apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. <i>A mark band 1 answer will contain some basic, relevant points related to features of flat file and/or relational databases. It may not be linked to Rosa's specific needs.</i> 0 mark No attempt to answer the question or response is not worthy of credit.		references • They are more expensive as you will need a DBMS rather than just a basic file AO2 Application • Given that Rosa currently has 150 members, a flat file database will be suitable • However, as the business expands, using a flat file database may prove problematic • She could end up with a lot of redundant data as each time a new booking/appointment is made, it may store repeated data. • The more data Rosa has, the more likely there could be inconsistencies if data is edited/updated and her data would lose integrity • A relational database would be more efficient. • Membership details can be stored once and then their membership ID number can then be used to make a booking • A relational database will also allow her to expand even further in the future as additional tables can be added. However, the database will need to be normalised to ensure data is consistent, in the same format and that dependencies are reduced AO3 Evaluation The most suitable database for Rosa would be a relational database. Although this is more complex and the data needs to be normalised, it will store less repeated data when her company expands. It will also allow the database to be easily maintained and expanded in the future and will be easier to keep data secure, which is important. <u>Examiner's Comments</u> There were some really good responses to this question. More successful candidates were able to explain the features of both types of database as well as giving relevant benefits and drawbacks of each which they then applied to the scenario well and gave a recommendation. Some candidates gave good descriptions of the

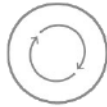
Mark Scheme

Question	Answer/Indicative content	Marks	Guidance
			features of each type but were unable to apply their knowledge to the scenario other than saying the membership was going to increase. There were a number of candidates who confused a database with a table stating that a relational database was a number of related databases and not a number of related tables.  Misconception The main misconception was to confuse database with table although some candidates also confused the different keys used in a relational database and what they were used for. Exemplar 3 A flat file database is a type of database that only contains one table. This means that all data is stored in a table, made up of records and fields. It doesn't require a primary key, or it can be normalised. A relational database uses multiple tables linked together using foreign keys, which creates one to many relationships between the different tables in the database. A flat file database has many advantages. Firstly, it is simple to understand, add, create and modify. This is because all records are stored in one table, so all the information is in one place. However, there are drawbacks to this. If a new member went to both multiple classes and appointments, extra records would be created. This would result in a large amount of redundant data being included, such as a member's details appearing more than once. This not only increases the amount of space the database takes up, but also makes it more difficult to search the database. A relational database also has many benefits. When a relational database has been normalised, it becomes very efficient to search and locate records within it. As well as this, through the process of normalisation, large amounts of redundant data would be deleted, reducing the storage space required for the database. For example, by creating tables for appointments and another for classes, and another for member details, the membership details wouldn't need to be written out again each time an appointment is booked, saving Rosa time. Overall, a relational database would be much more suitable for Rosa. Although a flat file database is fine for Rosa to use with 150 members, if she has 10,000 members in her leisure centre it will be incredibly difficult to locate specific records when searching, as there would be far too much redundant data, and the file size would be incredibly large if extra details are included each time an appointment is made. However, if Rosa were to use a relational database, there would be much less redundant data, therefore reducing the file size and making it easier for her to find records. Additionally, secondary keys and indexing will be used on a relational database to speed up the search process, although this may not be possible with 10,000 members due to the file size. Therefore, she should use a relational database. The candidate has shown good application to the scenario as well as benefits and

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
					drawbacks of both database types. They have made a valid recommendation which is justified.
			Total	9	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
2	a	- Relational data allows for less redundancy of data/less repeated data - Relational databases improve the consistency of data - Relational databases allow for complex queries and/or searches to be performed	AO1.2 (2)	<u>Examiner's Comments</u> This question was generally answered well, although some candidates did not use the correct terminology and therefore could not be given all the available marks.
	b	1 mark for each bullet point to max 2 marks: - One customer to many orders - Many orders to many products // One order to many orderLines and many orderLines to one product Solution 1: <pre> graph LR Customer[Customer] --- 1 Order[Order] Order --- many Product[Product] </pre> Solution 2: <pre> graph LR Customer[Customer] --- 1 Order[Order] Order --- many OrderLine[OrderLine] OrderLine --- many Product[Product] </pre>	AO3.1 (2)	Ignore any relationship between customer and product. Accept any suitable alternative name for the OrderLine entity. Additional guidance: For MP2, candidates may have avoided the use of many-to-many relationships, due to the information in part c). Therefore, allow one product to many orders. <u>Examiner's Comments</u> This question required candidates to correctly draw the relationships between the entities as explained in the question. Candidates were expected to indicate the relationships. Some candidates used either words or other symbols to indicate the relationships, therefore not achieving either of the available marks. Some candidates used a link entity to avoid a many to many relationship between product and order or indicated a relationship of one product to many orders. Either of these responses were acceptable.  Assessment for learning Appendices 5c in the specification shows the symbols used for entities and their relationships. Students need to be taught these to use in the exam.

