



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
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SUMMER-15 EXAMINATION
Model Answer

Subject Code: 17332

**Subject Name: Relational Database
Management System**

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

1. A) Solve any six:

MARKS 12

1) Define DBMS. List any two applications of DBMS.

(Definition- 1 Mark, Any 2 Application- 1/2 Mark each, Any relevant applications can be considered)

Ans:

DBMS: A database-management system is a collection of interrelated data and a set of programs to access those data.

Applications of DBMS:

1. Banking
2. Airlines and railways
3. Sales
4. Telecommunications
5. Universities.
6. Manufacturing
7. E-commerce
8. Credit card transactions.



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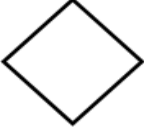




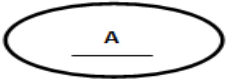
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- 2) List and draw any four symbols used in ER Model.
(For each symbol -1/2Mark, Any four symbols can be considered)

Ans:

The symbols used in E-R diagram are:

	Rectangle Represent entities sets
	Diamonds represent relationship sets
	Lines link attribute to entity set and entity sets to relationship sets
	Represent attributes(Ellipses)
	Represent multi value attribute (Double Ellipses)
	Represent derived attribute (Dashed Ellipses)
	Indicates primary key attributes (Underline)



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- 3) What is Primary Key? Give example.
(Definition Primary Key-1Mark, Example-1Mark)
[Note: Any other example can be considered]

Ans:

Primary key: Within a relation there is always one attribute which has values that are unique in a relation and thus can be used to identify tuple of that relation. Such a unique identifier is called the primary key.

E.g. In the Student(Rollno,name,class,address) relation **Rollno** is the primary key.

- 4) List any four DML commands.
(For each command – ½ Mark)

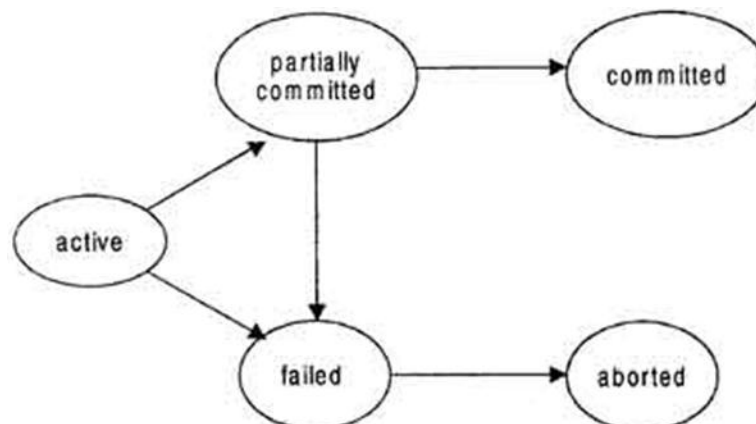
Ans:

List of DML commands:

1. Select
2. Insert
3. Update
4. Delete

- 5) Draw transaction state diagram.
(Correct diagram- 2 Marks)

Ans:





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- 6) How to create view?**
(Syntax OR Example of view - 2 Marks)

Ans:

Syntax for creating view.

Create view <viewname> as select <query>;

OR

Example :

Create viewemp_info as select Emp_no, Emp_name from Employee;

- 7) What is cursor?**
(Explanation of cursor-2Marks)

Ans:

Cursor:

The Oracle Engine uses a work area for its internal processing in order to execute an SQL statement. This work area is private to SQL's operations and is called a Cursor.

OR

A cursor is a temporary work area created in the system memory when a SQL statement is executed.

- 8) What are the atomic values?**
(Correct Definition-2 Marks)

Ans:

A piece of data in a database table that cannot be broken down any further called atomic value.

OR

The value of each attribute containing only a single value from that attribute domain is called atomic value.



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B) Solve any two:

MARKS 8

- 1) Explain Data Redundancy and Integrity.
(Each Explanation - 2 Marks each)

Ans:

Data redundancy :

Data redundancy is the unnecessary repetition of data.

Since different programmers create the files and application programs over a long period , the various files are likely to have different structures and programs may be written in several programming languages. The same piece of information or program may be duplicated in several places.e.g accounting department and registration department both keep student name, number and address.

Data Redundancy

- Increases the size of the database unnecessarily
- Causes data inconsistency.
- Increases the access cost and decreases efficiency of database.
- May cause data corruption.

Such **data redundancy in DBMS can be prevented by database normalization.**

Data integrity:

- Data integrity refers **to maintaining and assuring the accuracy and consistency** of data over its entire life-cycle.
- Data integrity is usually **imposed during the database design** phase through the use of standard procedures and rules.
- Data integrity can be maintained through the use of various error checking methods and validation procedures.

e.g The balance of certain type of bank account may never fall below a prescribed amount(Rs.5000).

We can handle this through program code and declaring integrity constraint along with definition.



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2) What is the use of GRANT and REVOKE?

(GRANT-2 Marks, REVOKE -2Marks)

Ans:

Grant: This command is used to give permission to user to do operations on the other user's object.

Syntax: Grant<object privileges>**on**<object name>**to**<username>[with grant option] ;

Example: Grant select,update on emp to user1;

Revoke: This command is used to withdraw the privileges that has been granted to a user.

Syntax: Revoke <object privileges>**on**<object name>**from** <username> ;

Example: Revoke select, update on emp from user1;

3) How to create trigger? State any two advantages of trigger.

