MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
<u>**Model Answer**</u>

Subject Code: 17332   **Subject Name: Relational Database Management System**

<u>**Important Instructions to examiners:**</u>
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.

Marks

1.   A) Attempt any six of following: 12

a)   Enlist different components of DBMS.
       (Listing any 2 components - 1 mark each)
Ans:
       Different components of DBMS are:
       1. Query Processor (DDL interpreter, DML compiler, Embedded DML Pre-Compiler, Query Evaluation Engine)
       2. Storage Manager (Authorization and Integrity Manager, Transaction Manager, File Manager, Buffer Manager)
       3. Disk Storage (Data Files, Data Dictionary, Statistical data, indices)

b)   What is meant by data redundancy?
       (Correct Definition - 2 marks)

Ans:
       Data redundancy means storing same data multiple times at different locations.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
<u>**Model Answer**</u>

Subject Code: 17332   **Subject Name: Relational Database Management System**

c) **List any four DBMS software.**
   (Any four software - ½ mark each)

Ans:

   Oracle, MySQL, Microsoft Access, Microsoft SQL Server, IBM DB2
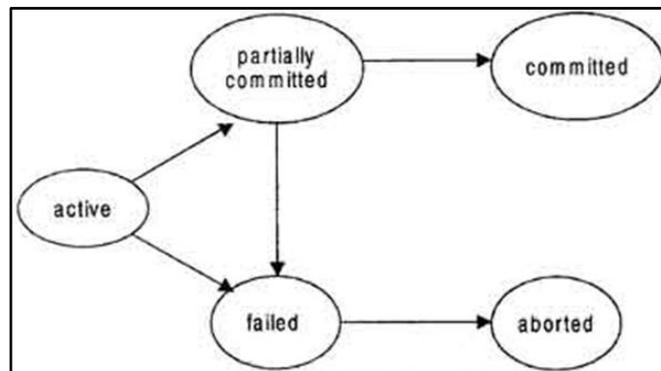
d) **List various data models.**
   (Listing of any 2 models - 1 mark each)
Ans:

   Relational Database Model, Hierarchical Model, Network Model, E-R Model

e) **Draw the state diagram of transaction.**
   (Correct Diagram - 2 marks)
Ans:

f) **Define attribute and entity.**
   (Definition of Attribute - 1 mark; Entity - 1 mark)

Ans:
   Entity: An entity is a thing or object in the real world with an independent existence. An entity may be an object with a physical existence.
   Attribute: Describing properties of an entity is called attributes. For example, a student entity may have name, class, and age as attributes.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
<u>**Model Answer**</u>

Subject Code: 17332   **Subject Name: Relational Database Management System**

g) **Define normalization.**
(Definition - 2 marks)

Ans:

Normalization can be defined as process of decomposition of database tables to avoid the data redundancy.

h) **What is meant by query optimization?**
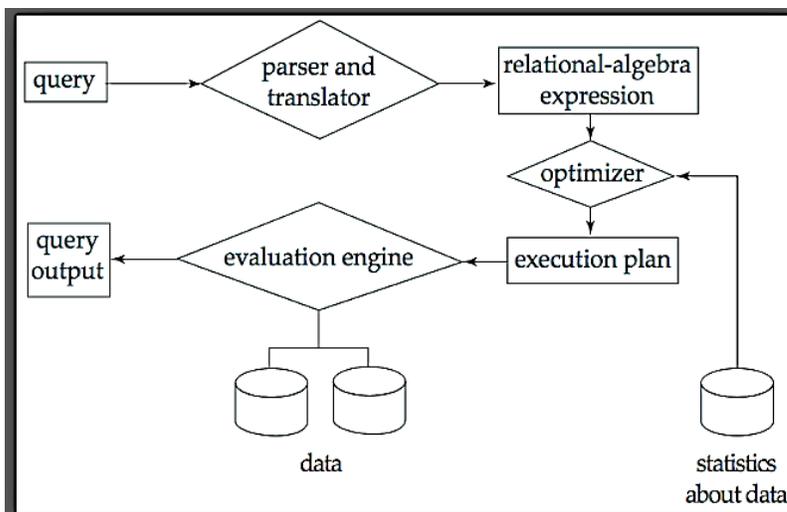*(Definition/Explanation - 2 marks)*

Ans:

The query optimization is the most efficient way to execute a given query by considering the possible query plans.

