MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

TIS3351 – Advanced Database

(All sections / Groups)

24th OCTOBER 2017
2.30 pm – 4.30 pm
(2 hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of 6 pages, including the cover page, with four questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please print all your answers in the answer booklet provided.

PART A: ANSWER ALL QUESTIONS [30 marks]

The following is a relational schema of The Trio Medical Clinic. The primary key for all the relations are underlined and the foreign keys are in *italic*.

PATIENT (PatID, PatName, PatContact, PatBalance)

DOCTOR (DocID, DocName, DocSpeciality)

APPOINTMENT (AppID, AppDate, AppTime, AppSchedule, *PatID, DocID*)

VISIT (VisID, *PatID, DocID*, VisDate, VisTime)

VISIT_DETAIL(DtlID, VisID, DtlDiagnosis, DtlCharge)

BILLING (BillID, BillDate, TotalCost, *VisID*)

PAYMENT (PayID, *BillID,* PayType, PayAmount, *PatID*)

Based on the relational schema above, answer Questions 1 to 3.

Question 1 [10 marks]

a) Assumed that tables PATIENT and DOCTOR have been created, write the SQL command to create table APPOINTMENT. The data types or constraints of the table are shown below:

Attribute	Data Type / Constraint
AppID	Identity column with the starting value of 1000, and increased by 1 for each new row entered.
AppDate	The date when the assignment is assigned. Default to the CURRENT Date.
AppTime	The time of the appointment, e.g. 10.00.00 for 10a.m. Ensure that it does not allow null.
AppSchedule	The tentative date for the next appointment.
AppStatus	The status of the Appointment. Ensure that it falls within the followings: New, Confirm, Cancel.
PatID	The ID of the patient.
DocID	The ID of the doctor.

The SQL command must include the entity and referential integrity constraints.

[3 marks]

Continued...

b) Write a SQL command to list all the patient names, patient contact, appointment date, and appointment time for all appointment under 'Confirm' status between the duration of January 1st, 2017 until February 15th, 2017 for doctor named 'Aisyah Ali'.
[2 marks]

c) Create a view to count the number of bill grouped by patient name.
[2 marks]

d) Write a trigger to update the column TotalCost in the BILLING table based on the total in the DtlCharge in the VISIT_DETAIL whenever a new record is inserted.
[2 marks]

e) List all the patients without contact numbers. [1 mark]

Question 2 [10 marks]

A data warehouse is created to record the hours that a doctor is seeing his patient based on the appointment schedule. The table below shows some sample records in the fact table.

Fact Table – EMP_LOG

TimeID	DocID	PatID	BranchID	Hours
11/1/17	D1002	P1001	B1234	2
11/1/17	D1002	P1002	B1234	1
14/1/17	D1001	P1001	C1111	2
16/1/17	D1001	P1001	C1111	1
18/1/17	D1001	P1001	N1111	2
18/1/17	D1002	P1005	B1234	3
18/1/17	D1003	P1004	B1234	4

a) Based on the fact table given above, draw **star schema** for the data warehouse, including the dimension tables. Include all the appropriate attributes in the dimension tables.
[4 marks]

Continued...

b) Assume that there are 80 records in each of the four dimension tables, calculate the size for the fact table in terms of number of rows. [1 mark]

c) Calculate also the size for the fact table in terms of bytes. Assume that there are six fields in the fact table with average of five bytes per field. [1 mark]

d) Draw the *Emp_Log* relation in temporal database. Doctors are identified by *DocID*, Patients are identified by *PatID*, while the number of hours are indicated in integer.

- On 11th January, Doctor D1002 seen Patient P1001 for 2 hours, and Patient P1002 for 1 hour.
- From 14th January to 16th January, Doctor D1001 seen Patient P1001 for 3 hours.
- On 18th January, Doctor D1001 has seen Patient P1001 for 2 hours.
- On 18th January, Doctor D1002 has seen Patient P1005 for 3 hours.
- On 18th January, Doctor D1003 has seen Patient P1004 for 4 hours.

Illustrate the *Emp_Log* relation graphically. [4 marks]

Question 3 [10 marks]

a) In the context of distributed database, explain hybrid fragmentation. Briefly illustrate it with any example. [2 marks]

b) Draw the object representation for DOCTOR, PATIENT, and APPOINTMENT should the company intend to migrate to Object-oriented database. [3 marks]

Continued...

c) Answer Question 3(i) and 3(ii) with regards to two-phase locking protocol in concurrent transaction.

(i) Explain the two phases involved in the two-phase locking protocol.

[3 marks]

(ii) Based on the schedules as illustrated below, which one demonstrated two-phase locking protocol? Explain your answer. [2 marks]

Schedule 1

T1	T2
lock(A)	
lock(B)	
unlock(A)	
	lock(A)
lock(C)	
unlock(B)	
	lock(B)
	unlock(A)
	unlock(B)
unlock(C)	

Schedule 2

T3	T4
lock(A)	
	lock(B)
lock(C)	
	unlock(B)
unlock(A)	
unlock(C)	

Question 4 [10 marks]

a) Convert the following ARTICLE table into XML Version 1.0 representation.

[3 marks]

Table name: ARTICLE

Art_No	Art_Title	Art_Type	Volume	Issue
1810	Challenges and Opportunity in Semantic Web	Journal	12	1
2111	Logic in Programming	Conference		

Continued...

b) Give ONE difference between query with parent-child relationship and query with ancestor-descendant relationship. Then, give the XPath representation of these queries based on the answer from 4 (a).

[2 marks]

c) MongoDB is a document-based NoSQL database, which works on the concept of collection and document. Suppose you have a collection of **Member** as follows. Answer Question 4(i) to 4(iii) based on the collection.

```
{
"_id" : ObjectId("50c598f577894fb5f92efb96"),
"first_name" : "Lim",
"last_name" : "Yong",
"member_id" : "12311",
"book" : [
    "In the Jungle",
    "Three Little Kittens",
    "The White Bear"
]
}
```

(i) Write the command to insert the collection into **Member**.

[1 mark]

(ii) Using the update() function, modify the first_name for member with id 12311 to 'Jammy'.

[2 marks]

(iii) Count the number of books borrowed by each member. [2 marks]

End of Page.