



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMPUTING AND INFORMATICS**

**DEPARTMENT OF COMPUTER SCIENCE**

<b>QUALIFICATION: BACHELOR OF COMPUTER SCIENCE, BACHELOR OF GEOMATICS, BACHELOR OF LAND ADMINISTRATION, BACHELOR OF GEO INFORMATION TECHNOLOGY, BACHELOR OF INFORMATICS, BACHELOR OF COMPUTER SCIENCE IN CYBER SECURITY, DIPLOMA IN GEOMATICS</b>	
<b>QUALIFICATION CODE: 07BACS, 07GITB, 07BLAD, 07BGEM, 07BCCS, 07BGEI, 07BAIT, 06DGEM,</b>	<b>LEVEL: 5</b>
<b>COURSE CODE: DBF510S</b>	<b>COURSE NAME: DATABASE FUNDAMENTALS</b>
<b>SESSION: JULY 2022</b>	<b>PAPER: THEORY</b>
<b>DURATION: 2 HOURS</b>	<b>MARKS: 100</b>

<b>SECOND OPPORTUNITY / SUPPLEMENTARY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	<b>MS TERESSA CHIKOHORA , MS. SHILUMBE CHIVUNO-KURIA , MS. JOSEPHINA MUNTUUMO, MR RIAHAMA MUSUTUA, MR HEKEREKO KAVIMAKA</b>
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<b>INSTRUCTIONS TO CANDIDATES</b>
<ol style="list-style-type: none"><li>1. Answer ALL questions in ALL sections of this paper.</li><li>2. Please, ensure that your writing is legible, neat and presentable.</li><li>3. Number your answers clearly on the answer booklet provided.</li><li>4. Write your student number, study mode and group number clearly on your answer booklet.</li></ol>

**THIS QUESTION PAPER CONSISTS OF \_6\_ PAGES (Including this front page)**

## SECTION A MULTIPLE CHOICE (20 MARKS)

1. The relationship between the instances of a single entity type is called a(n)\_\_\_\_\_
  - A. Ternary
  - B. Primary
  - C. Binary
  - D. Unary
  
2. A business rule\_\_\_\_\_
  - A. Defines or constrains some aspect of the business
  - B. Asserts business structure
  - C. Controls or influences the behaviour of the business
  - D. None of the above
  
3. A local area network-based environment in which a database server performs commands sent to it from the client workstation is called a(n) \_\_\_\_\_ architecture.
  - A. Workstation/server
  - B. Database/workstation
  - C. Server/client
  - D. Client/server
  
4. Which statement should you use to delete entire contents of a table
  - A. ALTER TABLE
  - B. DELETE TABLE
  - C. DROP TABLE
  - D. TRUNCATE TABLE
  
5. Which of the following are valid Data Definition Language (DDL) commands?
  - A. ALTER
  - B. INSERT
  - C. DELETE
  - D. CREATE
  
6. What is a primary key?
  - A. Allows us to access any field immediately like in RAM
  - B. Allows us to select which fields can be linked to other databases
  - C. It is a unique key that is an index to the data
  - D. It is a key that references another key in a relating table

7. You issue the following command to drop the PRODUCTS table

```
DROP TABLE PRODUCTS;
```

Which **three** statements are true about the implication of this command?

- A. All data along with the table structure is deleted.
  - B. All indexes on the table remain but they are invalidated
  - C. A pending transaction in the session is committed
  - D. All views and synonyms on the table remain but are invalidated
8. In which normal form is a table, if it has multi-valued attributes and no partial dependencies?
- A. First Normal Form
  - B. Second Normal Form
  - C. Third Normal Form
  - D. Fourth Normal Form
9. Which statement is true regarding the UNION operator?
- A. Null values are not ignored during duplicate checking
  - B. The number of columns selected in all SELECT statements need not be the same
  - C. Names of all columns must be identical across all SELECT statements
  - D. By default, the output is not stored
10. Which SQL statement is used to delete data from a database?
- A. REMOVE
  - B. DELETE
  - C. DROP
  - D. COLLAPSE
11. Which statement will display the last name and enrolment date of all students who registered after March 1989?
- A. 

```
SELECT last_name, enrolment_date  
WHERE enrolment_date > '31-MAR-89';
```
  - B. 

```
SELECT last_name  
FROM student  
WHERE enrolment_date > '31-MAR-89';
```
  - C. 

```
SELECT last_name, enrolment_date  
FROM student  
WHERE enrolment_date > '31-MAR-89';
```
  - D. 

```
SELECT enrolment_date  
FROM student
```