B) **Attempt any two of following:**   **8**

a) **Explain the steps used in query processing with suitable diagram.**
(Diagram - 2 marks; Explanation - 2 marks)

Ans:

Query processing: It is a three step process that transforms a high-level query (of relational calculus/SQL) into an equivalent and more efficient lower-level query (of relational algebra).
  1. **Parsing and translation** – Check syntax and verify relations. It translates the query into an equivalent relational algebra expression.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

2. **Optimization** – Generate an optimal evaluation plan (with lowest cost) for the query plan.
3. **Evaluation** – The query-execution engine takes an (optimal) evaluation plan, executes that plan, and returns the answers to the query.

b) **List and explain the types of integrity constraints in detail.**
(Listing - 1 mark; Any Two Constraints explanation - 1 ½ marks each)
*[** Note: Either syntax or example can be considered**]*

Ans:

Integrity constraints: Not Null constraint, CHECK constraint, Primary Key constraint, Unique Constraint, Referential Integrity Constraint

1. **Not Null:** By default all columns in tables allows null values. When a NOT NULL constraint is enforced on column or set of columns it will not allow null values.
   Syntax for NOT NULL
   CREATE TABLE TABLE_NAME
   (COLUMN_NAME DATA_TYPE, COLUMN_NAME DATA_TYPE NOT NULL);
   Example:
   SQL>CREATE TABLE STUDENT (ROLL_NO NUMBER(5), NAME VARCHAR2(20) NOT NULL);

2. **CHECK:** The constraint defines a condition that each row must satisfy. A single column can have multiple check condition.
   Syntax:-
   CREATE TABLE TABLE_NAME
   (COLUMN_NAME DATA_TYPE,
   COLUMN_NAME DATA_TYPE *CONSTRAINT CONSTRAINT_NAME CHECK <CONDITION>*);
   Example:
   SQL> CREATE TABLE EMP (ID NUMBER(5), NAME VARCHAR2(10), SAL NUMBER(10) CONSTRINT CHK_SAL CHECK (SAL>15000));

3. **Primary Key constraint**: It is use to avoid redundant/duplicate value entry within the row of specified column in table. It restricts null values too.
   Syntax:
   CREATE TABLE TABLE_NAME
   (COLUMN_NAME DATA_TYPE, COLUMN_NAME DATA_TYPE *CONSTRAINT CONSTRAINT_NAME PRIMARY KEY*);
   Example:
   SQL> CREATE TABLE EMP (ID NUMBER (5) *CONSTRAINT ID_PK PRIMARY KEY*, NAME VARCHAR2 (10), SAL NUMBER (10));

4. **Unique Constraint**: The UNIQUE constraint uniquely identifies each record in a database table. The UNIQUE and PRIMARY KEY constraints both provide a guarantee for uniqueness for a column or set of columns. It allows null value.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

Syntax:
CREATE TABLE TABLE_NAME (COLUMN_NAME DATA_TYPE, COLUMN_NAME DATA_TYPE CONSTRAINT CONSTRAINT_NAME UNIQUE);

Example:
CREATE TABLE PERSONS (P_ID NUMBER CONSTRAINT P_UK UNIQUE,
FIRSTNAME VARCHAR (20), CITY VARCHAR (20));

5. **Referential Integrity Constraint:** It is a relational database concept in which multiple tables share a relationship based on the data stored in the tables, and that relationship must remain consistent. A value of foreign key is derived from primary key which is defined in parent table.

Syntax:
CREATE TABLE TABLE_NAME (COLUMN_NAME DATA_TYPE, COLUMN_NAME DATA_TYPE CONSTRAINT CONSTRAINT_NAME REFERENCES PARENT_TABLE_NAME (PARENT_TABLE_COL_NAME ON DELETE CASCADE, COLUMN_NAME DATA_TYPE);

Example:
CREATE TABLE DEPARTMENT (EMP_ID NUMBER(5) REFERENCES EMP(EMP_ID), DNO NUMBER(3));

c) **Explain ACID properties of transaction.**
(Four ACID properties - 1 mark each)

Ans:

ACID Properties:
1. **Atomicity:** When one transaction takes place, many operations occur under one transaction. Atomicity means either all operations will take place property and reflect in the database or none of them will be reflected.
2. **Consistency:** Consistency keeps the database consistent. Execution of a transaction needs to take place in isolation. It helps in reducing complications of executing multiple transactions at a time and preserves the consistency of the database.
3. **Isolation:** It is necessary to maintain isolation for the transactions. This means one transaction should not be aware of another transaction getting executed. Also their intermediate result should be kept hidden.
4. **Durability:** When a transaction gets completed successfully, it is important that the changes made by the transaction should be preserved in database in spite of system failures.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

