UNIVERSITY OF BOLTON

WESTERN INTERNATIONAL COLLEGE FZE

BSc (HONS) COMPUTING

SEMESTER ONE EXAMINATION 2018/2019

DATABASE THEORY AND PRACTICE

MODULE NO: CPU5002

Date: Saturday 12th January 2019 **Time: 2:00 PM – 4:00 PM**

INSTRUCTIONS TO CANDIDATES:

There are two sections on this paper.

Answer ANY TWO questions from Section A and ANY TWO questions from Section B.

All questions carry equal marks.

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Section A –Database Issues

Q1. Database Theory

a. In the database context, what do we mean by redundant data? Why might it be a bad idea to have redundant data in a database?

(3 marks)

b. Define the following terms in brief

(i) Domain integrity

(1 mark)

(ii) Weak entity set

(1 mark)

(iii) Metadata

(1 mark)

(iv) Schema

(1 mark)

c. Define the following terms in brief with an example

(i) Hierarchical DBMS

(2 marks)

(ii) Multi-valued attribute

(2 marks)

(iii) Derived attribute

(2 marks)

d. Consider the following table definitions and answer the following questions.

Supplier(sid:integer, name:string, postcode:string)
Parts(pid:integer, name:string, description:string)
SuppliedBy(sid:integer, pid:integer, weight:integer)

i. How many attributes are shown in the *Parts* table?

(1 mark)

ii. Identify the foreign keys in *SuppliedBy* table. Explain what this means, in terms of what this tells us about the values in these columns.

(2 marks)

e. Discuss the reasons for the three-level architecture for a database management system. Support with required diagram and discuss the three levels with suitable examples.

(6 marks)

f. How the architecture helps to achieve logical and physical data independence in a database?

(3 marks)

Total 25 marks

Please turn the page

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Q2. Normalization

a. Based on table1 Project_Details, answer the following questions.

Table 1. Project_Details

ProjNumber	DeptNumber	ProjName	DeptName	Duration
P01	D07	Portal Development	HR	12
P01	D07	Portal Development	Sales	12
P02	D03	Data warehouse	Sales	8
P02	D03	Data warehouse	HR	8

(i) Identify functional dependencies in the above table.

(3 marks)

(ii) Explain what is meant by "partial dependency" in a table. Identify any partial dependencies in the above table.

(3 marks)

(iii) Show the anomalies in the above table and discuss about it.

(6 marks)

b. Consider the relation,

Inventory(Manufacturer, Brandname, ItemId, Weight, Store).

An example record is given here.

(Kellogg's Company, Rice krispies, K12, 50gm, LuLu)

This relation stores the items that a grocery store stocks. Each tuple in relation Inventory represents the fact that a store sells an item of a particular brand name manufactured by a particular company alongwith its weight.

Convert the following sentence in English about Inventory into functional dependency.

"A particular item specifies its manufacturer and brand name."

(2 marks)

Q2 Continued over the page

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Q2 continued.

c. The table 2 given below shows the details of items with their cost details.

Table 2. Items

ITEM	COLOUR	PRICE (AED)	TAX
T-shirt	Red, blue	12	0.50
Pants	Black, blue	25	2.50
Skirts	Pink, Yellow	15	1.50
Sweaters	Brown, Red	20	2.00
Socks	Black, Blue	6	0.20

Using this data, perform the Normalization for Table 2 into first, second and third normal form. For *Items* table, identify the reason for violation of each Normal Form. Show how you would normalize the *items* table with possible solutions.

(11 marks)

Total 25 marks

Q3. **Structured Query Language (SQL)**

Consider the following three tables, representing Insurance database. Write the SQL queries for the specified questions and sample output for the same.

Table 3: Customer (CustID, Name ,Cust_Gender,Cust_Mobile)

CustID	Name	Cust_Gender	Cust_Mobile
C101	Peter	M	05555555
C102	John	M	05444444
C103	Susan	F	05676666
C104	Diana	F	05777777
C105	Leona	F	05888888

Table 4: Policy (Policy_number,Start_date,Expiry_date,Cust_Id,Policy_amount)

Policy_number	Start_date	Expiry_date	Cust_Id	Policy_amount
P551	12/07/2018	31/05/2019	C101	AED 22,000.00
P552	18/05/2018	13/03/2019	C102	AED 12,000.00
P553	13/01/2018	28/02/2019	C103	AED 8,000.00
P554	22/05/2018	14/01/2019	C101	AED 10,000.00
P557	16/04/2018	18/02/2019	C105	AED 25,000.00

Q3 Continued over the page

Please turn the page

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Q3 continued.

Table 4: Payments(Payment_ID, Policy_number, Payment_amount, Payment_Date, Receipt_number)

Payment_ID	Policy_number	Payment_amount	Payment_Date	Receipt_number
111	P551	AED 2,000.00	12/07/2018	R17
112	P553	AED 1,000.00	18/05/2018	R12
113	P557	AED 8,00.00	13/01/2018	R15
114	P554	AED 1,500.00	22/05/2018	R23

a. Search and display the policy details of a customer based on customer name as “John”

(2 marks)

b. The policies which are going to expire by 30th January, 2019 need to be identified and customers need to be informed through registered mobile. So find the customer details to inform them and display them in the order of early expiry date of the policy at the top.