WHERE enrolment\_date > '31-MAR-89';

12. Which SQL statement selects all the columns from a table named Products?

- A. SELECT Products;
- B. SELECT [all] FROM Products;
- C. SELECT \* FROM Products;
- D. SELECT \*.Products;

13. Which SQL statement is used to extract data from a database?

- A. GET
- B. DISPLAY
- C. EXTRACT
- D. SELECT

14. The entity integrity rule states that

- A. No primary key attribute can be null
- B. Referential integrity must be maintained across all entities
- C. Each entity must have a foreign key
- D. A primary key must have only one attribute

15. Which two statements are true regarding the GROUP BY clause in a SQL statement?  
(Choose two)

- A. Using the WHERE clause after the GROUP BY clause excludes the rows after creating groups
- B. Using the WHERE clause before the GROUP BY clause excludes the rows before creating groups
- C. The GROUP BY clause is mandatory if you are using an aggregate function in the SELECT clause
- D. If the SELECT clause has an aggregate function, then those individual columns without an aggregate function in the SELECT clause should be included in the GROUP BY clause

#### **SECTION B ANSWER TRUE OR FALSE (10 MARKS)**

1. SQL keywords are case sensitive.
2. A NATURAL JOIN can be classified as an equijoin.
3. Values that are specified by the BETWEEN operator are inclusive.
4. When using the set operators, the SELECT lists must match in data type.
5. SQL DROP is used to remove objects from the database.

6. An UPDATE... SET... statement can modify multiple rows based on multiple conditions on a table.
7. A business rule is a table that defines some aspects of the DBMS.
8. A tuple is synonymous with record.
9. Update anomalies can occur in a normalised relation.
10. Date and character Literal values must be enclosed in single quotations.

### SECTION C (40 MARKS)

#### Question 1

Using examples, differentiate the following terms

- i. Attribute and tuple [3 marks]
- ii. Drop and delete commands [3 marks]
- iii. Union operator and intersection operator [3 marks]
- iv. Referential integrity and entity integrity [3 marks]
- v. Primary key and foreign key [3 marks]

#### Question 2

- i. Explain the phrase "three- tier architecture" with respect to databases and the ANSI-SPARC model [10 marks]
- ii. A bank has opened in the country and they would like to have a database that they can use for all their staff and clients in all main towns. They want to use the same database management software at all their locations. Briefly explain what type of database you would recommend. [5 marks]

#### Question 3

- i. State and explain any two (2) normalization goals [4 marks]
- ii. With the aid of your own table, describe the three (3) data anomalies. [6 marks]

## SECTION D (30 MARKS)

### Question 1

Read the scenario given below and draw an ER diagram in Chen's notation for the described database. [15 marks]

A company transports many chemical Products from one location to another on behalf of a registered Customer. Each transport operation is called a Job, which involves picking up one or more Loads of the same product from a customer's requested start location and delivers it to a customer's requested destination. A unique number is given for each Job and for each Load when they are created. A Load is transported using a particular Transport Unit, which consists of a lorry, a driver, a container (for carrying the product) and occasionally specialist loading equipment (such as Jacks and Pumps). A container is fixed to a trailer so it needs to be coupled to a lorry at the start of a Job. Transport operations are run from 5 regional Depots. Jobs are allocated to individual depots to service. Depots are usually located near to pick up points such as chemical plants. Depots hold, manage and maintain their own transport units which are permanently allocated to them to service Jobs. A container, and sometimes associated loading equipment, may on occasions be left at destinations or pick-ups after a Job is finished. But normally transport units are held at the base Depot they belong.

### Question 2

Table 1 below shows the definition details for the BOOK table:

Column Name	Other Constraints	Type
ISBNNumber	NOT NULL, PRIMARY KEY	number
BookTitle		varchar(50)
PublicationDate		Date
PublisherName		varchar(20)
PrintingCompany		varchar(25)
AuthorName		varchar(30)

- i. Write the SQL statement to create the BOOK table based on the details given above [10 marks]
- ii. Write the SQL statements to add the following record to the BOOK table created in i. [5 marks]

ISBNNumber	BookTitle	PublicationDate	PublisherName	PrintingCompany	AuthorName
9202874	Oxford Thesarus	30 June 2006	Oxford University Press	Interactive Sciences	Maurice Waite