2.   **Attempt any four of the following:**   **16**

a)   **State properties of Boyce Codd Normal Form.**
      (Any two properties - 2 marks each)

Ans:

     Properties of Boyce Codd normal form
1. BCNF: A relation R is in Boyce - Codd normal form (BCNF) if and only if every determinant is a candidate key.
2. In BCNF non-trivial functional dependency is preserved for super key.
3. A table can be in 3NF but not in BCNF.
4. 3NF does not deal satisfactorily with the case of a relation with overlapping candidates keys, in such case BCNF can be used.
5. The violation of BCNF means that the table is subject to anomalies.

b)   **Describe Relational model with example.**
      (Explanation - 2 marks; example - 2 marks)

Ans:

     Relational Model: Relational Model represents the database as a collection of tables. A table is a database object that stores data in form of rows and columns. Each row in the table represents collection of related data value.
     Tuple: In relational model, a row is called as tuple.
     Attribute: A column header is called as an attribute.
     Degree: The degree of relation is number of attributes of the table.
     Domain: All permissible values of attributes is called as a domain.
     Cardinality: Number of rows in the table is called as cardinality
     e.g. Create table Student_details(RollNo number(3),Name varchar(15));
     Student_details:

Roll No	Name
11	Nita
12	Rahul
13	Rakesh

     In the above example Student_details is the name of Relation.
     There are two attributes RollNo and Name so Degree is 2.
     In the relation there are three tuples(rows) so Cardinality is 3.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

c) **Describe Commit and Rollback with syntax.**
(For each command explanation - 1 mark; syntax - 1 mark)

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;

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.
- We can either rollback the entire transaction or till a particular save point transaction can be rolled back.
- **The syntax for ROLLBACK is:**
    ROLLBACK TO SAVEPOINT_NAME;
                    OR
    ROLLBACK;
  e.g. ROLLBACK TO sv1;
              OR
  ROLLBACK

d) **What are sequence? Why it is used? Create sequence for STUDENT table.**
(Definition - 1 mark; Use - 1 mark; creating valid sequence example/pattern - 2 marks)

Ans:

Definition: A sequence refers to a database object that is capable of generating unique and sequential integer values.

Use:
1. It saves a time by reducing application code.
2. It is used to generate unique sequential integers.
3. It is used to create an auto number fields.
4. Sequence can be use for many tables/relations

  Sequence for 'student' table:
  Create sequence student_seq increment by 1 start with 1 maxvalue 60 nocycle;

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

e)   **Give any four advantages of using PL/SQL.**
(Any four advantages - 1 mark each)

Ans:

Advantages of PL/SQL:
1. PL/SQL is portable and high transaction processing language.
2. PL/SQL is in fact procedural language but it also supports object oriented programming.
3. PL/SQL is that development tool which not only supports SQL data manipulations but also provides facilities of conditional checking and looping.
4. It allows user to write as well as access the functions and procedures from outside the programs.
5. It has got built in libraries of packages.
6. PL/SQL is highly productive as it works with the oracle forms to develop the application software i.e. it works with the front ends to develop the complete commercial applications.
7. The performance of PL/SQL is better, as in single line query entire block of statements can be processed.
8. Some special features of PL/SQL include the different data types that are capable of handling different types of data required in real life applications.
9. The most important features like triggers, cursors, locks etc have made PL/SQL a very versatile language.
10. Security can be ensured with the help of PL/SQL, while developing a commercial database system.
11. PL/SQL is a user friendly language and very simple to use.

f)   **List and explain any four functions of Database Administrator.**
(Any four functions - 1 mark each)

Ans:

Function of database administrator

1. **Schema Definition**
   The Database Administrator creates the database schema by executing DDL statements. Schema includes the logical structure of database table (Relation) like data types of attributes, length of attributes, integrity constraints etc.
2. **Storage structure and access method definition**
   The DBA creates appropriate storage structures and access methods by writing a set of definitions which is translated by data storage and DDL compiler.
3. **Schema and physical organization modification**
   DBA writes set of definitions to modify the database schema or description of physical storage organization.
4. **Granting authorization for data access**

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

The DBA provides different access rights to the users according to their level. Ordinary users might have highly restricted access to data, while you go up in the hierarchy to the administrator, you will get more access rights.

Integrity constraints specifications: Integrity constraints are written by DBA and they are stored in a special file which is accessed by database manager while updating data.