(Trigger Syntax or example -2Marks, Any 2 advantages- 2 Marks)

[Note: Any relevant example can be considered]

Ans:

The Syntax for creating a trigger is:

```
CREATE [OR REPLACE ] TRIGGER trigger_name  
{ BEFORE | AFTER | INSTEAD OF }  
{ INSERT [OR] | UPDATE [OR] | DELETE }  
ON table_name  
[FOR EACH ROW/For Each statement]  
WHEN (condition)  
BEGIN  
--- sql statements  
END;
```

(OR)



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Example

```
CREATE or REPLACE TRIGGER After_Update_Row_product
AFTER
insert On product
FOR EACH ROW
BEGIN
INSERT INTO product_check Values('After update, Row level',sysdate);
END;
```

Advantages of triggers:

1. Triggers provide an alternative way to check the integrity of data.
2. Can catch errors in business logic in the database layer.
3. SQL triggers provide an alternative way to run scheduled tasks.
4. Triggers are very useful to audit the changes of data in tables.



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2. Solve any four:

MARKS 16

- a) **What is the difference between weak entity set and strong entity set?**
(Any 2 difference points - 2 Marks each OR Explanation of weak entity and strong entity – 2 Marks each)

Ans:

	Weak Entity Set	Strong Entity set
1	It does not have sufficient attribute to form a primary key on its own.	It has its own primary key.
2	The relationship between one strong and a weak entity set is represented by a double diamond symbol .(known as identifying relationship)	The relationship between two strong entity set is represented by a diamond symbol
3	The Member of weak entity set is called as subordinate entity set .	The member of strong entity set is called as dominant entity set .
4	It is represented by double rectangle .	It is represented by rectangle
5	The line connecting weak entity set with the identifying relationship is double .	The line connecting strong entity set with the relationship is single .
6	<p>Example Shows Both Entity Set</p> <p>The diagram illustrates an identifying relationship between a strong entity set and a weak entity set. On the left, the 'Employee' entity set is shown as a rectangle with four attributes: EmpNo, EmpName, EmpGender, and EmpAddress. On the right, the 'Dependent' entity set is shown as a double rectangle with four attributes: D_Name, Relationship, D_Gender, and D_BirthDay. A double diamond labeled 'has' connects the two entities. A single line with the number '1' connects Employee to the relationship, while a double line with the number 'N' connects the relationship to Dependent.</p>	



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b) Explain Functional and Transitive dependency.
(Explanation of each - 2 Marks each)

Ans:

Functional Dependency:

A functional dependency occurs when one attribute in a relation uniquely determine another attribute.

OR

In the given relation R, attribute 'Y' of R is functionally dependent on attribute 'X' if and only if whenever two tuples of R are having same 'X' value then 'Y' value will be same. It is denoted as $X \rightarrow Y$ which means 'Y' functionally dependent on 'X'.

e.g. $emp_id \rightarrow ename$ (ename functionally dependent on emp_id)

Transitive dependency:

A transitive dependency can occur only in a relation that has three or more attributes. Let A, B, and C designates three distinct attributes (or distinct collections of attributes) in the relation. Suppose all three of the following conditions hold:

1. $A \rightarrow B$
2. It is not the case that $B \rightarrow A$
3. $B \rightarrow C$

Then the functional dependency $A \rightarrow C$ is a transitive dependency.

OR

If we have a primary key A and a non-key domain B and C, where C is more dependent on B than A and B is directly dependent on A, then C can be considered transitively dependant on A.



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Example:

Consider the relation SUPPLIER (SNO, SNAME, CITY, STATUS).

In this dependency SNAME is functionally dependent on SNO and STATUS is dependent on CITY with CITY dependent on SNO, which shows a transitive dependency i.e. STATUS is depending on SNO(via CITY).

- c) **What are the four ways to insert a record in a table?**
(Each Syntax or example- 1 Mark)

Ans:

Insert is a DML statement used to insert or add data into table.

1. **Syntax1:** syntax for insert command without defining attributes
Insert into <Table_name> values (value1,value2,.....);
2. **Syntax2:** syntax for insert command with defining attributes
Insert into <Table_name>(col1,col2,....) values (value1,value2,.....);
3. **Syntax3:** To insert values for selected attributes in a table.
Insert into <Table_name>(col1,col2) values (value1,value2);
4. **Syntax4:** To insert more than one row.
Insert into <Table_name>values(&attribute1, '&attribute2',...&attributen);

OR



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Example:

Consider table “persons”

Last_Name	First_name	Address	City
Varma	Ram	Airoli	Navimumbai

Example for both syntax and its output

Example1:

Insert into persons values ('Bhosale', 'Ajit', 'Bapat Road', 'pune');

Example2:

Insert into persons (Last_Name, First_name, Address, City) values ('Suryawanshi', 'Savita', 'Meera road', 'Raigad');

Example3:

Insert into persons (Last_Name, First_name) values ('Suryawanshi', 'Savita');

Example4:

Insert into persons values ('&Last_Name', '&First_name', '&Address', '&City')

Output:

Last_Name	First_name	Address	City
Varma	Ram	Airoli	Navimumbai
Bhosale	Ajit	Bapat Road	pune
Suryawanshi	Savita	Meera road	Raigad



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- d) **Explain with example simple and composite index.**
(*Simple Index Explanation & Example-2 Marks, Composite Index Explanation & Example- 2 Marks*)

Ans:

Simple index: An index created on single column of a table is called a Simple Index.

Syntax: Create index on <tablename><column name>;

E.g.: Create index idx on employee (empno);

Composite Index: An Index that contain two or more columns from the same table is called as Composite Index.

