

UNIVERSITY OF BOLTON
OFF CAMPUS DIVISION
WESTERN INTERNATIONAL COLLEGE FZE
BSC(HONS) COMPUTING
TRIMESTER ONE EXAMINATION 2021/2022
DATABASE THEORY AND PRACTICE
MODULE NO: CPU5002

Date: Friday 7th January 2022

Time: 10:00 – 12:00

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.

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Section A –Database Issues
Answer TWO questions from this section.

Q1.

a. Discuss any two advantages of Database Management Systems with suitable examples.

(4 marks)

b. Explain relational model with example

(2 marks)

c. Explain the following attributes with example

- i. Composite attributes
- ii. Multi-valued attributes
- iii. Derived attributes

(3 marks)

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

(8 marks)

e. For each of the following terms, explain in DBMS concept and give an example based on the *Table 1. Employee*

Table 1. Employee

Employee_ID	FirstName	LastName	Gender	Birth_Date	Phone_Number
E1	Tommy	Peter	Male	24-Jan-90	0505322341
E2	Sana	Ahmed	Female	12-Feb-84	0507427005
E3	Anne	Mary	Female	03-Dec-76	0523476787
E4	Anil	Jose	Male	15-Jun-98	0523812348

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Q1 continued...

- i. Primary Key (2 Marks)
- ii. Schema (2 Marks)
- iii. Data Dictionary (2 Marks)
- iv. Attribute (2 Marks)

Total 25 marks**Q2.**

- a. Consider the following tables of a University's database. *Table 2* comprises student's information, *Table 3* comprises course information, and *Table 4* comprises enrollment information. The enrollment table (*Table 3*) will be making links to the student table, as well as the course table. A student opts for a particular course in the university, and this creates an entry in the enrollment table.

Table2: Student (s_id,s_name,s_grade,address)

s_id	s_name	s_grade	Address
s1	Anna	A	Ajman
s2	Sam	B	Sharjah
s3	Mohammed	A	Dubai

Table 3: Course (c_id,c_name,professor)

c_id	c_name	Professor
c1	E-Commerce	Mr Edward
c2	Data Structures	Ms Anu
c3	Data structure	Ms Sara

**Q2 continued over the page....
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Q2 continued...*Table 4: Enrollment (e_id,s_id,c_id)*

e_id	s_id	c_id
e10	s1	c1
e11	s2	c2
e17	s3	c3

- i. Explain the Foreign key and its importance based on the scenario given.
(3 marks)
 - ii. Write the query for enrollment table creation with the required primary key and foreign keys.
(3 marks)
 - iii. Explain the four referential actions of the foreign key constraint based on the scenario given.
(4 marks)
- b.** Briefly explain why a table that is in 1st Normal Form and has no composite primary key is automatically in 2nd Normal Form.
(2 marks)
- c.** Explain the following Aggregate functions using examples.
- i. MAX()
 - ii. SUM()
 - iii. COUNT()
 - iv. AVG()

(4 marks)**Q2 continued over the page...****PLEASE TURN THE PAGE.....**

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Q2 continued...

- d. *Table 5: Student* shown below stores details of students and the overall grade each student obtained in different modules. The Primary Key is (StudentID, ModuleID).

Table5: Student

StudentID	StudentName	ModuleID	ModuleName	Grade
S001	Sana	M01	Java	A
S001	Sana	M02	DBMS	B
S002	Ahmed	M01	Java	B

- i) Identify one functional dependency in *Table 5*
 (2 marks)
- ii) Which Normal Form does the *Table 5* violate and why?
 (2 marks)
- ii) Show how you would normalize the *Table 5* with possible solutions.
 (5 marks)

Total 25 marks**PLEASE TURN THE PAGE.....**

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Q3.

Consider the following three tables *Table 6*, *Table 7* and *Table 8*, representing Progressive Insurance database. Write the SQL queries for the following questions.

