I

Name _____

Roll No. _____ Year 20____20____

Exam Seat No. _____

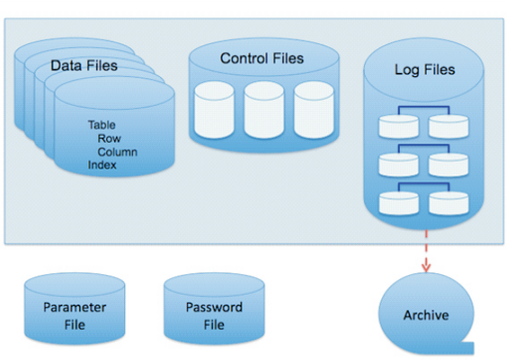
COMPUTER GROUP | SEMESTER - III | DIPLOMA IN ENGINEERING AND TECHNOLOGY

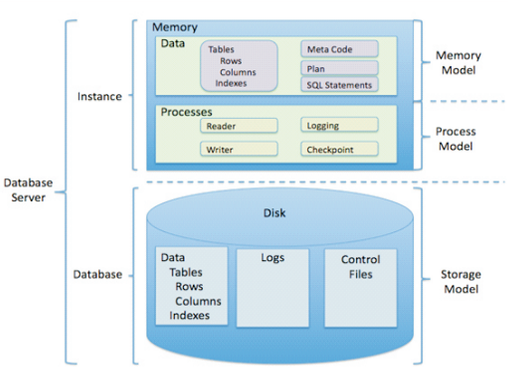
A LABORATORY MANUAL

FOR

DATABASE MANAGEMNT SYSTEM

(22319)





MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

(Autonomous) (ISO 9001 : 2015) (ISO / IEC 27001 : 2013)

VISION

To ensure that the Diploma level Technical Education constantly matches the latest requirements of technology and industry and includes the all-round personal development of students including social concerns and to become globally competitive, technology led organization.

MISSION

To provide high quality technical and managerial manpower, information and consultancy services to the industry and community to enable the industry and community to face the changing technological and environmental challenges.

QUALITY POLICY

We, at MSBTE are committed to offer the best in class academic services to the students and institutes to enhance the delight of industry and society. This will be achieved through continual improvement in management practices adopted in the process of curriculum design, development, implementation, evaluation and monitoring system along with adequate faculty development programmes.

CORE VALUES

MSBTE believes in the followings:

- Education industry produces live products.
- Market requirements do not wait for curriculum changes.
- Question paper is the reflector of academic standards of educational organization.
- Well designed curriculum needs effective implementation too.
- Competency based curriculum is the backbone of need based program.
- Technical skills do need support of life skills.
- Best teachers are the national assets.
- Effective teaching learning process is impossible without learning resources.

A Laboratory Manual

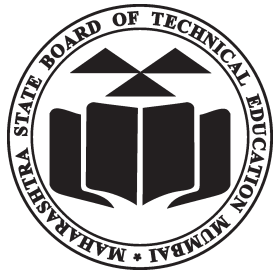
for

Database Management System

(22319)

Semester-III

(CO/CM/CW)



Maharashtra State
Board of Technical Education, Mumbai
(Autonomous) (ISO:9001:2015) (ISO/IEC 27001:2013)

Maharashtra State Board of Technical Education,
(Autonomous) (ISO : 9001 : 2015) (ISO/IEC 27001 : 2013)
4th Floor, Government Polytechnic Building, 49, Kherwadi,
Bandra (East), Mumbai - 400051.
(Printed on June, 2018)

MAHARASHTRA STATE

BOARD OF TECHNICAL EDUCATION

Certificate

This is to certify that Mr. / Ms. ……..…… Roll No. ……..…., of Third Semester of Diploma in ……..…… of Institute, ……..…….……..… (Code: ……...) has completed the term work satisfactorily in course **Database Management System (22319)** for the academic year 20…….. to 20…….. as prescribed in the curriculum.

Place: …… Enrollment No:.……

Date: …… Exam. Seat No: ……

Subject Teacher **Head of the Department** **Principal**

Seal of Institution

Preface

The primary focus of any engineering laboratory/ field work in the technical education system is to develop the much needed industry relevant competencies and skills. With this in view, MSBTE embarked on this innovative 'I' Scheme curricula for engineering diploma programmes with outcome-based education as the focus and accordingly, relatively large amount of time is allotted for the practical work. This displays the great importance of laboratory work making each teacher; instructor and student to realize that every minute of the laboratory time need to be effectively utilized to develop these outcomes, rather than doing other mundane activities. Therefore, for the successful implementation of this outcome-based curriculum, every practical has been designed to serve as a ***'vehicle'*** to develop this industry identified competency in every student. The practical skills are difficult to develop through 'chalk and duster' activity in the classroom situation. Accordingly, the 'I' scheme laboratory manual development team designed the practicals to ***focus*** on the ***outcomes***, rather than the traditional age old practice of conducting practicals to 'verify the theory' (which may become a byproduct along the way).

This laboratory manual is designed to help all stakeholders, especially the students, teachers and instructors to develop in the student the pre-determined outcomes. It is expected from each student that at least a day in advance, they have to thoroughly read through the concerned practical procedure that they will do the next day and understand the minimum theoretical background associated with the practical. Every practical in this manual begins by identifying the competency, industry relevant skills, course outcomes and practical outcomes which serve as a key focal point for doing the practical. The students will then become aware about the skills they will achieve through procedure shown there and necessary precautions to be taken, which will help them to apply in solving real-world problems in their professional life.

This manual also provides guidelines to teachers and instructors to effectively facilitate student- centered lab activities through each practical exercise by arranging and managing necessary resources in order that the students follow the procedures and precautions systematically ensuring the achievement of outcomes in the students.

This course aims to develop skills in students to create, store, modify, manage and extract information from a database. Database system can be used as a backend for developing database applications.

Although best possible care has been taken to check for errors (if any) in this laboratory manual, perfection may elude us as this is the first edition of this manual. Any errors and suggestions for improvement are solicited and highly welcome.

Programme Outcomes (POs) to be achieved through Practical of this Course:-

PO1. **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.

PO2. **Discipline knowledge:** Apply Information Technology knowledge to solve broad- based Information Technology related problems.

PO3. **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.

PO4. **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.

PO7. **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.

PO8. **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.

PO9. **Communication:** Communicate effectively in oral and written form.

PO10. **Life-long learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

Practical- Course Outcome matrix

Course Outcomes (COs)

a. Design Normalized database on given data.
b. Create and Manage Database using SQL command.
c. Able to write PL/SQL code for given database.
d. Apply triggers to database also create procedure and function according to condition.
e. Apply security and confidentiality on given database.