Syntax: Create index on <tablename><column name1, Column name 2>;

E.g.: Create index idx on employee (ename, empno);

- e) **Write a PL/SQL program which handles divide by zero exception.**
(*Correct Program - 4 Marks*)

Ans:

```
DECLARE
A number:=20;
B number:=0;
C number;
BEGIN
  dbms_output.put_line('First Num : '||A);
  dbms_output.put_line('Second Num : '||B);
  C:= A / B; --Raise Exception
  dbms_output.put_line(' Result ' || C); -- Result will not be displayed
EXCEPTION
  WHEN ZERO_DIVIDE THEN
    dbms_output.put_line(' Trying to Divide by zero :: Error ');
END;
/
```



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f) **What is data mining and data ware housing?**
(Each Explanation - 2 Marks each)

Ans:

Data Mining :-

- **Data mining** is the exploration and analysis of large quantities of data in order to discover valid, novel, potentially useful and ultimately understandable patterns in data.
- **It is** known as “Knowledge Discovery in Databases”. When the data is stored in large quantities in data warehouse, it is necessary to dig the data from the ware house that is useful and required for further use.
- For data mining, different software tools are used to analyze, filter and transfer the data from the data warehouses.

Data Warehousing:-

- A data warehouse is a repository of information gathered from multiple sources, stored under a unified schema, at a single site. Once gathered, data are stored for long time, permitting access to historical data.
- Data warehouses provide the user a single consolidated interface to data, making decision-support queries easier to write.
- Moreover, by accessing information for decision support from a data warehouse, the decision makers ensures that online transaction-processing systems are not affected by decision support workload.



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3. Solve any four:

MARKS 16

(a) Given-

**Employee (EMP_ID, FIRST_NAME, LAST_NAME, SALARY, JOINING_DATE,
DEPARTMENT)**

Write SQL queries for-

- i) Get FIRST_NAME, LAST_NAME from employee table.**
- ii) Get unique DEPARTMENT from employee table.**
- iii) Get FIRST_NAME from employee table using alias name “Employee Name”**
- iv) Get FIRST_NAME from employee table after removing white spaces from left side.**

(Each query – 1 Mark)

Ans :

- i) select FIRST_NAME, LAST_NAME from employee;**
- ii) select distinct DEPARTMENT from employee;**
- iii) select FIRST_NAME “Employee Name” from employee;**
- iv) select ltrim(FIRST_NAME) from employee;**



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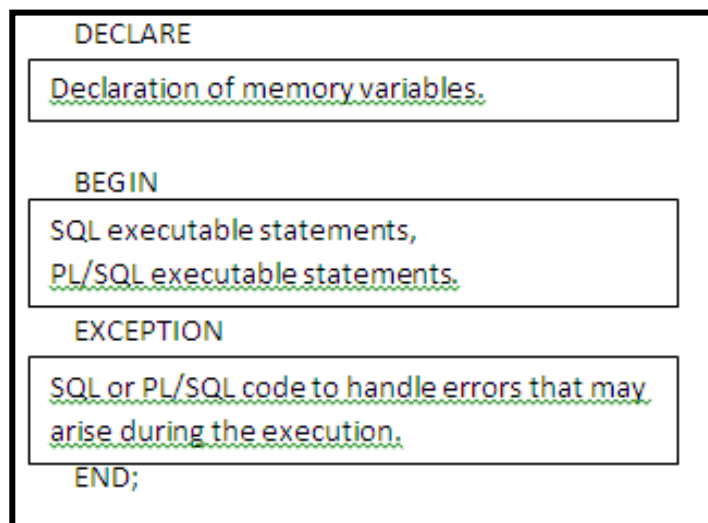
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- b) Draw the block structure of PL/SQL. List advantages of PL/SQL.
(Block structure – 2Marks, Any 4 advantages – 2 Marks)

Ans:



Advantages of PL/SQL :

1. PL/SQL is that development tool which not only supports SQL data manipulations but also provides facilities of conditional checking and looping.
2. PL/SQL sends an entire block of SQL statement to the ORACLE engine all in one go.
3. PL/SQL also permits dealing with errors as required, and facilitates displaying user-friendly messages, when errors are encountered.
4. PL/SQL allows declaration and use of variables in blocks of code. These variables can be used to store intermediate results of a query for later processing, or calculate values and insert them into an ORACLE table later. PL/SQL variables can be used anywhere, either in SQL statements or in PL/SQL blocks.
5. Applications written in PL/SQL are portable to any computer hardware and operating system, where Oracle is operational.



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-
- c) Explain Foreign Key and ON DELETE CASCADE with suitable example.
(Foreign key explanation with example – 3Marks, On delete cascade – 1 Mark)

Ans:

Foreign key represents relationship between two tables.

A foreign is a column (or group of columns) whose values are derived from the 'primary key' of same or some other table.

For eg : consider two tables :

Emp={empid, empname, deptno, salary}

Dept= { deptno, deptname}

In table Emp, empid is a primary key which contains unique values to identify each record.

In table Dept, deptno is a primary key containing unique values for deptnos.

To set the relationship between these two tables, we can define Emp.deptno as a foreign key as:

1. At creation time (Assuming Dept is already created with deptno as primary key)
Create table Emp (empid number(4), empname varchar(20), deptno number(3)
constraint fk1 references Dept(deptno) , salary number(10,2));

2. After creation :

Alter table Emp add constraint fk1 foreign key (deptno) references dept(deptno);

On delete cascade :

When a relation is created between two tables, it is permissible to delete records in child table , but a vice-versa operation is not allowed. i.e. deleting records from parent table when it is referenced from some other table is not allowed.

On delete cascade clause allows automatic deletion of child records when parent record is deleted.

Eg :

Alter table Emp add constraint foreign key emp(deptno) references dept(deptno) on delete cascade;



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d) What is sequence? What are the various operations with respect to sequences?
(Sequence explanation – 2 Marks, any two operations – 2 Marks)

Ans:

Sequence :

- In a table, generally there exists a column which can uniquely identify the record from a table. For that purpose, that column has to be a primary key which can never contain duplicate or null value.
- There are great chances of errors in manual entry of data, which can be minimized by creating sequence for automatic entry of certain values which are in sequence.
- Sequence creates a series of values which are computer generated and which can be inserted into a table.
- Oracle provides an object called as a Sequence that can generate numeric values. The value generated can have maximum of 38 digits.
- These numbers can be ascending or descending order.
- Provide intervals between numbers.