- a. Add a new field "Passport_Number" to the customer table
(3 marks)

- b. Search and display the policy details of a customer based on customer name as "Anne"
(2 marks)

- c. Find and display the number of male customers for the insurance company.
(2 marks)

- d. The policies which are going to expire on or before 27th June, 2021 need to be identified and customers need to be informed through registered mobile. So find the customer details and display the details in the order of early expiry date of the policy at the top.
(3 marks)

Table 6: Customer (CustID, Name ,Cust_Gender,Cust_Mobile)

CustID	Name	Cust_Gender	Cust_Mobile
C101	Diana	F	055555556
C102	Peter	M	054444449
C103	Susan	F	056766668
C104	Sara	F	057777774
C105	Leo	M	058888889
C106	Patrick	M	055578786
C107	Anne	F	056744487

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Q3 continued....

Table 7: Policy (Policy_number, Start_date, Expiry_date, Cust_Id, Policy_amount)

Policy_number	Start_date	Expiry_date	Cust_Id	Policy_amount
P551	19/07/2020	31/07/2021	C101	AED 32,000.00
P552	27/08/2020	15/08/2021	C102	AED 22,000.00
P553	05/06/2020	24/04/2021	C103	AED 16,000.00
P554	21/08/2020	18/04/2021	C101	AED 8,000.00
P557	29/04/2020	19/05/2021	C105	AED 27,000.00
P661	18/08/2020	15/10/2021	C107	AED 45,000.00

Table 8: 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	21/08/2020	R17
112	P553	AED 1,000.00	18/09/2020	R12
113	P557	AED 8,00.00	17/07/2020	R15
114	P554	AED 1,500.00	12/11/2020	R23
115	P661	AED 2,000.00	01/10/2020	R25

e. Rename the table name of *table 7:Policy* to Policy_details.

(2 marks)

f. Update the expiry date of his policy as 19th March, 2021 for the customer named "Diana"

(3 marks)

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

(3 marks)

h. Explain the use of Group By, Having and Order By clauses in SQL with an example

(3 marks)

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Q3 continued...

- i. Using your own specific examples, illustrate the following SQL querying techniques:

(i) Inner Join

(2 marks)

(ii) Right outer join.

(2 marks)

Total 25 Marks

END OF SECTION A

PLEASE TURN THE PAGE FOR SECTION B.....

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Section B: Data formats, Security and web interfaces to databases
Answer TWO questions from this section.

Q4.

- a. Among the three models, conceptual, internal and physical, which one will be used by the Database designer to explain the database project to a naive customer? Why?

(3 marks)

- b. 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.

Using a recognised modelling notation of your choice, draw an Entity-Relationship model for the given above, which shows the entity types, with corresponding attributes, primary keys and also the relationships between the entities. For each relationship, show their degree. State any assumptions you make to fill any gaps in the scenario.

(12 Marks)

- c. Explain the term cardinality in ER modelling. Also, explain the types of cardinality with examples based on question b.

(5 marks)

- d. Distinguish between specialization and generalization. How will you represent generalization in an ER diagram?

(5 marks)

Total 25 marks

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Q5.

- a. Write the code to create a HTML form for a car registration page of a company which has 5 fields (VehiclePlateNumber, Model, OnRoadCost, OwnerDetails and Model of the Year) which should match the 5 fields of the of the MySQL databasetable Cars. Write the PHP script to show how the information submitted to the web form can be saved to the table named cars.

The PHP script should include the necessary steps to establish a connection to the MySQL database and add a row inside the table using the provided Form data. It means data need to be entered into table using the form.

(10 marks)

- b. Write an XML file suitable for holding details of phonebook. Use it to hold the following information for each contact: contact ID, contact Name, mobile number, email_ID and address. Show the XML file populated with data relating to any three contacts.

(8 marks)

- c. Compare and contrast Get and Post methods in PHP.

(4 marks)

- d. Differentiate XML and HTML.

(3 marks)

Total 25 Marks

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Q6.

- a. Discuss the role of DBA in terms of Database Security. **(4 marks)**
- b. Discuss 4 methods used to implement database security. **(6 marks)**
- c. Describe 'SQL injection attack' and briefly describe 5 design principles that can be followed to reduce the risk of such an attack. **(7 marks)**
- d. Identify a reason why an attribute would have an index associated with it in a relational table. Write the SQL syntax to create an index. **(4 marks)**
- e. Explain what a view is, and why it might be used. **(4 marks)**

Total 25 marks

END OF SECTION B

END OF PAPER

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