S. No.	Practical Outcome	CO a.	CO b.	CO c.	CO d.	CO e.
1.	Perform following in GUI based database software using GUI only i) Create Database ii) Create tables and assign primary key. iii) Modify the table structure-add column, change the data type of column, delete the column from table. iv) Insert, update and delete the record from table. v) Retrieve data from the table according to condition given	√	√			
2.	Perform following in GUI based database using GUI only i) Apply given validation on table and set error messages. ii) Set default value for column. iii) Set and remove database password.		√			
3.	Design E-R diagram and Create Normalized Database on given data.	√				
4.	i) Create and Execute DDL commands using SQL. ii) Apply following Integrity constraints on table: iii) Primary key, Foreign key, Unique key constraint, Null, Not Null and Check constraint.	√	√			
5.	Create and Execute DML commands using SQL.		√			
6.	Write Queries using following operators:		√			

	Arithmetic Operators, Comparison Operators,Logical Operators, Set Operators, Range Searching operators-Between, Pattern matching operators-Like.					
7.	Write Queries using following Functions: String, Arithmetic, Date and time, Aggregate Functions.		√			
8.	Execute Queries using the Select command with Where, Having, Group by and order by clauses.		√			
9.	Execute the queries for implementation of Inner and Outer Join.		√			
10.	Implement Views i) Create different views ii) Insert, modify and delete records through views. iii) Delete the views		√			
11.	Create and Execute Indexes, Sequences, and synonyms in SQL.		√			
12.	Write a PL/SQL programs using if then else, for, while and nested loop.			√		
13.	Write a PL/SQL code to implement implicit and explicit cursors.			√	√	
14.	Write PL/SQL Programs based on Exceptions handling.(Predefined and user-defined exceptions)			√	√	
15.	Write PL/SQL code to create Procedures and functions.			√	√	
16.	Write PL/SQL code to create triggers on given database.			√	√	
17.	Executing DCL commands using SQL i) Create users ii) Grant privileges to users iii) Revoke privileges from users.					√

List of Industry Relevant Skills

The following industry relevant skills of the competency 'Create and Manage Database using SQL' are expected to be developed in you by undertaking the practical's of this laboratory manual.

1. Normalize and Create Database
2. Apply constraints.
3. Write SQL queries and PL/SQ code.

Guidelines to Teachers

1. There will be two sheets of blank pages after every practical for the student to report other matters (if any), which is not mentioned in the printed practicals.
2. For difficult practicals if required, teacher could provide the demonstration of the practical emphasizing of the skills which the student should achieve.
3. Teachers should give opportunity to students for hands-on after the demonstration.
4. Assess the skill achievement of the students and COs of each unit.
5. One or two questions ought to be added in each practical for different batches. For this teachers can maintain various practical related question bank for each course.
6. For effective implementation and attainment of practical outcomes, teacher ought to ensure that in the beginning itself of each practical, students must read through the complete write-up of that practical sheet.
7. During practical, ensure that each student gets chance and takes active part in taking observations/ readings and performing practical.
8. Teacher ought to assess the performance of students continuously according to the MSBTE guidelines.

Instructions for Students

Note: Kindly do add specific instructions for students for effective implementation of practicals depending upon your course, if needed.

1. For incidental writing on the day of each practical session every student should maintain a dated log book for the whole semester, apart from this laboratory manual which s/he has to submit for assessment to the teacher in the next practical session.
2. For effective implementation and attainment of practical outcomes, in the beginning it of each practical, students need to read through the complete write-up including the practical related questions and assessment scheme of that practical sheet.
3. Student ought to refer the reference books, lab manuals, etc.
4. Student should not hesitate to ask any difficulties they face during the conduct of practicals.

Content Page

List of Practical's and Progressive Assessment Sheet

Sr. No	Title of the Practical	Page No.	Date of perfor mance	Date of submi ssion	Assessment marks	Dated sign. of teacher	Rem arks (if any)
	Range Searching operators-Between, Pattern matching operators-Like.						
7.	Write Queries using following Functions: String, Arithmetic, Date and time, Aggregate Functions.	35					
8.	Execute Queries using the Select command with Where, Having, Group by and order by clauses.	41					
9.	Execute the queries for implementation of Inner and Outer Join.	46					
10.	Implement Views i) Create different views ii) Insert, modify and delete records through views. iii) Delete the views	51					
11.	Create and Execute Indexes, Sequences, and synonyms in SQL.	55					
12.	Write a PL/SQL programs using if then else, for, while and nested loop.	59					
13.	Write a PL/SQL code to implement implicit and explicit cursors.	66					
14.	Write PL/SQL Programs based on Exceptions handling.(Predefined and user- defined exceptions)	72					
15.	Write PL/SQL code to create Procedures and functions.	80					
16.	Write PL/SQL code to create triggers on given database.	87					
17.	Executing DCL commands using SQL i) Create users ii) Grant privileges to users iii) Revoke privileges from users.	93					
Total							

- **To be transferred to Proforma of CIAAN-2017**.

Practical No.1: Write Ms Access Code to create database, table and modify table

I. Practical Significance:

Microsoft Access is a Relational Database Management System (RDBMS), designed primarily for home or small business use. Student should be able to create and execute MS Access database, table and modify table structure by adding a new column, changing the datatype of column, deleting the column from table, insert/update/delete record from table, retrieve data from table according to condition given.

II. Relevant Program Outcomes (POs):

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical is expect to develop the following skills in you

Develop MS Access code to solve computer engineering related problems.

1. Write MS Access code to create Database.
2. Write MS Access code to create table and assign primary key.
3. Write MS Access code to modify table.
4. Follow ethical practices.

IV. Relevant Course Outcomes:

- Create and Manage Database using SQL command.

V. Practical Outcome (POs):

- Perform following in GUI based database software using GUI only

i) Create database
ii) Create tables and assign primary key.
iii) Modify the table structure-add column, change the datatype of column, delete the column from table.
iv) Insert, update and delete the record from table.
v) Retrieve data from the table according to condition given.

VI. Relevant Affective domain related Outcome(s):

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background:

Microsoft Access stores information which is called a database. To use MS Access, you will need to follow these four steps −

- **Database Creation** − Create your Microsoft Access database and specify what kind of data you will be storing.
- **Data Input** − After your database is created, the data of every business day can be entered into the Access database.
- **Query** − This is a fancy term to basically describe the process of retrieving information from the database.
- **Report** (optional) − Information from the database is organized in a nice presentation that can be printed in an Access Report.