5. **Routine Maintenance**

   some of the routine maintenance activities of a DBA is given below.
   (i)   Taking backup of database periodically
   (ii) Ensuring enough disk space is available all the time.
   (iii) Monitoring jobs running on the database.
   (iv) Ensure that performance is not degraded by some expensive task submitted by some users.

6. **Integrity- constraint specification:** Integrity constraints are written by DBA and they are stored in a special file, which is accessed by database manager, while updating the data.

3. **Attempt any four of following:**   **16**

a) **Consider the following database:**
   Employee(emp_id, emp_name, emp_city, emp_addr, emp_dept, join_date)
   Solve the following query:
   i)   **Display the names of employees in capital letters.**
   ii) **Display the emp_id of employee who live in city Pune and Mumbai.**
   iii) **Display the details of employees whose joining date is after '01-Apr.-1997'.**
   iv) **Display the total number of employees whose dept.no.is '10'.**
   (Each correct query - 1 mark)

Ans:
   i)   select upper(emp_name) from Employee;
   ii)   select emp_id from Employee where emp_city = 'Pune' or emp_city = 'Mumbai';
                         OR
         Select emp_id from Employee where emp_city in('Mumbai', 'Pune');
   iii) select * from Employee where join_date>'01-Apr-1997';
   iv)   select count(emp_id) from Employee where emp_dept = 10;

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer
Subject Code: 17332   Subject Name: Relational Database Management System

b)   What are Predefined exceptions and User defined exceptions?
(Predefined exception - 2 marks; User Defined exception - 2 marks)

Ans:

1) **Predefined Exception/system defined exception/named exception:**
    Are always automatically raised whenever related error occurs. The most common errors that can occurs during the execution of PL/SQL. Not declared explicitly. I.e. cursor already open, invalid cursor, no data found, zero divide and too many rows etc. Programs are handled by system defined Exceptions.

2) **User defined exception:**
    It must be declare by the user in the declaration part of the block where the exception is used.
    It is raised explicitly in sequence of statements using:
    Raise_application_error (error_no, error_name);

c)   Consider the following Relational algebra schema
STUDENT(RNO, Name, DOB, Percentage, DNO)
DEPARTMENT (DNO, DNAME, HEAD)
Write relational algebra expressions:
   i)   **Find students name and course from Computer Dept.**
   ii) **Get the students name who has percentage greater than 70**
(Each relational algebra expression - 2 marks)
[Note: Considering DNAME as Course**]**

Ans:

1. $\Pi_{\text{Name, DNAME}}(\sigma_{\text{dname= 'Computer'}}{}^{(\text{STUDENT}\bowtie\text{DEPARTMENT})})$
2. $\Pi_{\text{Name}}(\sigma_{\text{Percentage>70}}{}^{(\text{STUDENT})})$

d)   What are views? Give its syntax and explain its advantages.
(Views - 2 marks; Syntax - 1 mark; Advantages (Any two) - 1 mark)

Ans:

Views are created for security reasons. Instead of   coping same table multiple times for different requirements, views can be created. View is a logical copy of physical table. It doesn't exist physically. With the help of view, we can give restricted access to users. When view is used, underlying table is invisible, thus increasing security. Views can be used to see, insert, update and delete data from base table.
Syntax for creating view:-
Create [OR Replace][Force /Noforce] view
<viewname>[alias name ….]
As subquery

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

[with CHECK OPTION[CONSTRAINT]]
[with READ ONLY];
Advantages of Views:
- Views restrict access to the data because the view can display selective columns from the table.
- Views can be used to make simple queries to retrieve the results of complicated queries. For example, views can be used to query information from multiple tables without the user knowing how to write a join statement.
- Views provide data independence for adhoc users and application programs. One view can be used to retrieve data from several tables.
- Views provide groups of users to access to data according to their particular criteria. Thus implements security and authorization.

e) **What is lock? Explain types of locks.**
(Lock - 2 marks; Description - 1 mark each type)
Ans:

The lock table statement allows explicitly acquire a shared or exclusive table lock on the specified table. The table lock lasts until the end of the current transaction. To lock a table, one must either be the database owner or the table owner.
Syntax:
LOCK TABLE *TABLE-NAME* IN {SHARED | EXCLUSIVE} MODE;
Types of Locks:
Shared Lock
Exclusive Lock.