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
	c	i	- A primary key will only appear once in a table/is a unique identifier - A foreign key may appear multiple times a table/may not be unique	AO1.1 (2)	Accept entity for table <u>Examiner's Comments</u> Many candidates were able to state what a primary key is, but did not state the difference between this and a foreign key and therefore did not achieve both marks.
		ii	<u>CustomerID</u> <u>ProductID</u>	AO2.2 (1)	Correct answer only <u>Examiner's Comments</u> This question was generally answered well, although some candidates lost marks for mis-spelling the foreign key or adding spaces, both of which are not permitted.
		iii	There may be duplicate values.	AO2.2 (1)	<u>Examiner's Comments</u> This question was generally answered well with many candidates gaining the mark.
			Total	8	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
3		i	- DELETE FROM TblAccessLog - WHERE UserType = "NotNeeded"	2	Do not accept DELETE * or inclusion of field names Need quotation on MP2 For field and table names, case must match - only penalise once and FT Do not award MP2 if == is used instead of = <u>Examiner's Comments</u> Many candidates gained the mark for the WHERE statement but less gained a mark for the DELETE statement.
		ii	- Each attribute name is unique - Primary key identified - No repeated attributes - All data in attributes must be atomic (cannot be further split up) // by example	2	Do not accept repeated data / data redundancy (higher than 1NF) unless specified that this is within one field Allow fields/properties as alternative to attribute <u>Examiner's Comments</u> There were some excellent responses to this question and most candidates were able to gain at least one mark.
		iii	- DateAccessed... ...has non-atomic data // data can be split up (into separate dates)	2	<u>Examiner's Comments</u> Very well answered and most candidates could identify the DateAccessed field as being where the problem lay.
			Total	6	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
4	a	i	• (Committed) data/transaction is not lost... • ...in case of power / system failure	2	
		ii	• Completed transactions stored in secondary storage // data not stored long-term in RAM/cache	1	
		iii	• The outcome of concurrent transactions is the same as if transactions were completed sequentially. • Record locking allows one user/process to access/modify record level data at any one time • So data that is being used elsewhere cannot be modified // data that is being modified elsewhere cannot be used	3	Allow reference to lost updates/dirty reads/phantom reads for BP3. Examiner's Comments For candidates with a good understanding of ACID, these questions were well answered. Unfortunately, some had only a vague knowledge or confused it with referential integrity. Some answers were unclear. Some candidates talked about locking the entire database when record locking rather than just the relevant records.
		iv	• Can cause delays (as users wait for access) • Can cause deadlock	1	Examiner's Comments Many candidates were given a mark for deadlock or longer wait times. Those candidates given a mark in Question 2 (d) (iv) tended to be those who has gained marks in Question 2 (d) (iii).
	b	i	• Field that is unique/does not repeat	1	
		ii	• Foreign Key: PackageType • Table Name: Membership	2	Must be spelled correctly Examiner's Comments Many candidates gained 1 mark for the foreign key and most gained both marks, although some candidates gave 'package' as the table where it is a primary key rather than the membership table where it is the foreign key.
		iii	• Float / Floating Point / Real	1	Allow currency/double/single/decimal
		iv	• Adverts	1	CAO