VIII. Procedure:

i. Start Database.
ii. Click the “Blank desktop database” template.
iii. Type a file name for the database.
iv. Choose the folder where to store database.
v. Click the Create button.
vi. Save the database.
vii. Use different features on it and apply it on database
viii. Create or Open Database.
ix. Create table.
x. Suitable name for table.
xi. Add fields on table.
xii. Name of field should be as per proper convention.
xiii. Choose appropriate data types for representation of type of data.
xiv. Check the validity of data in each field. Such as primary key assignment.
xv. Save the table.
xvi. Close the table.
xvii. Close the database

IX. Resources required:

Sr. No.	Name of Resource	Specification	Qty.	Remarks
1	Hardware: computer system,	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD 500GB	As per batch size	For all Experiments
2	Operating system:	Windows 7 and above /LINUX version 5.0 or later		
3	Software	Any MS Access software.		

X. Precautions:

i) All SQL statements must end with a semicolon (;).
ii) Follow safety practices.

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the executed query):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise. Use blank pages provided or attach more pages if needed.)

1. Name the types of GUI databases available in your laboratory.
2. Write down the procedure for creating tables in a database.
3. Name open source SQL database management system.

[Space for Answers]

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XIV. Exercise:
Attempt Q1. and teacher shall allot Q. 2 TO Q.5 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1) Create ‘student’ database and save the database.
2) Create ‘Employee’ database and save it.
3) Create multiple tables in database ‘Employee’ and rename it.
4) Create multiple tables in database for ‘student’ database.
5) View the multiple tables in ‘student’ database

[Space for Answers]

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XV. References / Suggestions for further Reading:

https://www.ischool.utexas.edu/technology/tutorials/office/access03/access_starti ng.php

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Student Team Members

1. ……..
2. ……..
3. ……..
4. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.2: Write MS Access Code to apply given validation on table and set error messages, set default value for column, set and remove database password.

I. Practical Significance:

Student will learn to create a simple structure of database which contains multiple tables. Each table has its own structure. This practical is useful to apply validation on table and set error messages, set default value for column, set and remove database password.

II. Relevant Program Outcomes (POs):

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical is expect to develop the following skills in you

Develop MS Access code to solve computer engineering related problems.

1. Write MS Access code to apply given validation.
2. Write MS Access code to set default value for column.
3. Write MS Access code to set and remove database password.
4. Follow ethical practices.

IV. Relevant Course Outcomes:

- Create and Manage Database using SQL command.

V. Practical Outcome (POs):

1) Perform following in GUI based database using GUI only
2) Apply given validation on table and set error messages.
3) Set default value for column.
4) Set and remove database password.

VI. Relevant Affective domain related Outcome(s):

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background:

Protecting the validity of your data is one of the most important tasks of a database developer. To ensure that users enter accurate data, start at the foundation. By using validation rules, you can ensure accurate data entry. You can use the **Validation Rule** property to specify requirements for data entered into a record, field, or control. When data is entered that violates the **Validation Rule** setting, you can use the **Validation Text** property to specify the message to be displayed to the user.

The **Validation Rule** and **Validation Text** properties don't apply to check box, option button, or toggle button controls when they are in an option group. They apply only to the option group itself. Set the **Default Value** of each control so they offer the same value as soon as you move into the new record.

VIII. Procedure:

1. Open Database.
2. Open the table in Design View
3. At the bottom of the screen find the "Validation rule" field.
4. In the Validation Rule field type validation rule.
5. In the Validation Text field type an error message like.
6. Save the database.
7. Use different features on it and apply it on database
8. Close the database

IX. Resources required:

Sr. No.	Name of Resource	Specification	Qty.	Remarks
1	Hardware: computer system,	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD 500GB	As per batch size	For all Experiments
2	Operating system:	Windows 7 and above /LINUX version 5.0 or later		
3	Software	Any MS Access software.		

X. Precautions:

i) All SQL statements must end with a semicolon (;).
ii) Follow safety practices.

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII Result (Output of the executed query):

.....
.....
.....

XIII Practical Related Questions:

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Apply validation to restrict an hours worked field to values between 0 and 40 (inclusive). To do so, you'd use the following expression on an Integer field:
   <=40 And >=0. When a user enters a value other than 0 through 40, Access displays an error message and rejects the input value..
2. Set a default date value in a text box when the user adds a new record.
3. What is the use of Validation Rule and Validation Text.

XIV Exercise:

Attempt Q1. and teacher shall allot Q. 2 TO Q.5 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create a validation rule for a field that allows only values over 65 to be entered. If a number less than 65 is entered, a message is displayed.
2. Set course name as a default value in a text box when the user adds a new record.
3. Create a validation rule for a PARENT_MOBILE_NO field that allows only any value that consists of 10 number values. “Mobile number must consist of 10 numbers” this message is displayed if the value entered doesn't conform to the Validation Rule.
4. Set a database-level password on a database.
5. Remove a database-level password from a database

[Space for Answers]

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XV References / Suggestions for further Reading:

1. http://en.tekstenuitleg.net/articles/software/access-validation-rule-tutorial
2. http://allenbrowne.com/ValidationRule.html

XVI Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Student Team Members

1. ……..
2. ……..
3. ……..
4. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.3: Design ER Diagram and Normalize Database

I. Practical Significance:

Student should be able to identify the entities and relationship among them. The proper ER Diagram should be transformed into proper tables using normalization concepts to remove all the updation anomalies for ensuring data dependency. This practical is useful to inculcate these skills in students.

II. Relevant Program Outcomes (POs):

- **Discipline knowledge:** Apply Computer Programming knowledge to solve broad- based Computer related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer related problems.
- **Engineering tools:** Apply relevant Computer programming tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.
- **Life-long Learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III. Competency and Practical skills:

This practical is expect to develop the following skills:

Draw an E-R Diagram and Normalize the database of any systems

1. Identify attributes and relationship for E-R Diagram.
2. Normalize the database using normalization concepts.
3. Draw E-R Diagram for the given database.
4. Draw tables for the normalized database.

IV. Relevant Course Outcome(s):

- Design Normalized database on given data.

V. Practical Outcome (POs):

a) Design E-R diagram and Create Normalized Database on given data.

VI. Relevant Affective domain related Outcome(s):

1. Select appropriate ER Diagram Notations and Normal Forms.
2. Follow safety measures.
3. Follow ethical practices.

VII. Minimum Theoretical Background:

Entity –Relationship Model: ER-Diagram is a graphical representation of data that describes how data is communicated and related to each other. Any object, such as entities, attributes of an entity, sets of relationship and other attributes of relationship can be distinguished with the help of the ER diagram.