(3 marks)

c. Find the number of female customers for the insurance company.

(2 marks)

d. Find the policy numbers which do not have any payments.

(3 marks)

e. Insert a Payment for the policy_number P552 in the Payment table on 25th February, 2019.

(2 marks)

f. Update the expiry date of his policy as 19th March, 2019 for the customer named “Peter”

(3 marks)

g. Change the payment table so that it won’t accept a negative value for payment_amount.

(3 marks)

h. Calculate and display the total payment done for each policy based on policy_number.

(3 marks)

i. Using your own specific examples, illustrate “Outer join” in SQL.

(4 marks)

Total 25 Marks

Please turn the page

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Section B: Data formats, Security and web interfaces to databases

Q4. Web access to databases

a. Write a PHP script, to show how the information submitted to a web form can be saved to a MySQL database table named *Mobiles* which has 4 fields named: MobileNumber, ModelName, Cost, and Year. The HTML form has 4 fields (MobileNumber, Model, Cost, and Model of the Year) which should match the 4 fields of the table *Mobiles*. Write the PHP script for the necessary steps to establish a connection to the database. Data need to be entered into table using the form.

(11 marks)

b. Write an XML file suitable for holding details of different products. Use it to hold the following information for each product: productID, productName, category and price. Show the XML file populated with data relating to any 2 products including an attribute for each product element to provide additional information.

(7 marks)

c. Write a PHP script to extract the information from the XML file of Q4b into PHP using pre-defined function. Then display the contents as a report for product name and cost using PHP scripting.

(7 marks)

Total 25 Marks

Q5. ER Data Modeling

a. You have to design a database that manages information about publishers, authors and books. Some information includes:

A publisher has a name, an address, a pub_email_Id and a phone number for the headquarters. Each publisher also has a set of branches; each branch does have address and three phone numbers. An author has a name, auth_emailId and designation. A book will have book title, ISBN number, and version. Also, a book is published by a publisher and has a list of authors associated with it. An author can publish several books and a book can be published by at most one publisher.

(8 marks)

Q5 Continued over the page

Please turn the page

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Q5 continued.

b. Suppose we wish to implement this diagram in a relational database using three tables, S, T and R. Describe the schema you would use for R depending on the cardinality of the relationship.

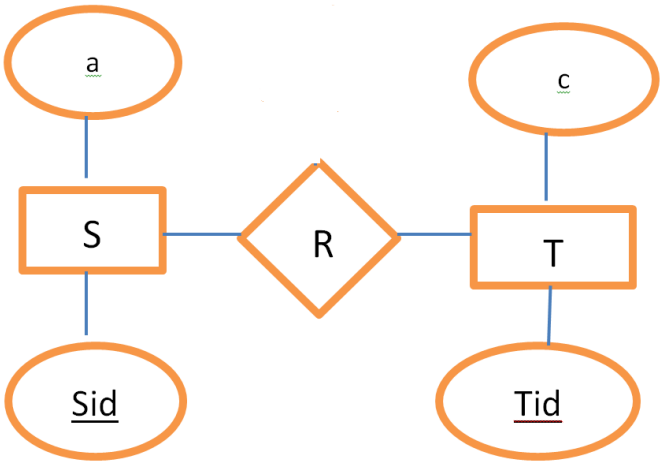

Figure 1. Sample ER diagram

i) When R is a many-to-many relationship between S and T.
(2 marks)

ii) When R is a one-to-many relationship between S and T.
(1 mark)

iii) When R is a one-to-one relationship between S and T.
(1 mark)

c. Distinguish between specialization and generalization. How will you represent generalization in an ER diagram?
(3 marks)

d. Analyze the difference between XML and HTML.
(4 marks)

e. GET and POST are two methods used to process the Form data in a PHP script. Which is the most preferred approach and justify your answer?
(6 marks)

Total 25 marks

Please turn the page

Western International College FZE
BSc (Hons) Computing
Semester 1 Examination 2018/2019
Database Theory and Practice
Module No. CPU5002

Q6. Database Security

a. Discuss about SQL injection attack. Write two statements for avoiding SQL injection attacks.

(5 marks)

b. Discuss the various aspects of Database Security.

(6 marks)

c. Give the syntax to create an index in SQL to improve the performance.

(2 marks)

d. Discuss the role of DBA in terms of Database Security.

(2 marks)

e. Discuss the difference between View and base relation

(2 marks)

f. Write the SQL query that would produce a view called *Student_Grade_Report(StudentNo,StudentName,Dept,CourseNo,Grade)* for the Tables named *Student (StudentNo, StudentName, Dept)* and *CourseGrade (StudentNo, CourseNo, Grade)*.

(3 marks)

g. Discuss the DCL SQL commands

(3 marks)

h. List the privileges that can be granted to a user.

(2 marks)

Total 25 marks

END OF QUESTIONS