Operations allowed on sequence:

1) Create a sequence :

```
Create sequence < sequence name >  
[incremented by <integer value> start with <integer value>Maxvalue<integer  
value>/nomaxvalue  
minvalue<integer value>/nominvalue cycle/ nocycle]  
cache<integer value>/Nocache  
order/noorder
```

INCREMENT BY: Specifies the interval between sequence number. It can be any positive or negative value but not zero. If this clause is omitted the default value is 1.

MINVALUE: Specifies the sequence minimum value.

NOMINVALUE: Specifies the maximum value of 1 for an ascending sequence and – (10)²⁶ for a descending sequence.

MAXVALUE: Specifies the maximum value that a sequence can generate.



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NOMAXVALUE: Specifies a maximum of 10^{27} for an ascending sequence or -1 for a descending sequence is the sequence minimum value(1) and for a descending sequence, it is the maximum value(-1).

CYCLE: Specifies that the sequence continues to generate repeat values after reaching either its maximum.

NOCYCLE: Specifies that a sequence cannot generate more values after reaching the maximum value.

Create sequence addr_sq increment by 1 start with 1 minvalue 1 maxvalue 999 cycle;

2) Referncing a sequence

Once a sequence is created SQL can be used to view the values held in its cache. To simply view sequence value use a SELECT sentence as describe below.

```
SELECT<SequenceName>.NextVal FROM DUAL;
```

Every time nextval reference a sequence its output is automatically increment from the old values to the values to the new value ready for use.

```
INSERT INTO
```

```
ADDR_DTLS(ADDR_NO, CODE_NO, ADDR_TYPE, ADDR1, ADDR2, CITY, STATE, PINCODE)VALUES(ADDR_SEQ.NextVal, 'B5', 'B', 'Vertex Plaza, Shop 4, 'Western Express Highway, Dahisar(East)', 'Mumbai', '400078');
```

To reference the current value of a sequence:

```
SELECT<SequenceName>.CURRVAL FROM DUAL;
```

3) Altering a sequence

A sequence once created can be altered. This is achieved by using the ALTER SEQUENCE statement .

SYNTAX:

```
ALTER SEQUENCE<SequenceName>  
[Increment by <IntegerValue> Maximum<IntegerValue>/NOMAXVALUE  
MINVALUE<IntegerValue>/NOMINVALUE CYCLE/NOCYCLE  
CACHE<IntegerValue>/NOCACHE ORDER/NOORDER]
```

Change the cache value of the sequence ADDR_SEQ to 30 and interval between two numbers as 2.

```
ALTER SEQUENCEADDR_SEQ INCREMENT BY 2 CACHE 30;
```



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4) Dropping A Sequence

The DROP SEQUENCE command is used to remove the sequence from database.

Syntax:

DROP SEQUENCE<SequenceName>;

- e) **Explain Lock Compatibility Table. What is Two-phase locking protocol?**
(*Lock compatibility table – 2 Marks, two phase locking protocol – 2Marks*)

Ans:

The two commonly used locks are 1) shared and 2) Exclusive

- 1) Shared lock : It can lock the transaction only for reading.
- 2) Exclusive Lock : It can lock the transaction for reading as well as writing.

The compatibility table for these two locks can be given as:

	Shared	Exclusive
Shared	Compatible	Not compatible
Exclusive	Not Compatible	Not Compatible

Two phase locking protocol:

This protocol is for ensuring serializability.

It requires the locking and unlocking of the transaction to be done in two phases.

- 1) **Growing phase:** In this phase, a transaction may obtain locks, but may not release locks.
- 2) **Shrinking phase:** In this phase, a transaction may release locks, but may not acquire any new locks.



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f) Differentiate between DBMS and RDBMS.

(Any 4 valid differences – 1 Mark each)

DBMS	RDBMS
1. Database Management System	1. Relational Database Management System
2. It is mainly used for storage of data and efficient retrieval.	2. It is that environment where data is represented in the form of relations, with enforced relationships between the tables.
3. Mainly used for single user system	3. Generally used in multiuser environment.
4. Not all Codd rules are satisfied.	4. All 12 Codd rules are satisfied.
5. Suitable for low volume of data	5. Suitable for large volume of data
6. Security is less.	6. More security measures provided
7. Example : Forxpro, dbaseIII plus	7. Example : Oracle, SQL Server