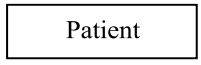
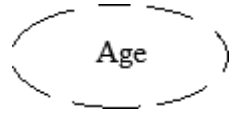
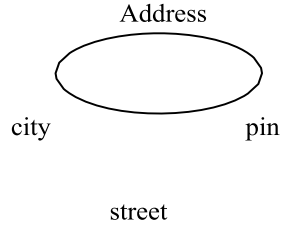
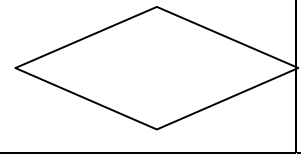
Entities are represented using the rectangle box. These rectangles are named with the entity set they represent.

Attributes are the properties of entities, represented by ellipse figures. All attributes are directly connected to its entity.

Attributes can be classified as:

1) **Simple Attribute**
2) **Composite Attribute**
3) **Multivalued Attribute**
4) **Derived Attribute**

Graphical representation of Entity, attributes and Relationship are :

Symbol	Meaning	Symbol	Meaning
	Entity	Doctor	Multivalued Attribute
	Simple Attribute		Derived Attribute
	Composite Attribute		Lines to link attribute
			Relationship

Relationships:

There are four types of relationships. These are:

- **One-to-one**
- **One-to-many**
- **Many-to-one**
- **Many-to-many**

E-R Diagram:

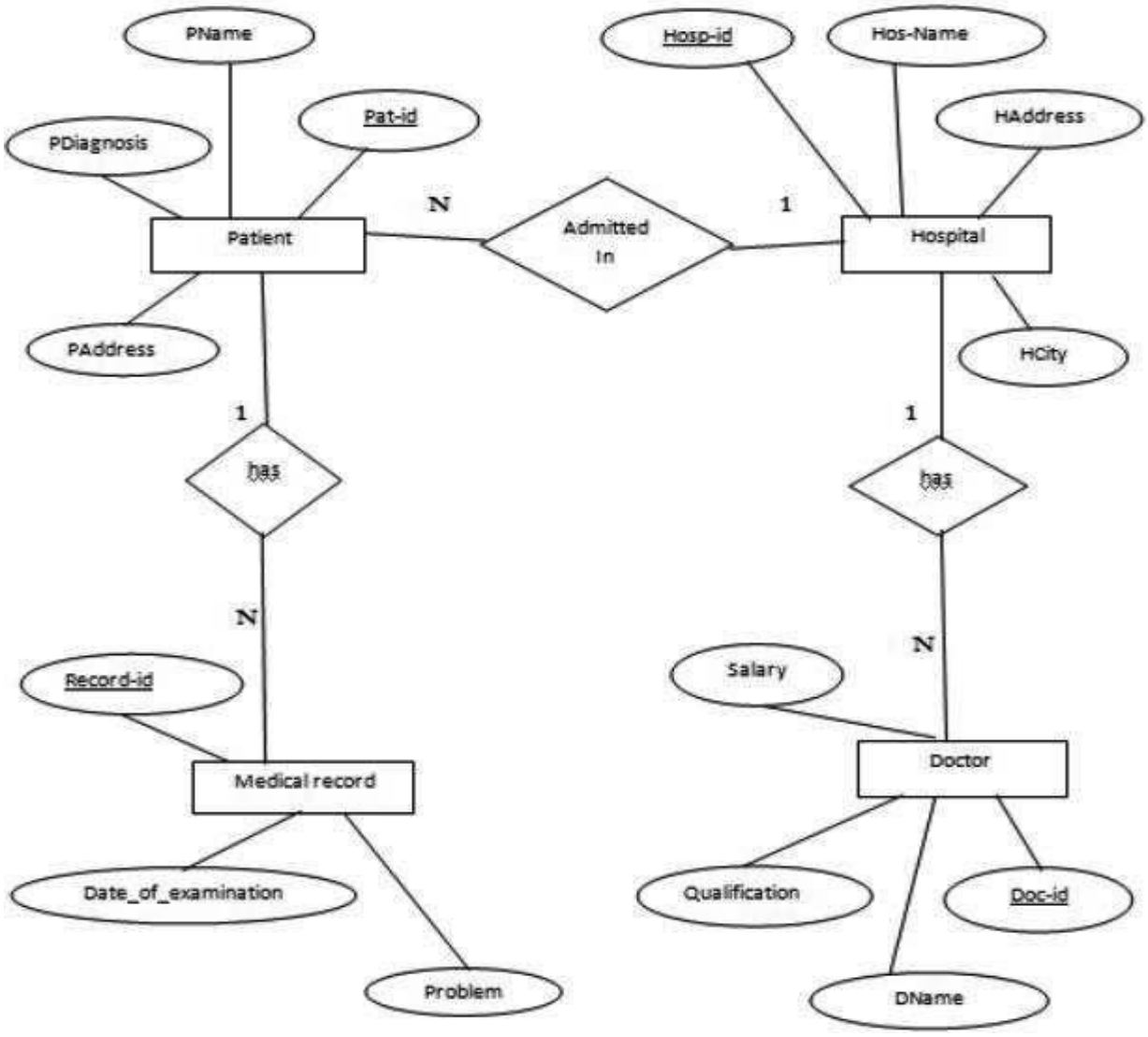


Fig1. ER Diagram for _Hospital Management System

Normalization:

Consider the ER Diagram of Fig1. For Hospital Management System. By applying Normalization the tables formed are as follows:

Hospital:

Hosp-id	**Primary Key**
HCity	
HAddress	
Hos-Name	

Pat-id	Foreign key references to Pat-id of Patient table
Doc-id	Foreign key references to Doc-id of Doctor table

Patient:

Pat-id	**Primary Key**
PName	
PAddress	
PDiagnosis	
Record-id	Foreign key references to Record-id of Medical Record table
Hosp-id	Foreign key references to Hosp-id of Hospital table

Medical record:

Record-id	**Primary Key**
Problem	
Date_of_examination	
Pat-id	Foreign key references to Pat-id of Patient table

Doctor:

Doc-id	**Primary Key**
DName	
Qualification	
Salary	
Hosp-id	Foreign key references to Hosp-id of Hospital table

VIII. Procedure:

i. Consider the Database
ii. Normalize using normal forms
iii. Draw ER diagrams

IX. Resources required:

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards	As per batch size	For all Experiments
2	Operating system	Windows XP/Windows 7/LINUX version 5.0 or later		
3	Software	MS-Access ,Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions:

1. Use appropriate Notations for E-R Diagrams.
2. Properly Normalize database using 1NF,2NF and 3NF.
3. Follow safety practices

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the Program):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Draw notations for Multivalued and Derived Attribute.

2.