1. **Shared**. If a transaction *Ti* has obtained a **shared-mode lock** (denoted by S) on item *Q*, then *Ti* can read, but cannot write, *Q*. Shared Lock is provided to the readers of the data. These locks enable all the users to read the concurrent data at the same time, but they are not allowed to change/ write the data or obtain exclusive lock on the object. It could be set for table or table row. Lock is released or unlocked at the end of transaction.
2. **Exclusive**. If a transaction *Ti* has obtained an **exclusive-mode lock** (denoted by X) on item *Q*, then *Ti* can both read and write *Q*. Exclusive Lock is provided to the writers of the data. When this lock is set on a object or transaction, it means that only writer, who has set the lock can change the data, and if other users cannot access the locked object. Lock is released at the end of change in transaction.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

f) **What is data warehousing and data mining?**
(Data Warehousing - 2 marks; Data Mining - 2 marks)

Ans:

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 ensure that online transaction-processing systems are not affected by decision support workload.

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.

4. **Attempt any four of following :** **16**

a) **Draw an E-R diagram of hospital management system.**
(Correct E-R Diagram - 4 marks)
[NOTE: Any relevant diagram shall be considered**]**
Ans:

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
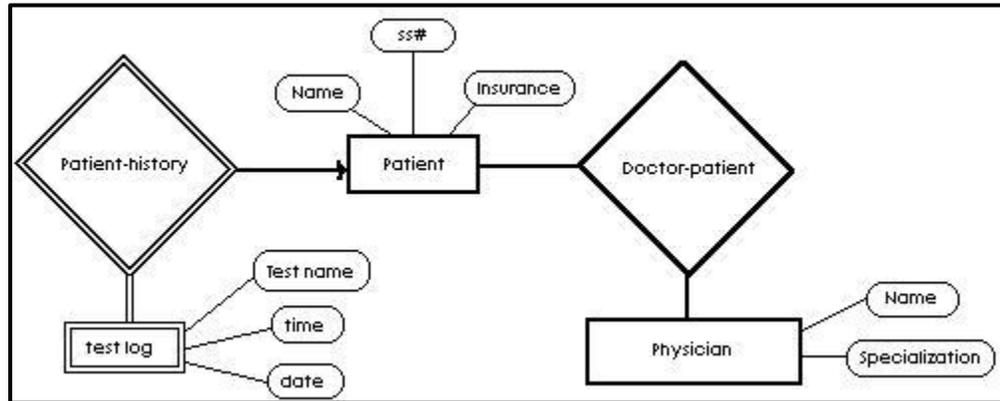**(Autonomous)**
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

b)   **Write a PL/SQL program to find the square of a number given by user usingWHILE….LOOP.(accept the number from user dynamically)**
(Correct Program - 4 marks)
[NOTE: any relevant program logic shall be considered**]**

Ans:
```
SET SERVEROUTPUT ON;
DECLARE
     n number:=  &n;
       sqr number:= 0;
       n_cntr number:=0;
BEGIN
       DBMS_OUTPUT.PUT_LINE(n);
       WHILE n_cntr <  n          LOOP
            sqr:= sqr + n;
       n_cntr   := n_cntr + 1;
  END LOOP;
  DBMS_OUTPUT.PUT_LINE('Square of ' || n || ' is ' || sqr);
END;
```

c)   **Describe Grant and Revoke commands.**
(Description of Grant - 2 marks; Revoke - 2 marks)
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] ;

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

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;

d) **Describe string function, date and time function.**
(Any two String Function - 2 marks; any two Date and Time Function - 2 marks)
Ans:

Character functions accept character as a input and return either character or number values.

Sr. No	Function	Description
1.	Initcap(str)	Converts first letter of string to capital letter. **Example:** Select initcap('rdbms') from dual;
2.	Lower(char)	Converts a string to all lowercase characters. **Example:** Select lower('RDBMS') from dual;
3.	Upper(char)	Converts a string to all uppercase characters. **Example:** Select upper('rdbms') from dual;
4.	Length(char)	Find outs the length of given string. **Example:** Select length('RDBMS') from dual;
5.	Ltrim(char,set)	It trim from the left of character string. **Example:** Select Ltrim('manas khan', 'manas') from dual;
6.	Rtrim(char,set)	It trim from the Right of character string. **Example:** Select Rtrim('manas khan', 'khan') from dual;
7.	Lpad(char1,length, char2)	It returns char1, left-padded to given length with the sequence of characters in char2. **Example:** Select Lpad('SKY', 8, '*') from dual;
8.	Rpad(char1,length ,char2)	It returns char1, right-padded to given length with the sequence of characters in char2. **Example:** Select Lpad('SKY', 8, '*') from dual;

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer
Subject Code: 17332   **Subject Name: Relational Database Management System**

9	Translate(char,fromstring,to string)	It returns expr with all occurrences of each character in from string replaced by its corresponding character in to_string. **Example:** Select translate(Hickory,'H','D') from dual
10	Replace(char,searchstring,[repstring])	It returns character string with each occurrences of search string replaced with [repstring] **Example:** Select replace('Tick and Tock','T','Cl') from dual;
11	Substr(char,m,n)	It returns substring of character string that stack at m character and is of length n **Example:** Select substr(Triangle'4,5) from dual;
12	Concatenation()	It merges two or more strings or a string and a data value together **Example:** Select ('Branch is'|| branch_name) from table_name;

Date functions takes values that are of data type DATE as input and return values of datatype DATE except months_between which return number as output.

