**General Instructions:**

* **Follow the instructions given in each section.**
* **Make sure that you attempt the questions in order.**

**SECTION-A (10\*1 mark=10 marks)**

***(All questions are compulsory)***

1. Normalization in database design aims to:
   1. **Minimize redundancy and eliminate data anomalies**
   2. Optimize query performance and speed
   3. Maximize data storage capacity
   4. Improve user interface design
2. Which concurrency control technique allows multiple transactions to access the database simultaneously while maintaining isolation?
   1. Two-Phase Locking (2PL)
   2. Timestamp Ordering
   3. **Multiversion Concurrency Control (MVCC)**
   4. Optimistic Concurrency Control (OCC)
3. Which SQL operator is used to combine multiple conditions in a WHERE clause?
   1. **AND**
   2. OR
   3. NOT
   4. XOR
4. Which SQL keyword is used to retrieve data from a database table?
   1. **SELECT**
   2. INSERT
   3. UPDATE
   4. DELETE
5. Which security measure ensures that data can be restored to its original state in the event of data loss or corruption?
   1. Role-based access control
   2. Data replication
   3. **Backup and recovery**
   4. Intrusion detection system
6. Which normal form eliminates all transitive dependencies in a relational database?
   1. First Normal Form (1NF)
   2. Second Normal Form (2NF)
   3. Third Normal Form (3NF)
   4. **Boyce-Codd Normal Form (BCNF)**
7. Which SQL statement is used to declare a cursor?
   1. OPEN
   2. SELECT
   3. **DECLARE**
   4. FETCH
8. Which SQL statement is used to close a cursor?
   1. **CLOSE**
   2. DEALLOCATE
   3. RELEASE
   4. FREE
9. In a DBMS, which control structure is used to selectively execute a block of statements based on a condition?
   1. FOR
   2. DO-WHILE
   3. **IF-ELSE**
   4. CASE
10. Which type of backup includes all the data that has changed since the last full backup?
    1. Incremental backup
    2. **Differential backup**
    3. Snapshot backup
    4. Mirror backup

**SECTION-B (5\*2 mark=10 marks)**

***(All questions are compulsory)***

1. In a given relationship R, if an attribute A uniquely defines all other attributes, then the attribute A is a key attribute which is also known as the \_\_\_\_\_\_\_\_\_ key.
   1. **Candidate**
   2. Join
   3. Functional
   4. None of the Mentioned
2. What operator tests column for absence of data
   1. NOT Operator
   2. Exists Operator
   3. **IS NULL Operator**
   4. None of the above
3. A CASE SQL statement is \_\_\_\_\_\_\_\_?
4. A way to establish a loop in SQL.
5. **A way to establish an IF-THEN-ELSE in SQL**
6. A way to establish a data definition in SQL
7. All of the above.
8. Which of the following options are correct regarding these three keys (Primary Key, Super Key, and Candidate Key) in a database?
   * 1. Minimal super key is a candidate key
     2. Only one candidate key can be a primary key
     3. All super keys can be a candidate key
     4. We cannot find a primary key from the candidate key
9. **I and II**
10. II and III
11. I and III
12. II and IV
13. What SQL command can be used to delete columns from a table?
14. MODIFY TABLE TableName DROP ColumnName
15. MODIFY TABLE TableName DROP COLUMN ColumnName
16. ALTER TABLE TableName DROP ColumnName
17. **ALTER TABLE TableName DROP COLUMN ColumnName**

**SECTION-C(Coding Question) (4x5 marks=20 marks)**

1. Create a table called "employees": attributes- emp\_id, emp\_name, emp\_age, emp\_department

Insert multiple records into the "employees" table. Add a new column "email" to the "employees" table. In employees table rename the email column as emp\_email.

Solution:

**CREATE TABLE employees (**

**emp\_id INT PRIMARY KEY,**

**emp\_name VARCHAR(50),**

**emp\_age INT,**

**emp\_department VARCHAR(50)**

**);**

**INSERT INTO employees (emp\_id, emp\_name, emp\_age, emp\_department)**

**VALUES**

**(1, 'John Smith', 30, 'IT'),**

**(2, 'Jane Doe', 25, 'HR'),**

**(3, 'Michael Johnson', 35, 'Finance'),**

**(4, 'Emily Williams', 28, 'Marketing');**

**-- Add a new column "email" to the "employees" table**

**ALTER TABLE employees**

**ADD COLUMN email VARCHAR(100);**

**desc employees;**

**-- In employees table rename the email column as emp\_email**

**ALTER TABLE employees**

**RENAME COLUMN email TO emp\_email**

1. Create table 'book' with attributes: book\_id, title, author, publication\_year, genre

Add multiple records in it. Delete a specific record from the "book" table. Update the publication\_year of a book with a specific book\_id