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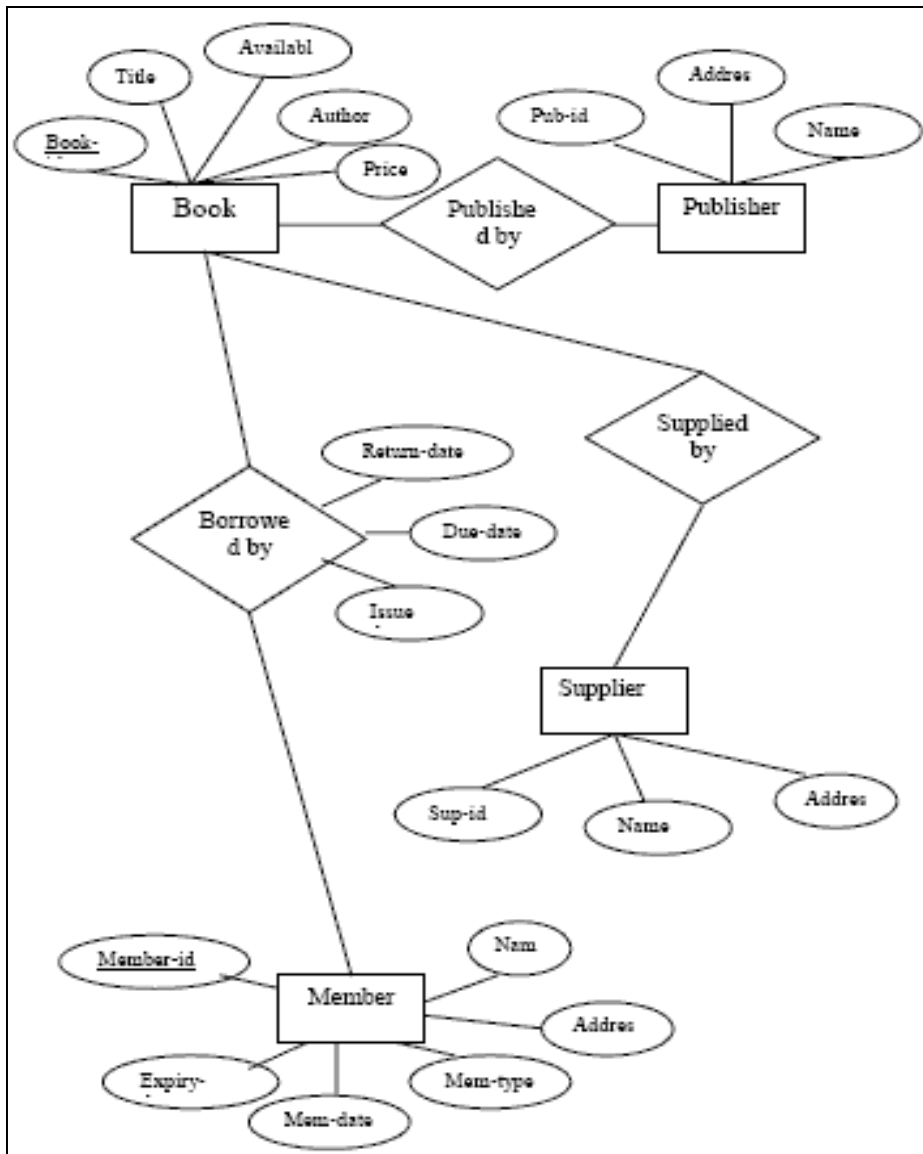
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4. Solve any four:

MARKS 16

- a) Draw an ER diagram for Library Management System.
(Suitable entities – 1 Mark, Proper attributes – 1Mark, Correct relationships showing basic activities of library – 1Mark, correct symbols- 1Mark)





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b) What are the various datatypes of PL/SQL?
(Any 4 data types -1Mark each)

Ans:

The default data types that can be declared in PL/SQL are :

- 1) number (size)– for storing numeric data
eg. a number(2);
- 2) char/ varchar(size) – for character data
eg: mynamevarchar(20);
- 3) date – for date and time data
eg : dob date;
- 4) Boolean – for storing true, false or null
eg: status Boolean;
- 5) %Type - to declare a variable or constant to have a same data type as that of a previously defined variable or a column in a table.
e.g. enoemp.empno%type

c) Explain the difference between DROP and TRUNCATE with example.
(Any 4 valid differences – 1 Mark each OR Explanation of DROP and TRUNCATE – 2 Marks each)

Ans:

DROP	TRUNCATE
1 .It is a DDL Statement which deals with the structure of the table along with data.	1.It is DDL statement which deals only with the data from the table.
2. It deletes entire table at once from the disk.	2.It deletes all records from table at once.
3.Column Structure of table does not remain on the disk.	3.Empty column structure of the table remains on the disk.
4.Syntax :	4.Syntax :
Drop <tablename>;	Truncate table <tablename>;
5.Example :	5.Example :
Drop employee;	Truncate table employee;



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d) What is schedule? Explain conflict serializability.

(Schedule – 1 Mark, Conflict serializability with suitable example – 3Marks)

Ans:

Schedule : A Schedule is a nothing but the order in which multiple transactions can be executed.

Conflict serializability:

The correctness and consistency of transaction schedules can be decided by serializability property. The serializable schedule is that which maintains the same consistency before and after the execution of a particular schedule. If it doesn't, it is called as **conflict serializability**. Serial schedule never shows conflict serializability, concurrent may show it.

Example :

Consider Transaction T1 : which transfers 50 Rs. From A's account to B's account.

And transaction T2 : Displays (A+B)

Initially A has 100 Rs and B has 150 Rs. in their accounts respectively.

The consistency can be checked as after both the transactions are over (A+B) always should be 250. If not, there is a conflict serializability.



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T1 READ(A) A:=A-50 WRITE(A).....A=50	T2 READ(A).....A=50 READ(B).....B=150 DISPLAY(A+B).....A+B=200..... <i>Conflict Serializability</i>
READ(B) B:=B+50 WRITE(B)	

e) Write a PL/SQL program to create any snapshot.