Sr. No	Function	Description
1	**months_between(d1,d2)** Where, d1 and d2 are dates	Used to find number of months between d1 and d2. If d1 later date then d2 ans is positive If d1 earlier than d2 answer is negative **Example:** Select months_between('05-MAY-1996','05-JAN-1996') from dual;
2	**add_months(d,n)** Where,d is date, n no of months to be added	Returns date after adding the number of months specified with the function. **Example:** Select add_months(sysdate,2) from dual;
3	**Next_day(d,char)** Where d is date, char- day of week	Returns the date of the first weekday named 'char' that is after the date named by date. **Example:** Select next_day('01-FEB-2006','Wednesday') from dual;
4	Last_day(d) Where, d is date	Returns the last day of the month that contains date 'd'. **Example:** Select last_day(sysdate) from dual

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

| 5 | Round(date,[fmt]) Where, fmt   format model Month Day Year | Returns date rounded to the unit specified by the format model 'fmt'. **Example:** Select round(sysdate,'day') from dual; |
| 6 | Trunc(date([fmt]) Where, fmt   format model Month Day Year | Returns date with the time portion of the day truncated to the unit specified by the format model fmt. **Example:** Select trunc(sysdate,'day') from dual; |

e)   What is index ? Explain types of index.
(Index Definition - 2 marks; Any Two Types - 1 mark each)

Ans:

Index: An index is a schema object that can speed up the retrieval of rows by using pointer. An index provides direct and fast access to rows in a table. Indexes are created explicitly Or automatically. Indexes are used to speed up searches/queries.

Types of Index:

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

Unique indexes are used not only for performance, but also for data integrity. A unique index does not allow any duplicate values to be inserted into the table.

Composite (concatenated): Indexes that contain two or more columns from the same table which are useful for enforcing uniqueness in a table column where there's no single column that can uniquely identify a row.

f)   Draw and explain client server architecture.
(Diagram - 2 marks; Description - 2 marks)

Ans:
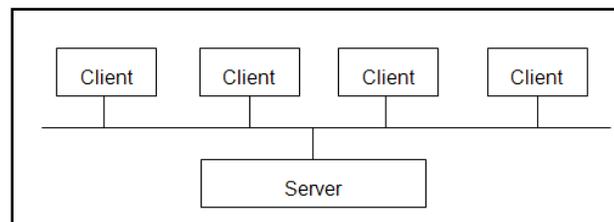
MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

Computer networking allows some task to be executed on a server system and some tasks on client system. This leads to development of client server architecture. The clients are the machines which requests for the service to the server. Server is the machine which serves to the clients. There are different types of client/server architecture such as two tier, three tier architecture. In two tier architecture, client systems directly approach database servers whereas in three tier architecture, there exists a middle layer which acts as application server to receive and send requests from client machine to database server and vice versa.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

5.   Attempt any four of following :   **16**

a)   Compare network and hierarchical model.
       (Any 4 points - 1 mark each)
Ans:

Network Model	Hierarchical Model
Supports many to many relationships.	Supports one to many relationships.
It is based on records and links.	It is based on tree like structure with one root.
More popular than Hierarchical	Less popular
Network model is upgraded version of the hierarchical model so used in the networks.	The main application of hierarchical data model is in the mainframe database system
Data storage is in the form of arbitrary graphs.	Data storage is in the form of data tree i.e. parent child relationship
Uses links to relate data	Uses pointers to relate data
It uses client server architecture.	It does not uses client server architecture.

b)   What are snapshots? Give its uses. How to create a snapshot?

(Definition - 1 mark; any one Use - 1 mark, Syntax/Example - 2 marks)

Ans:

Snapshots:
- It is also known as materialized view.
- It is a copy of either an entire single table or set of its rows or collection of tables, Views or either rows using join, grouping and selection criteria.

Uses:
- Useful in distributed environment.
- Response time of the queries gets minimized as the client has made a local copy of master table.
- If the master table gets corrupted, then data can be restored using snapshot.

