**Time allowed: 90 Minutes Max. Marks: 40**

**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. When dealing with database transactions, there is often a need for multiple users to use a database to perform different operations. In this case, \_\_\_ of the database occurs.
2. Concurrent Connection
3. Concurrent Reduction
4. **Concurrent Execution**
5. Concurrent Revolution
6. Which type of error occurs when the database crashes while a transaction is being executed?
   1. **System error**
   2. Media error
   3. Transaction error
   4. Operator error
7. Which of the following is a concurrency control protocol?
8. Lock Based Concurrency Control Protocol
9. Timestamp Concurrency Control Protocol
10. Validation Based Concurrency Control Protocol
11. **All of the above**
12. Which of the following is not a type of loop in programming?
    1. FOR loop
    2. WHILE loop
    3. REPEAT loop
    4. **FOREACH loop**
13. Views in a DBMS are used for:
    1. Creating temporary tables
    2. **Improving query performance**
    3. Defining primary key constraints
    4. Storing complex queries
14. Which of the following is a disadvantage of the shadow paging recovery technique?
    1. **Increased disk space requirement**
    2. Slower recovery process
    3. Limited support for concurrent transactions
    4. Difficulty in implementing locking mechanisms
15. Which recovery technique uses backward recovery to undo the changes made by a failed transaction?
    1. **Undo logging**
    2. Redo logging
    3. Deferred update
    4. Immediate update
16. In a DBMS, a cursor can be used to:
    1. Insert rows into a table
    2. Delete rows from a table
    3. Update rows in a table
    4. **All of the above**
17. The "CASE" statement in SQL is used to:
    1. **Perform conditional branching**
    2. Perform iterative looping
    3. Define primary key constraints
    4. Create temporary tables
18. Which type of error occurs when the data written by a transaction is not yet permanently stored on the disk and a failure happens?
    1. System error
    2. **Media error**
    3. Transaction error
    4. Operator error

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

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

1. What is the output of the following program?

DECLARE

x NUMBER := 5;

BEGIN

IF x > 10 THEN

DBMS\_OUTPUT.PUT\_LINE('Greater than 10');

ELSIF x < 5 THEN

DBMS\_OUTPUT.PUT\_LINE('Less than 5');

ELSE

DBMS\_OUTPUT.PUT\_LINE('Between 5 and 10');

END IF;

END;

* 1. Greater than 10
  2. Less than 5
  3. **Between 5 and 10**
  4. No output

DECLARE

CURSOR emp\_cursor IS

SELECT employee\_id, first\_name FROM employees;

Which PL/SQL statement will open the cursor for fetching data?

* 1. **OPEN emp\_cursor;**
  2. FETCH emp\_cursor;
  3. OPEN emp\_cursor FOR;
  4. EXECUTE emp\_cursor;

1. Which advantage of using views in PL/SQL allows you to restrict access to certain columns of a table?
2. Data Abstraction
3. Data Integrity
4. **Data Security**
5. Data Encapsulation

14) Which part of a package in PL/SQL is used to declare the public variables and subprograms that can be accessed from outside the package?

1. Package Body
2. **Package Specification**
3. Package Interface
4. Package Declaration

15) CREATE OR REPLACE TRIGGER audit\_changes

AFTER UPDATE OR DELETE ON employees

FOR EACH ROW

BEGIN

INSERT INTO audit\_table (action, emp\_id, old\_salary)

VALUES ('UPDATE\_OR\_DELETE', :OLD.emp\_id, :OLD.salary);

END;

What is the trigger's purpose?

1. **To audit changes made to the employees table.**
2. To update the salary of employees in the audit\_table.
3. To delete records from the audit\_table after an update or delete on the employees table.
4. To insert new records into the audit\_table.

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

16) Write a PL/SQL program to determine whether a given year is a leap year or not. A leap year is divisible by 4, except for years that are divisible by 100 but not divisible by 400.

Solution:

**DECLARE**

**year\_val NUMBER;**

**BEGIN**

**year\_val := &year\_input;**

**IF (year\_val MOD 4 = 0 AND year\_val MOD 100 <> 0) OR (year\_val MOD 400 = 0) THEN**

**DBMS\_OUTPUT.PUT\_LINE(year\_val || ' is a leap year.');**

**ELSE**

**DBMS\_OUTPUT.PUT\_LINE(year\_val || ' is not a leap year.');**

**END IF;**

**END;**

17) Create a PL/SQL procedure that calculates the square of a given number and displays the result.

Solution:

**CREATE OR REPLACE PROCEDURE calculate\_square(num IN NUMBER) IS**

**square\_result NUMBER;**

**BEGIN**

**square\_result := num \* num;**

**DBMS\_OUTPUT.PUT\_LINE('The square of ' || num || ' is ' || square\_result);**

**END;**

**/**

18) Create a PL/SQL Package to Calculate the Area and Perimeter of a Rectangle

Solution:

**CREATE OR REPLACE PACKAGE Rectangle\_Pkg AS**

**FUNCTION Calculate\_Area(length NUMBER, width NUMBER) RETURN NUMBER;**

**FUNCTION Calculate\_Perimeter(length NUMBER, width NUMBER) RETURN NUMBER;**

**END Rectangle\_Pkg;**

**/**

**CREATE OR REPLACE PACKAGE BODY Rectangle\_Pkg AS**

**FUNCTION Calculate\_Area(length NUMBER, width NUMBER) RETURN NUMBER IS**

**BEGIN**

**RETURN length \* width;**

**END;**

**FUNCTION Calculate\_Perimeter(length NUMBER, width NUMBER) RETURN NUMBER IS**

**BEGIN**

**RETURN 2 \* (length + width);**

**END;**

**END Rectangle\_Pkg;**

**/**

19) Create a trigger that automatically updates the "last\_updated" column of a table whenever a new record is inserted into that table.

Solution:

**CREATE OR REPLACE TRIGGER tr\_update\_last\_updated**

**AFTER INSERT ON employees**

**FOR EACH ROW**

**BEGIN**

**UPDATE employees**

**SET last\_updated = SYSDATE**

**WHERE employee\_id = :NEW.employee\_id;**

**END;**

**/**