**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. Which recovery technique requires that transactions be logged in reverse order during the recovery process?
   1. **Undo logging**
   2. Redo logging
   3. Deferred update
   4. Immediate update
2. Which of the following is NOT a disadvantage of the log-based recovery technique?
   1. Increased disk I/O overhead
   2. Slower transaction processing
   3. Increased disk space requirement
   4. **Limited support for concurrent transactions**
3. Which control structure is used to execute a block of statements as long as a condition is true?
   1. FOR loop
   2. **WHILE loop**
   3. SWITCH statement
   4. IF-THEN-ELSE statement
4. In a DBMS, a view is stored:
   1. **In the system catalog**
   2. In a temporary file
   3. In the buffer cache
   4. In the transaction log
5. Which of the following is NOT a type of lock used in concurrency control?
   1. Shared lock
   2. Exclusive lock
   3. **Update lock**
   4. Read lock
6. In a two-phase locking protocol, when are locks released?
   1. After the transaction is committed
   2. After the transaction is aborted
   3. In the growing phase
   4. **In the shrinking phase**
7. Which of the following is NOT a benefit of using locking for concurrency control?
   1. Deadlock prevention
   2. Data consistency
   3. Serializable execution
   4. **High performance**
8. Which control structure is used to execute a block of statements based on multiple conditions?
   1. IF-THEN-ELSE statement
   2. **SWITCH statement**
   3. FOR loop
   4. WHILE loop
9. In a DBMS, a cursor can be used to navigate through:
   1. **Rows of a table**
   2. Columns of a table
   3. Indexes of a table
   4. Triggers of a table
10. Which of the following statements is true about deferred update recovery technique?
    1. It requires more disk space for logging.
    2. **It provides better concurrency control.**
    3. It guarantees immediate crash recovery.
    4. It is also known as shadow paging.

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

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

1. What is the output of the following program?

DECLARE

a NUMBER := 2;

BEGIN

FOR i IN 1..3 LOOP

a := a \* 2;

END LOOP;

DBMS\_OUTPUT.PUT\_LINE(a);

END;

1. 4
2. 8
3. 16
4. **32**

12) Which cursor attribute can be used to determine the total number of rows returned by a cursor in PL/SQL?

1. **%ROWCOUNT**
2. %FOUND
3. %ISOPEN
4. %NOTFOUND

13) Which type of view in PL/SQL allows you to update data directly through the view?

1. Read-Only View
2. Materialized View
3. **Updatable View**
4. Join View

14) Which keyword is used to create a new package body in PL/SQL?

1. **BODY**
2. IMPLEMENTATION
3. DEFINE
4. CREATE

15) In PL/SQL, which trigger event is fired when a column value is updated to NULL?

1. AFTER UPDATE NULL
2. BEFORE UPDATE NULL
3. **AFTER UPDATE OF column\_name**
4. BEFORE UPDATE OF column\_name

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

16) Write a PL/SQL program to calculate the factorial of a given non-negative integer.

Solution:

**DECLARE**

**num NUMBER;**

**fact NUMBER := 1;**

**BEGIN**

**num := &num\_input;**

**IF num < 0 THEN**

**DBMS\_OUTPUT.PUT\_LINE('Factorial is not defined for negative numbers.');**

**ELSE**

**FOR i IN 1..num LOOP**

**fact := fact \* i;**

**END LOOP;**

**DBMS\_OUTPUT.PUT\_LINE('Factorial of ' || num || ' is: ' || fact);**

**END IF;**

**END;**

17) Create a PL/SQL procedure to calculate the factorial of a given positive integer.

Solution:

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

**result NUMBER := 1;**

**BEGIN**

**FOR i IN 1..num LOOP**

**result := result \* i;**

**END LOOP;**

**DBMS\_OUTPUT.PUT\_LINE('Factorial of ' || num || ' is ' || result);**

**END;**

**/**

18) Create a PL/SQL Package to Handle Simple Interest Calculation.

Solution:

**CREATE OR REPLACE PACKAGE Simple\_Interest\_Pkg AS**

**FUNCTION Calculate\_Simple\_Interest(principal NUMBER, rate NUMBER, time NUMBER) RETURN NUMBER;**

**END Simple\_Interest\_Pkg;**

**/**

**CREATE OR REPLACE PACKAGE BODY Simple\_Interest\_Pkg AS**

**FUNCTION Calculate\_Simple\_Interest(principal NUMBER, rate NUMBER, time NUMBER) RETURN NUMBER IS**

**interest NUMBER;**

**BEGIN**

**interest := (principal \* rate \* time) / 100;**

**RETURN interest;**

**END;**

**END Simple\_Interest\_Pkg;**

**/**

19) Create a trigger that logs deleted records into an audit table whenever a record is deleted from the "products" table.

Solution:

**CREATE OR REPLACE TRIGGER tr\_log\_deleted\_records**

**AFTER DELETE ON products**

**FOR EACH ROW**

**BEGIN**

**INSERT INTO audit\_log (action, table\_name, record\_id, deleted\_date)**

**VALUES ('DELETE', 'products', :OLD.product\_id, SYSDATE);**

**END;**

**/**