(Creation of snapshot – 2 Marks, PL/SQL code – 2Marks)

[Note: Any other relevant example of PL/SQL code can be considered]

Ans:

1) To create a snapshot :

Create snapshot emp_snap refresh with rowid as select * from emp;

2) To use snapshot from PL/SQL :

declare

cnt as number(2):=0;

begin

Select count(*) into cnt from emp_snap;

dbms_output.put_line ('Number of rows from snapshot :' || cnt);

end;

/



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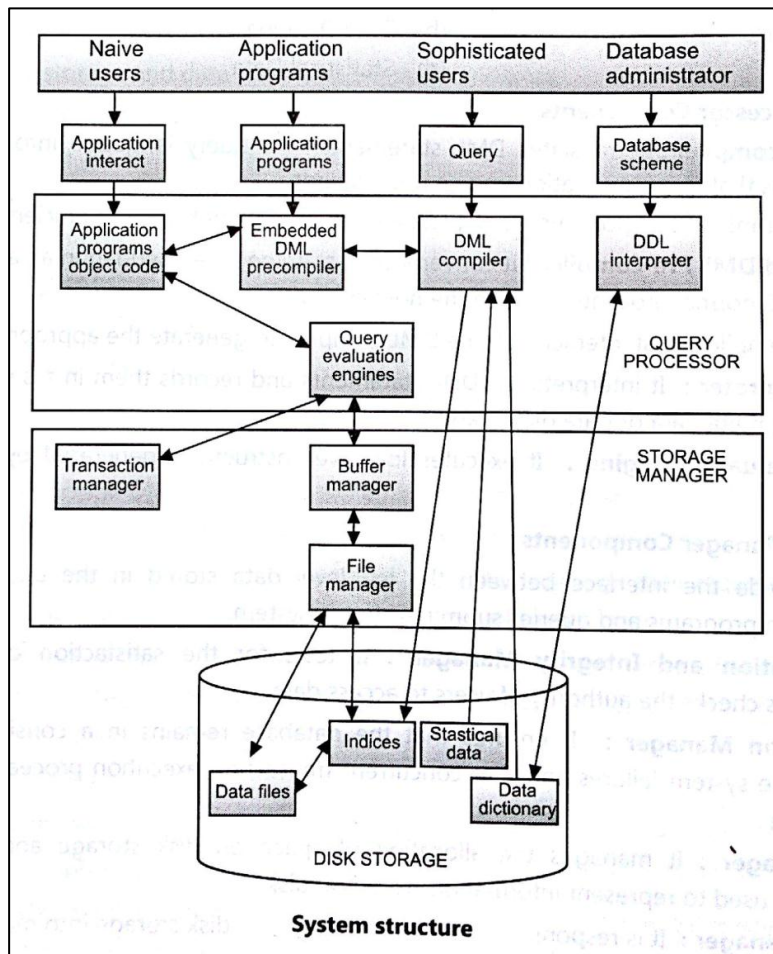
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f) Draw diagram for overall architecture of DBMS.
(Correct diagram – 4 Marks)

Ans:





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5. Solve any four:

MARKS 16

a) What is data abstraction? What are the levels of abstraction?
(*Data abstraction – 1 Mark , Three levels – 3Marks*)

Ans:

Data Abstraction:

The need for efficiency has led designers to use complex data structures to represent data in the database. Since many database-systems users are not computer trained, developers hide the complexity from users through several levels of abstraction, to simplify users' interactions with the system:

1. **Physical level.** The lowest level of abstraction describes *how* the data are actually stored. The physical level describes complex low-level data structures in detail.
2. **Logical level.** The next-higher level of abstraction describes *what* data are stored in the database, and what relationships exist among those data. The logical level thus describes the entire database in terms of a small number of relatively simple structures.
3. **View level.** The highest level of abstraction describes only part of the entire database. Many users of the database system do not need all this information; instead, they need to access only a part of the database. The view level of abstraction provides many views for the same database.



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- b) Explain types of JOINS.
(Any four JOINS –1 Mark each)

Ans:

SQL Join types are as follows:

1) INNER JOIN or EQUI JOIN:

A join which is based on equalities is called equi join. In equi join comparison operator “=” is used to perform a Join.

Syntax:

```
SELECT tablename.column1_name,tablename.column1_name  
FROM table_name1,table_name2  
where table_name1.column_name=table_name2.column_name;
```

Example:

```
Select stud_info.stud_name,stud_info.branch_code,branch_details.location  
From stud_info,branch_details  
Where  
Stud_info.branch_code=branch_details.branch_code;
```

2) SELF JOIN:

The SQL **SELF JOIN** is used to join a table to itself, as if the table were two tables, temporarily renaming at least one table in the SQL statement.

Syntax:

```
SELECT a.column_name, b.column_name...  
FROM table1 a, table1 b  
WHERE a.common_field = b.common_field;
```

Example:

```
Select x.stud_name, y.stud_name from stud_infox,stud_info y  
Where x.leader= y.stud_id;
```



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3) LEFT OUTER JOIN:

A left outer join retains all of the rows of the “left” table, regardless of whether there is a row that matches on the “right” table.

Syntax:

```
Select column1name,column2name  
from  
table1name any_alias1 ,table2name any_alias2  
on  
any_alias1.columnname(+) = any_alias2.columnname;
```

OR

```
Select column1name,column2name  
from  
table1name left outer join table2name on  
table1name.columnname= table2name.columnname;
```

Example:

```
select  
last_name,department_name  
from  
employeee,departments d  
on  
e.department_id(+) = d.department_id;
```

OR

```
select  
last_name,department_name  
from  
employees left outer join departments  
on  
employees.department_id = departments.department_id;
```



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4) RIGHT OUTER JOIN

A right outer join retains all of the rows of the “right” table, regardless of whether there is a row that matches on the “left” table.

Syntax:

```
Select column1name,column2name  
from table1name any_alias1 ,table2name any_alias2  
on  
any_alias1.columnname =any_alias2.columnname (+);
```

OR

```
Select column1name,column2name  
from table1name any_alias1 right outer join table2name any_alias2  
on  
any_alias1.columnname =any_alias2.columnname;
```

Example:

```
Select last_name,department_name  
from  
employeee,departments d  
on  
e.department_id = d.department_id(+);
```

OR

```
Select last_name,department_name  
from  
employees e right outer join departments d  
on  
e.department_id = d.department_id;
```

5) NON EQUI JOIN:

Non equi joins is used to return result from two or more tables where exact join is not possible.