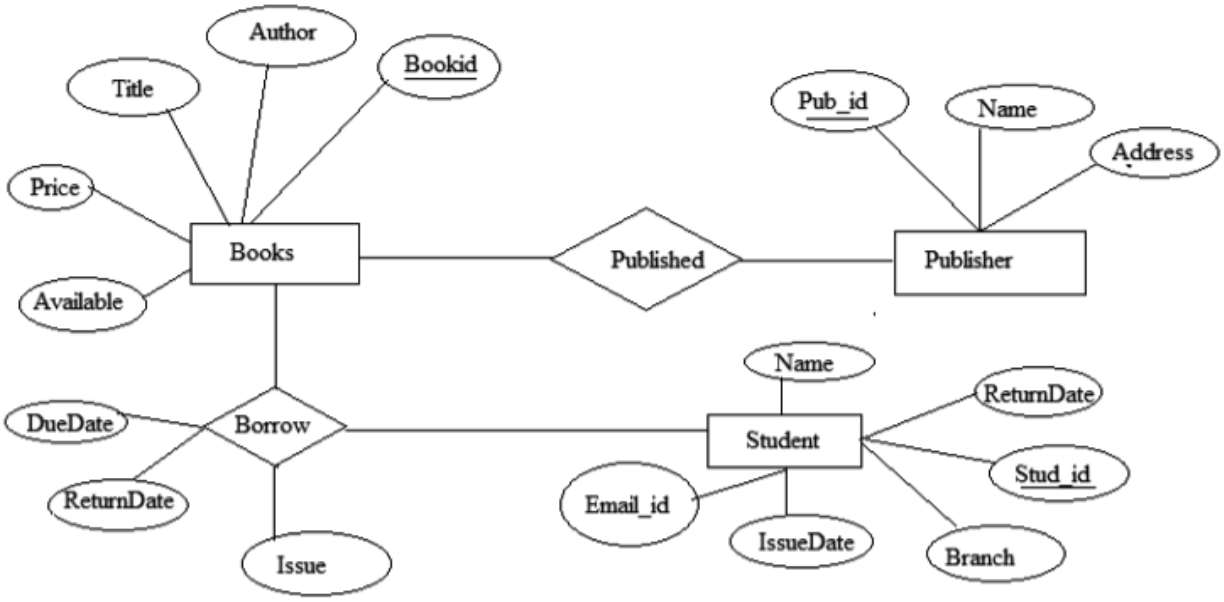

Fig2.ER Diagram for Student Borrowing Books Published by Publisher

i) Identify Derived Attribute
ii) Identify Multivalued Attribute
iii) Identify Primary Key and Foreign Key

3. Consider the database of Fig2.and Draw normalize tables upto 3NF

Theory Related Questions::

(1) Draw notations for strong & weak entity.

(2) Difference between strong & weak entity.

(Space for answers)

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XIV. Exercise:

Attempt Q1. and Q.2 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Draw ER Diagram for Railway Reservation System using minimum 4 entities.(Hint: Customer_Details,Train_Details,Payment_Details etc)
2. Normalize the database of Railway Reservation System upto 3NF.

(Space for answers)

XV. References / Suggestions for further Reading:

www.w3schools.com

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students /Team Members

1. ……..
2. ……..
3. ……..
4. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No. 4: Execute SQL Queries based on DDL Commands

I. Practical Significance:

Design database by applying the constraints and modify the structure of table. These practical skills will help them to create proper database.

II. Relevant Program Outcomes (POs):

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve database related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve broad- based Electronics related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Electronics related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.
- **Life-long Learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III. Competency and Practical skills:

This practical is expect to develop the following skills:

Create and modify database structure for maintaining any information.

1. Write and Execute SQL queries for creating and altering table structure with all integrity constraints.
2. Write and Execute SQL queries for changing the structure of table.
3. Write and Execute SQL queries for Removing structure of table and Renaming the table names..

IV. Relevant Course Outcome(s):

Create and Manage Database using SQL command.

V. Practical Outcome (POs):

a) Write and Execute SQL queries for creating and modifying the database structure.

VI. Relevant Affective domain related Outcome(s):

1. Select proper SQL Statement for creation and modification of database structure.
2. Follow safety measures
3. Follow ethical practices.

VII. Minimum Theoretical Background:

Basic SQL Data Types:

1. **CHAR(SIZE)**
2. **VARCHAR/VARCHAR2(SIZE)**

3. **NUMBER(P,S)**
4. **DATE**
5. **LONG**
6. **RAW/LONG RAW**

DDL Commands: It is set of SQL commands used to create, modify and delete database structure but not data. These commands normally used by DBA.

1. **CREATE**
2. **ALTER**
3. **DROP**
4. **RENAME**
5. **TRUNCATE**
6. **DESCRIBE**

Create Table Syntax:

Create table table_name (column1 name d*ata*type(size), column2 name datatype(size)……);

Example:

Create table stud (Stud_Name varchar2(20),Rollno Number,DOB Date);

VIII. Procedure:

i. Normalize the database
ii. Create the database
iii. Alter the database
iv. Drop the database

IX. Resources required:

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards and HDD with minimum 10GB	As per batch size	For all Experiments
2	Operating system	Windows XP/Windows 7/LINUX version 5.0 or later		
3	Software	Oracle/MySQL/SQL SERVER2005/2008/2015		

X. Precautions:

1. All SQL statements must end with a semicolon (**;**).
2. White space used in SQL to describe blanks and tabs.
3. Follow safety practices

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the SQL Commands):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create a table EMPLOYEE with following schema:

   Emp(Emp_no as primary key, E_name,, Dept_no, Dept_name,Job_id , Salary)
2. Create a tables EMPLOYEE and DEPARTMENT with following schema by applying Primary key and Foreign key:
   Emp(empno as primary key ,empname, salary, phno)
   Dept(deptno primary key, empno foreign key, deptname,location)

Theory Questions:

(1) List DDL Commands with syntax.
(2) Use of Describe Command.
(3) Analyze the difference between drop & truncate.

(Space for answers)

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XIV. Exercise:

Attempt Q1. and teacher shall allot Q. 2 to Q.4 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create table for stud using attributes Rollno, studname, percentage)apply primary key for rollno and check constraint on percentage should not greater than 100.
2. Change the stud table structure by adding column city .
3. Increase the size by 10 of studname column.
4. Write output of the following:

a) Create table passenger_details(passenger_Name varchar2(30), train_details varchar2(30),travelling_date date ,birthdate date);	Write output here
b)Alter table stud add column Ticket_cost number;	

(Space for answers)

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XV. References / Suggestions for further Reading:

www.w3school.com

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students /Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No. 5: Execute DML Commands in SQL

I. Practical Significance:

Student should be able to create a database table using integrity constraints and should be able to use Data manipulation language to insert, upadate, delete and manage the database. This will help to understand different issues involved in design and implementation of database.

