



Examiner Only

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 and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible answers 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	1702463
2	Title of Examination Paper	DATABASE MANAGEMENT SYSTEMS
3	Module Code	ACCA5014
4	Date and Time of Examination	09/05/2019 9:02am
5	Examination Venue	Swansea 1Q 310
6	Seat Number	G026
7	Number of Answer Books handed in	1

List the numbers of the questions you have attempted	Office Use
Q1	22.25
Q3	20.75
Q4	15.5
Total	58.5

(Gweler yr ochr arall am y fersiwn Cymraeg)

Student Number: 1702463.....

Time	T ₁	T ₂	bal _x (£500)
t1		BEGIN TRANS	500
t2	BEGIN TRANS	Read bal _x	500
t3	Read bal _x	bal _x = bal _x + 100	600
t4	bal _x = bal _x - 50	Write bal _x	550
t5	...	COMMIT	550
t6	Write bal _x		550
t7	COMMIT		550

Table 1: Table for Question 4c.ii.

not quite -

1.a)i) CREATE TABLE TutorBooking (

BookingRef	CHAR (6) NOT NULL,
Booking Date	DATE CONSTRAINT
	CHK_BookingDate (BookingDate)
	CHECK LENGTH (10) <i>not quite</i>
Tutor No	CHAR (6) NOT NULL,
Student No	CHAR (6) NOT NULL,
Subject Id	CHAR (6) NOT NULL,
Subject Level	VARCHAR (20) NOT NULL
Hourly Rate	DECIMAL (10, 2) NOT NULL

) *6.75*

ii) ALTER TABLE TutorBooking ADD
CONSTRAINT BookingRef ~~CHAR (6)~~
CONSTRAINT PK_TutorBooking_BookingRef
PRIMARY KEY *1*

iii) ALTER TABLE TutorBooking ADD
CONSTRAINT TutorNo FK_TutorBooking
TutorNo FOREIGN KEY (TutorNo) Tutor

ALTER TABLE TutorBooking ADD
CONSTRAINT StudentNo FK_TutorBooking
StudentNo FOREIGN KEY
(StudentNo) Student

ALTER TABLE TutorBooking ADD
CONSTRAINT SubjectId FK_TutorBooking
SubjectId FOREIGN KEY (SubjectId)
Subject

missing references *2.5*

iv) CREATE TABLE TutorSubject (

TutorNo CHAR (6) NOT NULL
 CONSTRAINT PK_TutorSubject
 TutorNo PRIMARY KEY,
~~Title~~ ~~VARCHAR (4) NOT NULL,~~
~~First Name~~ ~~VARCHAR (20) NOT NULL,~~
 SubjectId CHAR (6) NOT NULL
 CONSTRAINT FK_TutorSubject
 SubjectId FOREIGN KEY
 (SubjectId) Subject
 KS Level VARCHAR (20) NOT NULL,
 A Level VARCHAR (20) NOT NULL,
 HE Level VARCHAR (20) NOT NULL,
 Min Hourly Rate DECIMAL (10, 2) NOT
 NULL,
 Max Hourly Rate DECIMAL (10, 2) NOT
 NULL)

incorrect
FK, PK
and check
constraints

1. b) i) SELECT TutorNo, ~~First~~ First Name,
 Surname, Email, PhoneNo,
 DBS Expiry Rate
 FROM Tutor
 WHERE DBS Expiry Date ~~DATE~~
 BETWEEN ('~~01~~³¹ - ~~06~~⁰⁵ - 2019')
 AND ('01 - 07 - 2019')

missing ORDER BY

ii) UPDATE Tutor^{ser} status = 'Pending PS
~~WHERE DBS Check~~
 WHERE status = 'Expired' ← not quite

iii) SELECT MIN (HourlyRate) AS Min HourlyRate,
 MAX (HourlyRate) AS Max HourlyRate,
 AVG (HourlyRate) AS Avg Hourly Rate
 FROM Tutor Booking
 WHERE ~~BOOKING~~ BookingDate BETWEEN