Syntax:



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Select aliasname.column1name, aliasname.column2name from tablename
alias where <condition using range>;

For example:

we have emp table and salgrade table. The salgrade table contains grade and their low salary and high salary. Suppose you want to find the grade of employees based on their salaries then you can use NON EQUI join.
Select e.empno, e.ename, e.sal, s.grade from emp e, salgrade s where e.sal between s.lowsal and s.hisal;

- c) **Write PL/SQL procedure to calculate factorial of a give number.**
(Correct program – 4Marks)
[Note: Any other relevant logic shall be considered]

Ans:

```
SQL> create or replace procedure Factorial(n in number)
is
v number :=1;
begin
for i in 1..n
loop
v :=v * i;
end loop;
dbms_output.put_line(v);
end;
Procedure created
```

```
SQL> Begin
Factorial(5);
End;
```



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d) Differentiate between function and procedure.

(Any four point – 1Mark each)

Ans:

	function	procedure
1.	Syntax: CREATE [OR REPLACE] PROCEDURE proc_name [list of parameters] IS <Local Declaration section > BEGIN Execution section EXCEPTION Exception section END;	Syntax: CREATE OR REPLACE FUNCTION function_name (argument IN data type ,...) RETURN datatype {IS,AS } Variable declaration; Constant declaration; BEGIN PL/SQL statements; EXCEPTION Exception PL/SQL block END;
2.	Return type is must	Return type is not must
3.	It can return any scalar or table	It can directly return only integers
4.	Will compiled at run time	Stored in database in compiled format.
5.	It won't support out parameters	It can also return more than one values (of any data type) indirectly with the help of out parameters



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e) Given:

driver (driver_id, driver_name, age, rating)

bus (bus_id, bus_name, color)

reserves (driver_id, bus_id, date);

Write Relational Algebra Queries for

i) Find the colors of bus reserved by 'John Mark'.

ii) Find the names of drivers who have not reserved a yellow bus.

(Each correct query – 2Marks)

Ans:

1. $\pi_{color} (\sigma_{driver_name = 'John Mark'} ((driver \bowtie reserves) \bowtie bus))$

2. $\pi_{driver_name} (\sigma_{color <> 'yellow'} ((driver \bowtie reserves) \bowtie bus))$

f) How to use COMMIT, SAVE POINT, ROLLBACK commands.

(Explanation – 3Marks, Example – 1Mark)

Ans:

Commit:

- The COMMIT command is used to save changes invoked by a transaction to the database.
- The COMMIT command saves all transactions to the database since the last COMMIT or ROLLBACK command.
- The syntax for COMMIT command is as follows:
SQL> COMMIT;



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Savepoint:

- A SAVEPOINT is a point in a transaction when you can roll the transaction back to a certain point without rolling back the entire transaction.
- The syntax for SAVEPOINT command is as follows:
SAVEPOINT SAVEPOINT_NAME;
e.g. SAVEPOINT SV1;

Rollback:

- The ROLLBACK command is used to undo transactions that have not already been saved to the database.
- The ROLLBACK command can only be used to undo transactions since the last COMMIT or ROLLBACK command was issued.
- The syntax for rolling back to a SAVEPOINT is as follows:
ROLLBACK TO SAVEPOINT_NAME;

e.g. ROLLBACK TO sv1;

6. Solve any four:

MARKS 16

- a) **Explain two disadvantages of file processing system.**
(Any two Disadvantages – 2Marks each)

Ans:

Disadvantages of file processing system

1. Data redundancy and inconsistency :

Since the files and application programs are created by different programmers over a long period, the various files are likely to have different formats and the programs may be written in several programming languages. So , the same information may be duplicated in several places (files).That repetition of information is known as redundancy.This redundancy leads to higher storage and access cost. In addition, it may lead to **data inconsistency**, that is different copies of the same data may have different values.



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2. Difficulty in accessing data :

The conventional file processing system do not allow to access data in a convenient and efficient way. As the data was scattered in different files and whenever need arises different application programs were written by different programmers in different formats.

3. Data isolation

As the data scattered in various files and files may be in different formats, writing new application programs to retrieve the data is very difficult.

4. Integrity problems

The data values stored in the database must satisfy certain types of **consistency constraints**. When new constraints are added, it is difficult to change the programs to enforce them.

5. Atomicity problems

A computer system, like any other mechanical or electrical device, is subject to failure. If any failure occurs in the system the transaction which are executing should fully get executed or should not, so that database remains in consistent state.

6. Concurrent-access anomalies

To improve the performance of the system, multiple transactions must get executed concurrently. Multiple transactions may be updating the same data concurrently. In such case the data may result in inconsistent state

7. Security problems

Only authorized person should be able to modify the data. Security should be maintained at different levels which were not possible in file processing system.



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-
- b) **Given: Student (Roll_No, Name, Class, Total_Marks, Percentage, Grade)**
find appropriate dependencies and normalize up to 3NF
(Functional Dependencies - 2 Marks, 2NF- 1Mark, 3NF-1 Mark)

Ans:

Functional Dependencies:

Roll_No \longrightarrow Name

Roll_No \longrightarrow Class

Total_Marks \longrightarrow Percentage

Percentage \longrightarrow Grade

1NF:

- 1) Student (Roll_No, Name, Class, Total_Marks, Percentage, Grade)

2NF:

- 1) Student(Roll_No, Name, Class)
- 2) Marks(Roll_No, Total_Marks, Percentage, Grade)

3NF:

- 1) Student(Roll_No, Name, Class)
- 2) Marks(Roll_No, Total_Marks, Percentage)
- 3) Grade (Percentage, Grade)



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- c) **Explain ACID properties.**
(Four properties –1 Mark each)

Ans:

To ensure integrity of the data, we require that the database system maintain the following properties of the transactions (ACID properties):

- **Atomicity:** Either all operations of the transaction are reflected properly in the database, or none are.
- **Consistency:** Execution of a transaction in isolation (that is, with no other transaction executing concurrently) preserves the consistency of the database.
- **Isolation:** Even though multiple transactions may execute concurrently, the system guarantees that, for every pair of transactions T_i and T_j , it appears to T_i that either T_j finished execution before T_i started, or T_j started execution after T_i finished. Thus, each transaction is unaware of other transactions executing concurrently in the system.
- **Durability:** After a transaction completes successfully, the changes it has made to the database persist, even if there are system failures.