II. Relevant Program Outcomes (POs):

- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Engineering tools:** Apply relevant Computer technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical is expect to develop the following skills:

Design and Execute Data Manipulation Language Queries

1. Creating the database table.
2. Insert single or multiple rows into the table.
3. Update single and multiple rows of the table.
4. Delete single and multiple rows of the table.

IV. Relevant Course Outcome(s):

- Create and Manage Database using SQL commands

V. Practical Outcome (POs):

a) Create and Execute DML commands using SQL.

VI. Relevant Affective domain related Outcome(s):

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background:

Data Manipulation Language(DML): DML statements are used to insert single as well as multiple rows/tuples, update single or multiple rows/tuples in the table, delete single or multiple rows/tuples from the table and to retrieve the data i.e. rows/tuples from the table. The different DML commands used are:

1) INSERT 2) UPDATE 3) DELETE 4) SELECT

1) INSERT INTO: This statement is used to add new rows/tuples into the relation/table. There are three type of INSERT INTO queries:

- **Inserting a single record**
- **Inserting a multiple records**
- **Inserting a records from another relation/table**

2) **UPDATE-SET-WHERE:** This statement is used to update or modify single or multiple rows/tuples of the relation/table.

3) **DELETE:** This statement is used to delete single or multiple rows/tuples from the relation/table. When all rows/tuples are deleted the structure of relation/table is still retained.

4) **SELECT :** This statement is used to retrieve information from the table/relation. The DISTINCT keyword with select is used to retrieve only distinct rows/tuples.You can use WHERE clause to retrieve the rows/tuples with specific conditions.WHERE clause filters the rows retrived from the relation/table and gives only the rows/tuples satisfying the conditions.

VIII. Procedure:

i. Using the appropriate database to create table by applying integrity constraints.
ii. Insert single or multiple rows by using INSERT command.
iii. Display the contents of the table using SELECT command.
iv. Update single or multiple rows using UPDATE-SET-WHERE command by giving specific condition in WHERE clause.
v. Display the contents of the table using SELECT command to check the updations.
vi. Delete single or multiple rows using DELETE command. Use WHERE clause by giving specific condition in WHERE clause to delete particular rows from the table.
vii. Display the contents of the table using SELECT command to check whether rows are deleted.

IX. Resources required:

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards,HDD of 160GB	As per batch size	For all Experiments
2	Operating system	Windows 7 and Above/LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions:

1. All SQL statements must end with a semicolon (**;**).
2. Follow safety practices

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the Executed Queries):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create a table EMPLOYEE with following schema:
   Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate)
2. Insert multiple rows in the above table Emp using single INSERT command of SQL.
3. Execute the following queries ,debug the errors and write the output:
   a. Insert into
      Emp(Emp_no,E_name,Dept_no,Dept_name,Job_id,Salary,hiredate)
      Values(1,'Shreyas',100,Sales,111,40000,'28-09-2014');
   b. Delete Emp where E_name=Shreyas;
   c. Update set salary =50000 where dept_no=production
   d. Select * from where salary >=25000 and <=60000

Theory Question:

(1) Analyze the difference between drop & delete.
(2) How to delete multiple records?
(3) Mention TRUE/FALSE. Justify "After 'drop table', the structure of the database remain same".

(Space for answers)

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XIV. Exercise:

Attempt Q1. and Q. 2 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create a table **EMPLOYEE** with following schema:

Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate)

Write SQL queries for following question:

a. Insert at least 5 rows in the table.
b. Display all the information of EMP table.
c. Display the information of employees working in department PRODUCTION and salary above 40000 .
d. Update the salary of employees to 30000 working in department sales.
e. Delete the employee working in SALES department having salary below 10000.
f. Display the complete record of employees working in SALES Department.

2. Create a tables EMPLOYEE and DEPARTMENT with following schema by applying Primary key and Foreign key:

Emp(empno,empname,salary,phno)
Dept(deptno,deptname,location,job_id)

a. Insert 5 rows in both the tables
b. Display information of both tables
c. Update deptno of employee Shreyas to 201
d. Delete the information of employees belonging to department
e. Display the information of Employee and Department and analyze the difference.

(Space for answers)

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XV. References / Suggestions for further Reading:

https://www.w3schools.com/sql/sql_select.asp

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students /Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.6: Execute SQL Queries Using Arithmetic, Comparison, Logical, Set, Between and Like Operators.

I. Practical Significance:

Student should be able to execute queries using arithmetic, comparison, logical, set and pattern searching operators. These practical skills will help the student to execute queries to retrieve the needed information from the table as per the specified condition.

II. Relevant Program Outcomes (POs):

- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Engineering tools:** Apply relevant Computer technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical develop the following skills:

Execute Queries using All SQL Operators to retrieve the information from database:

1. Execute SQL queries based on Arithmetic, Comparison and Between, Logical, Set and Pattern Searching-Like Operators.
2. Retrieve information from the table.

IV. Relevant Course Outcome(s):

- Create and Manage Database using SQL command.

V. Practical Outcome (POs):

a) Write Queries using following operators:
Arithmetic Operators, Comparison Operators, Logical Operators, Set Operators, Range Searching operators-Between, Pattern matching operators-Like.

VI. Relevant Affective domain related Outcome(s):

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background:

SQL programming has wide range of operators to perform various operations on databases. For better understanding of operators, these operators can be classified as:

Operator	Its types
Arithmetic operators	+ , - , * , /
Comparison operators	< , > , = ,<= , >= ,< >
Logical operators	AND,OR,NOT
Set operators	UNION,INTERSECT,MINUS, UNION ALL
Range Searching Operator	Between, Not Between
Pattern matching operator	LIKE,NOT LIKE,IN ,NOT IN

Subqueries :- A subquery or inner query or nested query is a query within another SQL query & embedded within where clause.

VIII. Procedure:

i. Use the table created in practical 4 and practical 5.
ii. Display the information of the tables using SELECT statement.
iii. Execute the SQL queries using Arithmetic Operators.
iv. Execute the SQL queries using Comparison Operators.
v. Execute the SQL queries using Logical Operators.
vi. Execute the SQL queries using Set Operators.
vii. Execute the SQL queries using Range Searching Operators.
viii. Execute the SQL queries using Pattern Matching Operators

IX. Resources required:

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD of 160GB	As per batch size	For all Experiments
2	Operating system	Windows 7 and Above/LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions:

1. All SQL statements must end with a semicolon (;).
2. Follow safety practices

Subqueries can be used with SELECT, INSERT, UPDATE & DELETE statements along with the operators =, <, >, >=, IN, BETWEEN, ORDERBY, etc.