Creating Snapshots:

- **Create snapshot** command is used to create the snapshot.
- **Syntax:**

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
<u>**Model Answer**</u>

Subject Code: 17332   **Subject Name: Relational Database Management System**

Create snapshot snapshot_name refresh with rowid as <select query>;
- **Example:**

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

c) **Write a PL/SQL program using while loop to display n even numbers.**
(Correct logic - 2 marks; correct syntax - 2 marks)
 [** Note: Any relevant logic can be considered**]

Ans:

```
SET SERVEROUTPUT ON;
DECLARE
        n number:= &n;
        i number:= 0;
        cnt number:=0;
BEGIN
        WHILE (cnt< n) LOOP
        if( mod (i,2)=0) then
                Dbms_output.put_line(i);
                cnt:=cnt+1;
        End if;
        i:=i+1;
        END LOOP;
END;
```

d) **List out any four statements of PL/SQL.**
(Any four statement list/syntax - 1 mark each)

Ans:

1. Declare
2. Begin
3. End
4. Exception
5. dbms_output.put_line();
6. If condition then
        Statements
   Else
        Statements
   End if;
7. LOOP
        <loop_body>
   END LOOP;
8. LOOP
        <loop_body>

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

EXIT WHEN (condition);
END LOOP;
9. WHILE <condition> LOOP
       <loop body>
    END LOOP;
10. GOTO <<label_name>>;
11. FOR COUNTER IN [reverse] LOWER_BOUND..UPPER_BOUND LOOP
    <loop body>
    END LOOP;
12. CASE [expression]
    WHEN condition_1 THEN result_1
    WHEN condition_2 THEN result_2

    …..
    WHEN condition_n THEN result_N
                    ELSE RESULT
                    END CASE

e)   Consider the structure as
       Product_Master = {prod_id, prod_name, rate}
       Purchase_details = {prod_id, quantity, dept_no,purchase_date}
       Write a relational algebra expression for the following:
       i) Get product_id, product_name and quantity for all purchased product
       ii) Get the products with rates between 100 and 4500.

(Each correct expression - 2 marks)

Ans:

i) Π prod_id, prod_name, quantity (σ Product_Master.prod_id=Purchase_details.prod_id (Product_Master Purchase_details))

OR

Π prod_id, prod_name, quantity (Product_Master Purchase_details)

ii) Π prod_name,rates (σ rates>100 ∧ rates < 4500 (Product_Master))

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
<u>**Model Answer**</u>

Subject Code: 17332   **Subject Name: Relational Database Management System**

f)   **Explain 3NF with example.**
(Explanation - 2 marks; example - 2 marks)

Ans:

Third normal form: A table is in the third normal form if it is in the second normal form and all the non-key columns are dependent only on the primary key. If the value of a non-key column is dependent on the value of another non-key column we have a situation known as transitive dependency. This can be resolved by removing the columns dependent on non-key items to another table.

Example

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

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

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

3NF:
- Student(Roll_No, Name, Class)
- Marks(Roll_No, Total_Marks, Percentage)
- Grade (Percentage, Grade)

6.   **Attempt any four of the following:**   **16**

a)   **What is database trigger? Compare database triggers and procedures and explain the use of database trigger.**
(Definition - 1 mark; Comparison - 2 marks; Uses - 1 mark)
[**Note: Any relevant comparison can be considered**]

Ans:

Database Trigger:

Database trigger are 'event-condition-action model' which are fixed on certain event. Trigger represents action to be taken if some event happens. In case of DBMS, triggers are automatically fired when tables are modified with insert, update and delete etc.

Comparison:

Database Trigger	Procedures
1. Triggers are fired when particular SQL commands (DML) are executed	1. Procedures are executed when they are called
2. Triggers have events and related actions	2. Procedure do not have events and related actions

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

3. Triggers are called implicitly	3. Procedure are called explicitly

Use of database trigger:
- Triggers can be used to prevent invalid transaction and to apply complex security authorization.
- It can be used to implement complicated integrity constraints.
- It can be used to maintain duplicate table and to check the data modifications.

b) **Explain PL/SQL block structure.**
(Correct Explanation - 4 marks)

Ans:
A PL/SQL block has following structure:

```
DECLARE
Variable declaration
BEGIN
Program Execution
EXCEPTION
Exception handling
END;
```