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
	c	- Username and FirstName fields (and no others) selected correctly using SELECT keyword - Membership / both tables correctly selected using FROM keyword - Tables joined using correct JOIN / INNER JOIN keywords // Tables joined using correct WHERE clause - Fields use table identifiers before them - WHERE clause used to correctly show only records where Adverts = true	5	For full marks, a fully correct working answer must be provided. Candidates can join tables in either of two valid ways (using JOIN or WHERE). Note that JOIN is given in the specification but INNER JOIN is also equally acceptable. BP1 is the same for either method For BP2, candidates can either choose just the Membership table or <u>both</u> the Membership and Packagetable BP3 credited for correct JOIN / INNER JOIN or correct use of WHERE clause to join tables. <u>Do not credit if FROM clause incorrect for this method</u> BP4 credited if candidates have used table identifiers before the field name (i.e they have used Membership.PackageType and not just PackageType) BP5 will require use of AND if WHERE is used to join tables. Spellings of all field names, table names and keywords must be accurate but only penalise once. <u>Example one using JOIN keyword</u> SELECT Username, Firstname FROM Membership JOIN Package on Membership.PackageType=Package. PackageType WHERE Adverts = true <u>Example two using WHERE clause</u> SELECT Username, Firstname FROM Membership, Package WHERE Membership.PackageType = Package.PackageType AND Adverts = true <u>Examiner's Comments</u> Many candidates were able to gain some marks. The question refers to the Adverts field which is in the package table and states that the data shown in the tables is only an extract from the tables. For full marks on this question, candidates were expected to attempt to join the two tables to access the Username and Firstname from the membership table, and the Adverts from the package table.

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
	d	i	- Form / web form - Can use validation to check for common errors... - Can check for duplicate values - Data can be entered direct into the database / limited manual processing - Can be done from remote locations	3	One mark maximum for identification of method Two marks for discussion of suitability Accept other valid methods of capturing data. Do NOT accept OCR/OMR/barcodes/QR codes If the method is incorrect, don't read on <u>Examiner's Comments</u> Few candidates were able to gain full marks on this question as many overcomplicated it or could not give a relevant data capture method. When they did give form as a relevant answer, they often had unclear suitability. Exemplar 2 Method Electronic form filled out by customer..... Suitability An electronic form can be processed automatically and details new customer details automatically added to the database. An electronic form is also suitable for the customer as it can be filled in at home..... [3] The candidate has given a valid method and has given clear and correct suitability by describing that the details could be automatically added to the database and can be filled in from home, which would be a remote location. The candidate gained the full 3 marks.
		ii	e.g. - CSV - JSON - XML - SQL - APIs - EDI - RSS - SOAP	2	<u>Examiner's Comments</u> Few candidates gained full marks on this question although there were a range of relevant responses they could have given.
			Total	22	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
5		i	- Field with a unique value - CustomerID	2 AO1.2 (1), AO2.2 (1),	
		ii	- SELECT CustomerID, Surname - FROM Customer - WHERE Title="Miss" - OR Title = "Mrs"	4 AO3.2	1 mark per bullet point. Data in fields must be in speech marks/apostrophes Allow speech mark/apostrophe FT for BP 2 and 4 Ignore colons/semicolons
		iii	- Only one customer entry allowed (because of key field) ...so would not be able to add second entry - Customer data already present/would be repeated resulting in redundant data/wasted space ...resulting in inconsistencies should changes be made	2 AO2.1	Mark in pairs.
		iv	- Add in second table ...for the cars // splitting up cars/customers - The primary key of customer is used as a field in the car/vehicle table ... as a foreign key of cars - Create one to many relationship. <i>Accept many to one.</i>	5 AO1.2	
			Total	13	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
6	a	i	• Client computers connect to server • Server provides access to a resource/service • In this case hotel staff use client computers to connect to database on server (or other sensible example).	3 AO1.2	
		ii	e.g. • only one point of failure • easier to manage users/access • Easier to backup • Easier to keep data secure. • Technicians can more easily remotely install / monitor.	2 AO1.1	
	b		• Joins computers/devices together on a LAN • Receives packets/data • Recipient's address is given in packet header/it uses the mac address • Send packets/data • Out the correct port /to the specific computer device	3 AO1.1	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
	c	Mark Band 3–High Level (7-9 marks) The candidate demonstrates a thorough knowledge and understanding of network security. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. Mark Band 2-Mid Level (4-6 marks) The candidate demonstrates reasonable knowledge and understanding of network security; the material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate provides a sound discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. Mark Band 1-Low Level (1-3 marks) The candidate demonstrates a basic knowledge of network security; the material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides a limited	9 AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	AO1 Malware and viruses are software that can have a negative impact on computer systems Spyware and keyloggers can record information entered and send back to a third party Phishing attacks attempt to steal data by fraudulently appearing as legitimate emails asking for secure information Denial of Service Attacks can overload a computer system with traffic and effectively disable access for legitimate users AO2 Hotel's systems could be disrupted by DDOS attacks so no external bookings able to be made. Phishing and spyware attacks may compromise visitor security and result in financial loss Malware, viruses could destroy hotel data Theft of customer data would be an issue under Data Protection Act / GDPR for which the hotel could be prosecuted AO3 Education for staff and customers is important to deal with recognising and dealing with threats Up to date software, limitations of use of devices such as USB sticks and restricted access to wireless networks can all limit risks. Use of Firewall to restrict traffic entering and leaving the network. Should be balanced against customer experience; will customers return if they have no access to It facilities?