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Results (Output of the Program):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. **Consider the table EMPLOYEE**
   Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate).
   Execute and write output of the following queries:

   a. Select E_name,(Salary*.20) as Incremented_Salary from Emp;
   b. Select E_name ,Emp_no from Emp where Salary <=50000 and >=25000;
   c. Select details of employess having salary more than Ashish Salary;
   d. Select * from Emp where Dept_no< > 201;

2. **Consider the table EMPLOYEE and DEPARTMENT**
   Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate). Dept(E_name,Dept_no,Location,job_id);
   Execute and write output of the following queries

   i. Select * from Emp union Select * from Dept;
   ii. Select * from Emp intersect Select * from Dept;
   iii. Select * from Emp minus Select * from Dept;
   iv. Select * from Emp where salary Emp_no between 100 and 200;
   v. Select * from Emp where E_name IN('Shreyas');

Theory Question:

(1) What is the use of SET Operators.
(2) Syntax of (i) BETWEEN (ii) NOT BETWEEN (iii) LIKE (iv) NOT LIKE (v) IN
(3) Difference between UNION & UNION ALL.

(Space for answers)

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XIV. Exercise:

Attempt Q1. and Q. 2 from the following:

(Note: Use Point VIII to X and XIII to XIV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

Consider the table EMPLOYEE and DEPARTMENT
Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate). Dept(E_name,Dept_no,Location);

1. **Write SQL Queries for the following:**

   a. Display the name of employees who does not work under any Job_id=2.
   b. Display names of all employees whose name is exactly 6 characters long.
   c. List all employees information except job_id =2 and job_id=3.
   d. List the employee name and salary whose salary is not in the range of 20000 to 35000.
   e. List Common E_name from Emp and Dept Tables.
   f. Display the name of employee whose salary becomes more than 50000 after giving 15% increment.

2. **Execute and Write output of the following queries:**

   a. Select * from Emp where Salary >40000 AND Dept_Name=’Sales’;
   b. Select * from Emp where NOT(Dept_Name=’Sales’);
   c. Select * from Emp where E_name like ‘S%’;
   d. Select * from Emp where E_name like ‘_s%’;

(Space for answers)

XV. References / Suggestions for further Reading:

1. https://www.w3schools.com

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.7: Execute SQL Queries Using String, Arithmetic, Date and Time, Aggregate Functions.

I. Practical Significance:

Student should be able to execute queries using String, Arithmetic, Date and Time and Aggregate functions. These practical skills will help the student to execute queries to retrieve the needed information from the table as per the specified condition.

II. Relevant Program Outcomes (POs):

- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Engineering tools:** Apply relevant Computer technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical develop the following skills:

Execute Queries using Built-In SQL functions to retrieve the information from database.

1. Execute SQL queries based on String, Arithmetic, Date and Time and Aggregate Functions.
2. Retrieve information from the table.

IV. Relevant Course Outcome(s):

- Create and Manage Database using SQL command.

V. Practical Outcome (POs):

a) Write Queries using following Functions:
String, Arithmetic, Date and time, Aggregate Functions.

VI. Relevant Affective domain related Outcome(s):

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background:

SQL programming has wide range of built-in functions to perform various operations on databases.Function is ready to use code .User have to just know how to use it by passing the required values. For better understanding of functions, these functions can be classified as:

1. **STRING FUNCTIONS:** SQL string functions are used for string manipulation. Some of the string functions are listed below:

   - LOWER
   - UPPER
   - INITCAP

- CONCAT
- SUBSTR
- LENGTH
- INSTR
- LPAD/RPAD
- LTRIM/RTRIM

2. **ARITHMETIC FUNCTIONS:** SQL numeric functions are used for numeric manipulation and/or mathematical calculations.
   - ABS
   - CEILING
   - FLOOR
   - EXP
   - POWER
   - SQRT
   - MOD

3. **DATE & TIME FUNCTIONS:** SQL Date & Time functions are used for operations on date and time provided by users. Teacher may teach additional functions other than this.
   - SYSDATE
   - NEXT_DAY
   - ADD_MONTHS
   - LAST_DAY
   - MONTHS_BETWEEN
   - LEAST
   - GREATEST
   - DATE_ADD
   - DATE_SUB
   - NOW()
   - DATEDIFF
   - FLOOR

4. **AGGREGATE FUNCTIONS:** An aggregate function allows you to perform a calculation on a set of values to return a single scalar value. We often use aggregate functions with the GROUP BY and HAVING clauses of the SELECT statement.
   - AVG
   - COUNT
   - MAX
   - MIN
   - SUM

VIII. Procedure:

i. Use the Emp and Dept Table created in practical 4 and practical 5.
ii. Display the information of the tables using SELECT statement.
iii. Execute the SQL queries using Numeric Functions.
iv. Execute the SQL queries using String Functions.
v. Execute the SQL queries using Date and Time Functions.
vi. Execute the SQL queries using Aggregate Functions.

IX. Resources required:

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD of 160GB	As per batch size	For all Experiments
2	Operating system	Windows 7 and Above/LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions:

1. All SQL statements must end with a semicolon (**;**).
2. Follow safety practices

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Results (Output of the Program):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

Consider the table EMPLOYEE and DEPARTMENT.
Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate).

1. **Write Output of the following queries:**
   a) Select abs(-15) from dual;
   b) Select exp(4) from dual;
   c) Select power(4,2) from dual;
   d) Select mod(10,3) from dual;
   e) Select sqrt(16) from dual;

2. **Write Output of the following queries:**
   a) select concat('Shreyas','NBA')from dual;
   b) select ltrim('shreyasss','s')from dual;
   c) select rtrim('shreyasss','s')from dual;
   d) select lower('SALES')from dual;

3. **Write Output of the following queries:**
   a) select sysdate from dual;
   b) select next_day(sysdate,'thur')from dual;
   c) select add_months(sysdate,2)from dual;
   d) select last_day(sysdate)from dual;
   e) select months_between(sysdate,hiredate)from Emp;

Theory Question :

(1) Use of format( ) function with syntax & example.

(2) Use of months_between function with syntax & example.

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XIV. Exercise:

Attempt Q1. and Q. 2 from the following:

(Note: Use Point VIII to X and XIII to XIV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

Consider the table EMPLOYEE and DEPARTMENT

Emp(Emp_no, E_name,, Dept_no, Dept_name,Job_id , Salary,hiredate).

1. **Write SQL Queries for the following:**
   a. Display information of employees whose salary is greater than average salary of all employees.
   b. Display total employees in sales department with its location.
   c. Display maximum and minimum salary of employees.
   d. Display total salaries of employees working in production department with Dept_no and location of department.
   e. List the employees with hiredate in format 'Jan 19 2018'.
   f. Display the difference in joining dates of employee Ashish and Shreyas.