A PL/SQL Block consists of four sections:
1. **The Declaration section** : Declaration of memory variables used later in begin section.
2. **The Begin..End section** : SQL executable statements for manipulating table data should be in BEGIN....END block.
3. **The Exception section** : SQL and/or PL-SQL code to handle errors that may crop up during execution of the above code block.

c) **Explain with example group by and having clause.**
(For each clause - Explanation - 1 mark, syntax/example - 1 mark)

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

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

Select col1,col2,….,coln aggregate_function (expression)
From table_name
Where predicates
Group by column_name;

4. **Example: Display average salary of each department**
Select avg(sal)
from emp
group by deptno;

Having clause
1. This like a where clause, except that it involves a summary value, rather than a column value.
2. A where clause specifies the rows in the table to be included in the summation.
3. The having clause operates after the summation has been done.
4. Having clause is used in combination with the group by clause.
5. It can be used in a select statement to filter the records that a group by returns.
6. **The syntax is :**
Select col1,col2,….,col n aggregate_function (expression)
From table_name
Where predicates
Group by column_name;
Having condition 1,condition2;
7. **Example: Display the department number whose total salary is greater than 15000**.
Select deptno, sum(sal)
from emp
group by deptno
having sum(sal)>15000;

d) **List types of cursor and explain each with example.**
(Description - 1 mark; example - 1 mark for each type; 1 mark shall be awarded if only list is given)
[**Note: any other examples showing use of implicit and explicit cursor can be considered**]
Ans:

Types of Cursor
- **Implicit cursor**
- **Explicit cursor**

Implicit cursor:
If database engine opens a cursor for internal processing, it is called as implicit cursor.
Example of implicit cursor:

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   **Subject Name: Relational Database Management System**

Begin
        Update emp set salary= salary +500 where empno =&empno;
If SQL%FOUND then
                Dbms_out.put_line("Emp table modified");
        Else
                Dbms_out.put_line("Emp table modified");
        End if;
        End;

Explicit cursor:
A user can open a cursor for processing data as required. Such user defined cursors are known as explicit cursors.
Example of explicit cursor:
Declare
Cursor c1 is select empno, salary from emp Where deptno=10;
Ecode emp.empno%Type;
Sal emp.salary%Type;
Begin
        Open c1;
If c1%ISOPEN then
Loop
        Fetch c1 into ecode,sal;
If c1% NOTFOUND then Exit;
End if;
        Update emp set salary = salary+500;
End Loop;
Close c1;
Else
        Dbms_out.put_line("unable to open");
End if;
End;

e) **List and explain any 4 arithmetic operators in SQL with example.**
   (For each - 1 mark)

Ans:

Arithmetic operators are used to perform mathematical functions in SQL—the same as in most other languages. There are four conventional operators for mathematical functions:
- + (addition)
- - (subtraction)
- * (multiplication)

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

- / (division)

Addition
Addition is performed through the use of the plus (+) symbol.

Example	Meaning
SELECT SALARY + BONUS FROM EMPLOYEE_PAY_TBL;	The SALARY column is added with the BONUS column for a total for each row of data

Subtraction
Subtraction is performed using the minus (-) symbol.

Example	Meaning
SELECT SALARY - BONUS FROM EMPLOYEE_PAY_TBL;	The BONUS column is subtracted from the SALARY column for the difference

Multiplication
Multiplication is performed by using the asterisk (*) symbol.

Example	Meaning
SELECT SALARY * 10 FROM EMPLOYEE_PAY_TBL;	The SALARY column is multiplied by 10

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)
SUMMER-16 EXAMINATION
Model Answer

Subject Code: 17332   Subject Name: Relational Database Management System

Division

Division is performed through the use of the "/" symbol.

Example	Meaning
SELECT SALARY / 10 FROM EMPLOYEE_PAY_TBL;	The SALARY column is divided by 10

f) **Consider the structure for book table as Book_master {book_id, book_name, subcode, author, no_of_copies, price}.**
Write SQL queries for the following:
    i) **Display total no. of book for subject 'DBM'.**
    ii) **Get authorwise list of all books.**
    iii) **Display all books whose prices are between Rs. 200 and Rs.500**

Ans:

  i. Select sum(no_of_copies) from Book_master where subcode='DBM';   **(1 mark)**
                         OR
     Select sum(no_of_copies) from Book_master where book_name='DBM';
  ii. Select author, book_name From Book_master Order by author;
                    OR   **(1 mark)**
     Select author, sum(no_of_copies) from Book_master group by author;
  iii. Select book_id From Book_master Where price between 200 and 500;   **(2 marks)**
                    OR
     Select book_id From Book_master Where price >= 200 and price <= 500;