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
			discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. 0 marks No attempt to answer the question or response is not worthy of credit.		
	d	i	-Customer, Room and Booking entities, must be singular -Customer joined to Booking and Room joined to booking and no other links -Customer to Booking relationship indicated as one-many -Room to Booking relationship indicated as one-many	4 AO2.2	<pre> graph TD Customer[Customer] --- one-to-many Booking[Booking] Room[Room] --- one-to-many Booking[Booking] </pre>
		ii	• A field that links to a (primary) key in a second table • Example : Customer ID // RoomID... • ... in Booking table	3 AO1.1 (1) AO2.1 (2)	
		iii	• Hashing for security • ...e.g. hash <u>passwords</u> in database • ...to make sure they cannot be read if they are stolen • Hashing for direct access • ...e.g. Customer/Room/Booking records can be quickly accessed • ...by using hash of index as address	4 AO1.2 (2) AO2.2 (2)	
	e		• Database/relationships are consistent // each foreign key links to an existing/valid primary key • Suitable example of being broken (e.g. if primary key is deleted/updated, foreign keys are no longer valid / changes should be cascaded)	2 AO1.1 (1) AO1.2 (1)	Accept example that is not related to the database given (as this is an AO1 question)
			Total	30	

Mark Scheme

Question		Answer/Indicative content	Marks	Guidance
7	a	– Ensuring that changes are consistent across a database – if a record is removed all references to it are removed – A foreign key value must have a corresponding Primary key value in another table. – In this case, a user being removed will result in their reviews being removed / a restaurant being removed will result in its reviews being removed. (1 mark per -, max 2 marks for explanation)	3 AO1.1 (2) AO2.1 (1)	<u>Examiner's Comments</u> In general, this question was poorly attempted by most candidates on two counts. Firstly, many candidates could not clearly explain the term 'referential integrity'. Secondly, some examples incorrectly stated that when a review is deleted, the corresponding User / Restaurant needs to be deleted.
	b	– A transaction / review can only fully complete or not complete / cannot partially complete – In this case, it should not be possible for the review to be added without the (average) rating being updated. (1 mark per -, max 2)	2 AO1.1 (1) AO2.1 (1)	<u>Examiner's Comments</u> This question was generally well attempted by most candidates. Those who did not gain credit referred to atomic being the lowest level of detail which is incorrect in this context.
	c	– Consistency – Isolation – Durability (1 mark per -, max 3)	3 AO1.1	<u>Examiner's Comments</u> Well attempted by most candidates. In general, candidates either scored three or zero marks.
		Total	8	

Mark Scheme

Question			Answer/Indicative content	Marks	Guidance
8	a	i	- No Repeating fields/data - Data is atomic - Has a primary Key (1 Mark per -, max 2)	2 (AO2.1)	<u>Examiner's Comments</u> The definition for 1NF was answered well by most candidates.
		ii	- Is in First Normal Form - Every field is dependent on the primary key. (1 Mark per -, max 2)	2 (AO2.1)	<u>Examiner's Comments</u> The definition for 2NF was not as well answered with most candidates omitting to state that the database must first be in 1NF.
		iii	- Has a transitive relationship/ A non-key field depends on another non-key field. - DestinationName depends on DestinationCode (1 Mark per -, max 2)	2 (AO1.2)	<u>Examiner's Comments</u> Fewer candidates scored well on this part of the normalisation question. Many identified that there was a transitive relationship between DestinationName and DestinationCode but few could describe this with clarity.
	b		- Gets/selects/outputs the flight numbers from the 'Flight' table - Of flights with the destination JFK - It returns OC0089 and OC7750 (1 Mark per -, Max 2)	2 (AO2.2)	<u>Examiner's Comments</u> Many candidates achieved full marks on this question. Candidates were credited for describing the statement and/or stating the output. Those who did not achieve full marks generally stated that the statement 'outputs the flight numbers of flights with the destination of JFK' omitting to state that the flight numbers will be extracted from the flight table.
			Total	8	