('31-12-2018') AND ('01-01-2020')

3. a) One threat to database security is loss of confidentiality. Confidentiality is that a user's information and company information should be kept secure so as to ensure the safety of our country's sensitive information. One way this can be lost is by ~~hardware~~ database administrators placing weak protection on vulnerable data which allows users with malicious intent to gain access. Another threat to database security is loss of integrity. Integrity means to only allow authorised and authenticated users the rights to update data in order to keep data trustworthy and reliable. An example of this is poor authentication rules meaning hackers can get the authentication they need through scaring the user or pretending to be someone from the company. The risk this poses is they will gain whatever authorisation that user had to the database, and if it is a real company they can find out secrets and gain sensitive information.

A third threat to database security is loss of availability. Availability is having the database up-to-date and available whenever a user needs it. This can be

lost by hardware failing or being damaged in a fire or flood. The software could also fail. This is a risk to the organisation as any time the database is offline means a loss in business and prolonged ~~access~~ unavailability could lead to closing the business. A final threat to database security is poor security rules and policies set by the organisation. This can lead to employee incompetence and opens the organisation up to multiple threats e.g. loss of data, allowing hackers access to data and unpreparedness in case of emergencies e.g. no backup recovery plan.

(8)

b) i)

The DBA can use authentication by using user logins and passwords for the database.

ii) The DBA can use access controls and user privileges by granting certain users access to certain tables. They can also grant them permission to grant other users with access. This means that users will only be allowed access to what they have permission for and reduces the risk of loss of confidentiality and integrity. The DBA can also grant them ~~permission~~ privileges to update columns of a table or a whole table. ✓

iii) The DBA can use views by ~~allow~~ creating views with only data that is authorised to specific users. With views, the user will not be aware of any columns that are missing. For example, a view may contain employee details but not their salary ~~for~~ for employees but managers and HR may have access to the full table and view the salary. ✓

(7)

C. CREATE VIEW ActiveTutors AS ~~SELECT~~
 TutorNo, FirstName, Surname, Email,
 City, ^{status} FROM Tutor AND
 SubjectId, KSLerel, ALerel, HE Lerel,
 MinHourlyRate, MaxHourlyRate
 WHERE status = 'Active'.

misspelled
and alias.

5.75

Q3 - 20.75

4.a). Atomicity is the first property of transactions. This means transactions are "all or nothing" and can only be committed once they are complete. Consistency is the second property and it means that the database should always move from one consistent state to another. This is the role of concurrency control. Isolation is the third property and it means each transaction should not be affected by the intermediate results of another transaction. Durability is the fourth property and it means that transactions once committed cannot be undone and affected by failed transactions.

b) Concurrency control allows transactions to perform in order and only be committed once ^{there} they

are no errors. ✓ (0.5)

c) i) Lost updates are when the committed transactions of a user are overridden by another user. ✓
~~to these~~ Uncommitted dependency is when the intermediate actions of a transaction affect another transaction. Inconsistent analysis is when the effects of a transaction affect the do not take effect. ✓

c) ii) The lost update problem occurred because T_1 was reading the balance after T_2 had already deposited £100. It can be prevented using two phase locking so only the person with the exclusive lock can read or write, ~~to the~~ and ~~it is not~~ the other person can only get a shared lock so they can only read it. table not correct
 Interleaving can also prevent it or ~~last~~ timestamping so the first person to start the step-by-step explanation transaction goes can do it first then it commits and goes to the next. 2.5

d) Any transactions after the checkpoint need to be redone as they have not been committed to secondary storage.

ii) Any transactions before ^{after} the commit need to be redone. ✓

You need to specify which ones and after what be more specific about after what

iii) ~~T2~~ will not be affected as it
is ^ before the ~~check~~ checkpoint.
committed

(1.5)

Q4 - 15.5

15 1/2