



12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over the flap and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

1	Student Number	1700481
2	Title of Examination Paper	Database Management systems
3	Module Code	ACCA5014
4	Date and Time of Examination	09/05/2019 at 9 AM
5	Examination Venue	IQ 112
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
Q1	23.5
Q2	19
Q3	19
Total	61.5

A. H. P.

SECTION A

Question 1.

a.i.

CREATE TABLE TutorBooking(

BookingRef CHAR(7) NOT NULL

CONSTRAINT CHK_TutorBooking_BookingRef CHECK (BookingRef LIKE 'BR[0-9][0-9][0-9][0-9]'),

BookingDate DATE NOT NULL,

TutorNo CHAR(7) NOT NULL,

StudentNo CHAR(7) NOT NULL,

SubjectID CHAR(7) NOT NULL,

SubjectLevel INT NOT NULL

CONSTRAINT DFT_TutorBooking_SubjectLevel DEFAULT('SubjectLevel', 1),

HourlyRate DECIMAL(4,2) NOT NULL -- Assuming hourly rate < 100

CONSTRAINT CHK_TutorBooking_HourlyRate CHECK (HourlyRate > 0.0)

);

7

a.ii.

ALTER TABLE TutorBooking

ADD CONSTRAINT PK_TutorBooking PRIMARY KEY(BookingRef)

1

a.iii.

ALTER TABLE TutorBooking

ADD CONSTRAINT FK_TutorBooking_TutorNo FOREIGN KEY REFERENCES Tutor(TutorNo),

ADD CONSTRAINT FK_TutorBooking_StudentNo FOREIGN KEY REFERENCES Student(StudentNo)

ADD CONSTRAINT FK_TutorBooking_SubjectId REFERENCES Subject(SubjectId)

2.75

a.iv.

CREATE TABLE TutorSubject(

TutorNo CHAR(7) NOT NULL

CONSTRAINT FK_TutorSubject_TutorNo FOREIGN KEY REFERENCES Tutor(TutorNo),

SubjectId CHAR(7) NOT NULL

CONSTRAINT TutorSubject_SubjectId FOREIGN KEY REFERENCES Subject(SubjectId),

KSLLevel BIT NOT NULL,

ALevel BIT NOT NULL,

HELevel BIT NOT NULL,

MinHourlyRate DECIMAL(4,2) NOT NULL,

MaxHourlyRate DECIMAL(4,2) NOT NULL

CONSTRAINT CHK_TutorSubject_MaxHourlyRate CHECK (MaxHourlyRate > MinHourlyRate),

CONSTRAINT PK_TutorSubject PRIMARY KEY(TutorNo, SubjectId)

);

b.i.

SELECT TutorNo, FirstName, Surname, Email, PhoneNo

FROM Tutor

WHERE DBSEpiryDate LIKE '%Jun-2019' -- a combination of > and < could also be used

ORDER BY DBSEpiryDate;

incorrect where

1.75

b.ii.

UPDATE TABLE Tutor

SET Status = 'Pending DBS Check'

WHERE DBSEpiryDate > Date.Now();

missy order by

less than not greater than

1.5

b.iii.

SELECT MIN(HourlyRate) AS MinimumRate, MAX(HourlyRate) AS MaximumRate, AVG(HourlyRate) AS AverageRate

FROM TutorBooking;

missy where

1.5

Q1 - 23.5

23 1/2

SECTION B

p3

Question 2.

a.

Conceptual schema refers to the relationship structure between tables in the database. Internal and external refer to physical storage medium.

2

b.i.

An index is used to improve query performance by mapping data to storage to be able to find a given piece of information faster. It can be likened to the index of a book – it tells you what "page" to find something, so that only that page needs to be searched.

2

b.ii.

It is important to analyse transactions because of the performance overheads that come with indexes. If indexes are used inappropriately, they could even worsen performance as the performance hit they give may negate the benefit.

Indexes should be implemented on:

6

- Columns which are part of a relation which is frequently used
- Columns which are frequently queried
- Columns which do not change frequently (as the index is remade each time its data changes)
- Tables with many records or many columns

b.iii.

In the Tutor table, the DBSEpiryDate would be appropriate for a clustering index.

not quite, needs to be combined with another column.

This is because it would be useful to sort tutors by nearest DBS Expiry in order to contact them first about having a DBS check.

SQL CODE:

CREATE INDEX IX_Tutor_DBSEpiryDate CLUSTERED INDEX (DBSEpiryDate);

incorrect syntax

1

b.iv.

For a secondary index, the City column would be appropriate. This would improve query performance because this column would be frequently queried to find tutors in a certain city, like:

SELECT * FROM TUTORS WHERE City = 'CityName';

2

b.v.

```
INSERT INTO TutorBooking(BookingRef, BookingDate, TutorNo, StudentNo, SubjectId)
VALUES (500, '09-May-2019', 66, 25, 100);
```

-- Booked on 9th May, exam date

One TutorBooking has many BookedLessons:

```
INSERT INTO BookedLesson(BookingRef, LessonDateTime, DurationMins)
VALUES (500, '30-May-2019 10:00', 120);
```

```
INSERT INTO BookedLesson(BookingRef, LessonDateTime, DurationMins)
VALUES (500, '31-May-2019 10:00', 120);
```

6

Q2 - 19

19

~~Q2~~

PS

Question 3.

a.

Database security threats include:

- Accidental damage / loss – An employee not competent in database administration could cause loss of data
- Malicious damage / loss – external hackers deleting or stealing data, wiping the original and asking for a ransom, or gaining access through social engineering. Internal threats also exist such as unhappy employees wishing to cause damage. This could cause the organisation time and money, and give a bad reputation if customer data was breached.
- Physical damage – a natural disaster could occur. If data is not properly backed up externally, it could be completely lost if storage media is damaged and data is corrupted. This could not only impact the organisation campus where it occurred due to natural disaster, but also any of the organisation's buildings which use the data.
- Data corruption due to power loss or power fault – This could damage hardware and also destroy data on site so an external backup is necessary

7

b.i.

Authentication may be used to ensure that a database user is who they claim to be. This can be used to ensure that only those with appropriate privileges can perform certain actions on the database. Authentication helps prevent a user's identity from being stolen. For example, somebody claiming to be an administrator would need to validate their identity before gaining access.

8

b.ii.

Access controls and user privileges can be used to ensure that specific database actions may only performed by certain people or groups of people. For example, a database administrator of an organisation may be allowed all privileges, but the CEO may only be allowed read (and possibly update) privileges. Other members of the organisation may then be allowed to insert, read and update specific columns or tables, dependent on their job role.

Access controls can be granted by users who currently have the permissions. When removing these permissions, a cascade option may be used to determine whether permissions should also be removed from the people they granted to.

b.iii.

Views may be used to select all appropriate data, but only display portions of it to the user dependent on their access rights. For example, A student may be able to see a list of all other students in their class, but not see these student's details, whereas a lecturer would have access to this information.

pl6

c.

CREATE VIEW ActiveTutors(
SELECT FirstName, Surname, Email, City, Subject FROM Tutor;
~~SELECT~~ MinHourlyRate, MaxHourlyRate FROM TutorSubject
INNER JOIN TutorSubject.SubjectId = Subject.SubjectId;
);

miss join
missing where
slightly wrong syntax

4

19

Q3 - 19.