- d) **What are the types of attributes?**
(Any Four attributes – 1Mark each)

Ans:

An attribute can be characterized by the following attribute types:

1. **Simple attributes:** Attributes which cannot be divided into subparts are known as Simple attributes. E.g RollNo.
2. **Composite attributes:** Attributes which can be divided into subparts (that is, other attributes).
e.g Name can be divided as First_name, Middle_name, Last_name
3. **Single-valued attribute:** The attributes that hold a single value for a single entity are single-valued attributes. E.g DOB
4. **Multivalued attributes** : There may be instances where an attribute has a set of values for a specific entity. E.g TelephoneNo
5. **Derived attributes:** The value for this type of attribute can be derived from the values of other related attributes or entities. E.g Age attribute can be derived from attribute DOB
6. **Null attributes** : a NULL value is used when an entity does not have a value for an attribute.



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- e) Explain GROUP BY, ORDER BY clause of SQL with example.
(Explanation with syntax / example – 2Marks each)

Ans:

Group by clause

- The group by clause can be used in a select statement to collect data across multiple records and group by one or more columns.
- The group by field contains the repetitive records or values like department number in employee.
- The syntax is:

```
Select col1,col2,.....,col n aggregate_function (expression)
From table_name
Where predicates
Group by column_name;
```

- Example: Display average salary of each department

```
Select avg(sal)
From emp
group by deptno;
```

Order by clause:

- The ORDER BY keyword is used to sort the result-set by one or more columns.
- The ORDER BY keyword sorts the records in ascending order by default.
- To sort the records in a descending order, you can use the DESC keyword.
- Syntax:

```
SELECT column_name,column_name
FROM table_name
ORDER BY column_name,column_name ASC|DESC;
```

- Example:

1. SELECT * FROM Customers
ORDER BY Country;
2. SELECT * FROM Customers
ORDER BY Country DESC;



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f) What are the various control structure statements used in PL/SQL?

(Any four control structures - 1 Mark each)

Ans:

Conditional Control:

1. If then Else End If statement:

- The 'If then Else End if is used to check the conditions.
- If the condition in if part is true then the statement in the if block gets execute.
- If the condition in if part is false then the statement given in the else part gets execute.
- To give more number of conditions we can use 'if the elseif' which provides more number of conditions.
- The general syntax of 'if' is as follows:

```
If condition then
    Statements
Else
    Statements
End if;
```

2. Nested If:

- In this, any number of ELSIF clauses can be used with one IF statement.
- Either set of actions of the result of the first IF statement of ELSE statement can contain further IF statements before specific actions are performed.
- Each nested IF statement must terminate with a corresponding END IF.
- Syntax:

```
If condition then
    Statements
    If condition then
        Statements
    Else
        If condition then
            Statements
        Else condition then
            Statements
        End if;
    End if;
End if;
```



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3. Case

- Evaluates a list of conditions and returns one of multiple possible result expressions.
- CASE can be used in any statement or clause that allows a valid expression. For example, you can use CASE in statements such as SELECT, UPDATE, DELETE and SET, and in clauses such as select_list, IN, WHERE, ORDER BY, and HAVING.
- Syntax:

```
CASE [ expression ]  
    WHEN condition_1 THEN result_1  
    WHEN condition_2 THEN result_2  
    ...  
    WHEN condition_n THEN result_n  
ELSE result  
END
```

Iterative Control:

1. Simple Loop
2. While Loop
3. For Loop

4. Simple Loop

- LOOP statements let you execute a sequence of statement multiple times.
- Place the keyword LOOP before the first statement in the sequence and the keyword END LOOP after the last statement in the sequence.

➤ Syntax:

- Endless loop

```
LOOP  
    <loop_body>  
END LOOP;
```

- Conditional loop

```
LOOP  
    <loop_body>  
EXIT WHEN (Condition);  
END LOOP;
```



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- The EXIT WHEN statement lets you complete a loop if further processing is impossible or undesirable.
- When the EXIT statement encountered, the condition in the WHEN clause is evaluated.
- If the condition is true, the loop completes and control passes to the next statement.

5. While Loop

- The WHILE LOOP statement associates a condition with a sequence of statements.
- Before each iteration of loop, the condition is evaluated.
- If the condition is true, the sequence of statement is executed, then control resumes at the top of the loop.
- If the condition is false or null, the loop is bypassed and control passes to the next statement.
- Syntax:

```
WHILE <Condition> LOOP  
<loop body>  
END LOOP;
```

6. For Loop :

- The FOR LOOP statement specifies a range of integers, then execute a sequence of statements once for each integer in the range.
- To reverse the range , “REVERSE” keyword is used.
- The syntax is :

```
FOR i IN 1..N LOOP  
<loop_body>  
END LOOP;
```

7. Sequential Control:

- Label can be used to give a label or name to the piece of code. And once the name is given to it, user can call that piece of code with that label whenever and wherever required in the program .
- Syntax for label is as follows:
 <<label_name>>
 Statements;
- The Goto statement is used to transfer the control or to change the sequence of the instructions.
- Syntax for goto statement is as follows:
 Goto<<label_name>>