Solution:

**CREATE TABLE book (**

**book\_id INT PRIMARY KEY,**

**title VARCHAR(255),**

**author VARCHAR(100),**

**publication\_year INT,**

**genre VARCHAR(50)**

**);**

**INSERT INTO book (book\_id, title, author, publication\_year, genre)**

**VALUES (1, 'Example Book', 'John Doe', 2020, 'Fiction'),(2, 'Another Book', 'Jane Smith', 2018, 'Mystery'),**

**(3, 'Great Novel', 'Michael Johnson', 2015, 'Drama'),**

**(4, 'Adventure Awaits', 'Samantha Lee', 2021, 'Adventure');**

**select \* from book;**

**-- Delete a specific record from the "book" table**

**DELETE FROM book**

**WHERE book\_id = 2;**

**-- Update the publication\_year of a book with a specific book\_id**

**UPDATE book**

**SET publication\_year = 2019**

**WHERE book\_id = 3;**

1. Create table Books with attributes book\_id, title, published\_date

Books table is already in 3NF

You have to Decompose it to BCNF- Create a new table for book details that are dependent on both the book\_id and author\_id.

Solution:

**-- Create Books table**

**CREATE TABLE Books (**

**book\_id INT PRIMARY KEY,**

**title VARCHAR(100),**

**published\_date DATE**

**);**

**-- BCNF**

**-- Create a new table for BookDetails**

**CREATE TABLE BookDetails (**

**book\_id INT PRIMARY KEY,**

**author\_id INT,**

**title VARCHAR(100),**

**published\_date DATE**

**);**

**-- Insert records into BookDetails table**

**INSERT INTO BookDetails (book\_id, author\_id, title, published\_date)**

**VALUES (1001, 1, 'Book A', '2023-01-15'),**

**(1002, 2, 'Book B', '2022-11-10'),**

**(1003, 3, 'Book C', '2023-04-20'),**

**(1004, 1, 'Book D', '2021-12-05'),**

**(1005, 2, 'Book E', '2023-07-01');**

**-- Remove title and published\_date from the Books table**

**ALTER TABLE Books**

**DROP COLUMN title, DROP COLUMN published\_date;**

1. Write a program in PL/SQL to declare a record datatype with same datatype of tables using %TYPE attribute.

Solution:

**-- Create the "employee" table**

**CREATE TABLE employee (**

**employee\_id NUMBER PRIMARY KEY,**

**first\_name VARCHAR2(50),**

**last\_name VARCHAR2(50),**

**department VARCHAR2(50),**

**salary NUMBER**

**);**

**-- Insert sample records into the "employee" table**

**INSERT INTO employee (employee\_id, first\_name, last\_name, department, salary)**

**VALUES (1, 'John', 'Doe', 'HR', 50000);**

**INSERT INTO employee (employee\_id, first\_name, last\_name, department, salary)**

**VALUES (2, 'Jane', 'Smith', 'Finance', 60000);**

**INSERT INTO employee (employee\_id, first\_name, last\_name, department, salary)**

**VALUES (3, 'Michael', 'Johnson', 'IT', 70000);**

**DECLARE**

**CURSOR cur\_emp\_detail IS**

**SELECT employee\_id,**

**first\_name,**

**last\_name,**

**salary**

**FROM employee;**

**TYPE type\_record\_type IS RECORD (**

**emp\_id employee.employee\_id%TYPE,**

**emp\_f\_name employee.first\_name%TYPE,**

**emp\_l\_name employee.last\_name%TYPE,**

**emp\_s\_salary employee.salary%TYPE );**

**emp\_rec\_type type\_record\_type;**

**BEGIN**

**OPEN cur\_emp\_detail;**

**LOOP**

**FETCH cur\_emp\_detail INTO emp\_rec\_type;**

**EXIT WHEN cur\_emp\_detail%NOTFOUND;**

**dbms\_output.Put\_line('Employees Information:: '**

**||' ID: '**

**||emp\_rec\_type.emp\_id**

**||'| Name: '**

**||emp\_rec\_type.emp\_f\_name**

**||' '**

**||emp\_rec\_type.emp\_l\_name**

**||'| Salary: '**

**||emp\_rec\_type.emp\_s\_salary);**

**END LOOP;**

**dbms\_output.Put\_line('Total number of Employees : '**

**||cur\_emp\_detail%rowcount);**

**CLOSE cur\_emp\_detail;**

**END;**

**/**