2. **Write Output of the following queries:**
   a. select upper('production')from dual;
   b. select length('sales')from dual;
   c. select substr('production sales',3,4)from dual;
   d. select instr('production','ro',3,2)from dual;
   e. select greatest('10-jan-07','12-oct-07')from dual;
   f. select date_add('2014-01-01', interval 1 day) from dual;
   h. select datediff(day,'2015-02-01','2015-02-19') from dual;

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XV. References / Suggestions for further Reading:

1. https://www.w3schools.com

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.8: Execute Queries Using the Select Command with where, Having, Group by and Order by Clauses.

I. Practical Significance:

Student should be able to execute queries using Select statement with Group by, Having and Order by Clauses. These practical skills will help the student to execute queries to retrieve the needed information from the table as per the specified condition.

II. Relevant Program Outcomes (POs):

- **Discipline knowledge**: Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice**: Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Engineering tools**: Apply relevant Computer technologies and tools with an understanding of the limitations.
- **Communication**: Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical develop the following skills:

Execute Queries using Built-In SQL functions to retrieve the information from database.

1. Execute SQL queries based on Group by,Having and Order by Clauses.
2. Retrieve information from the table.

IV. Relevant Course Outcome(s):

- Create and Manage Database using SQL command.

V. Practical Outcome (POs):

b) Write Queries using following Clauses:
Group By, Having and Order by

VI. Relevant Affective domain related Outcome(s):

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background:

GROUP BY clause in SQL is used to group to all the records in a relation together for each and every value of a specific key(s) and then display them for a selected set of fields in the relation.

The HAVING clause is used in SQL because the WHERE keyword could not be used with aggregate functions. The HAVING clause is used with GROUP BY clause .We often use aggregate functions with the GROUP BY and HAVING clauses of the SELECT statement.

ORDER BY clause is used to display a selected set of fields from a relation in an ordered approach (desc/asc) base on some field.

VIII. Procedure:

i. Use the Emp and Dept Table created in practical 4 and practical 5 .
ii. Display the information of the tables using SELECT statement.
iii. Execute the SQL queries using Select , Where and Group By Clause.
iv. Execute the SQL queries using Select , Where ,Group By and Having Clause.
v. Execute the SQL queries using Select , Where and Order By Clause.

IX. Resources required:

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD of 160GB	As per batch size	For all Experiments
2	Operating system	Windows 7 and Above/LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions:

1. All SQL statements must end with a semicolon (**;**).
2. Follow safety practices

XI. Resources used:

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Results (Output of the Program):

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XIII. Practical Related Questions:

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

Create a tables EMPLOYEE and DEPARTMENT with following schema:

Emp(empno ,empname, salary, phno)
Dept(deptno, empno,
deptname,location,jobtype)

1. Write Output of the following queries:

a) Select empno,sum(salary) from Emp e,Dept d where e.empno=d.empno group by deptno;
b) Select empno,deptno from Dept group by deptname
c) Select min(salary) from Emp e,Dept d where e.empno=d.empno group by deptno;
d) Select empno,jobtype from Dept order by deptname;
e) Explain order by clause (asc/desc) with suitable example.

2. Write Output of the following queries:

a) Display minimum salary of employee from every department.
b) Display total salary of every department.
c) Display the department having total employees more than 5.
d) Display details of employees with the employee name in ascending order.

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XIV. Exercise:

Attempt Q1. from the following:

(Note: Use Point VIII to X and XIII to XIV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

Create a tables EMPLOYEE and DEPARTMENT with following schema:

Emp(empno ,empname, salary, phno)
Dept(deptno, empno,
deptname,location,jobtype)

1. Write SQL Queries for the following:

a. Display total salary spent for each job category.
b. Display lowest paid employee details under each department
c. Display number of employees working in each department and their department name.
d. Display the details of employees with the salary in increasing order.
e. Display the details of employees earning salary greater than 60000 from every department.
f. List the number of employees from every department with sorted order(ascending).
g. List the number of employees from every department getting salary more than 45000.
h. List the employee details of employee working in PRODUCTION department having salary more than average salary of all the employees

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XV. References / Suggestions for further Reading:

1. https://www.w3schools.com

XVI. Assessment Scheme:

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.9: Write Query Using Inner and Outer Join

I. Practical Significance:

The join clause allows students to work with more than one table. Student should be able to combine the columns from two or more tables based on column values.

II. Relevant Program Outcomes (POs):

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills:

This practical develop the following skills:

Develop SQL query to solve computer engineering related problems.

1. Apply Inner Join on two tables.
2. Apply Outer (left/right/full) join on more than one table.
3. Display different combinations of results of different table.

IV. Relevant Course Outcome(s):

- Create and Manage Database using SQL command.

V. Practical Outcome (POs):

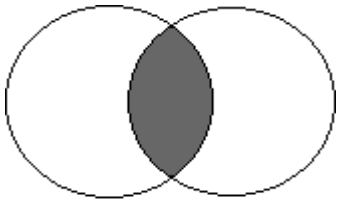
Execute the queries for implementation of Inner and Outer Join

VI. Relevant Affective domain related Outcome(s)

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background

INNER JOIN is also referred to as an **EQUIJOIN**. The INNER JOIN displays records that have similar values in both tables. An inner join is a join in which the values in the columns being joined are compared using a comparison operator. Inner joins eliminate the rows that do not match with a row from the other table.

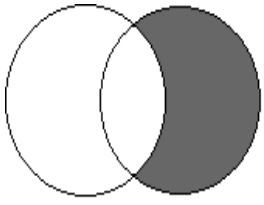


INNER JOIN

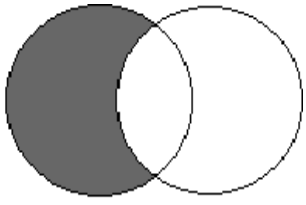
OUTER JOIN return all records when there is a match in either left or right table. Outer joins return all rows from at least one of the tables mentioned in the FROM clause, as long as those rows meet any WHERE or HAVING search conditions. All rows are retrieved from the left table referenced with a left outer join, and all rows from the right table referenced in a right outer join. All rows from both tables are returned in a full outer join.

SQL Server uses the following keywords for outer joins specified in a FROM clause:

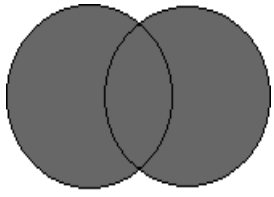
- LEFT OUTER JOIN or LEFT JOIN: The LEFT JOIN keyword returns all records from the left table (table-1), and the matched records from the right table (table-2). The result is NULL from the right side, if there is no match.
- RIGHT OUTER JOIN or RIGHT JOIN: The RIGHT JOIN keyword returns all records from the right table (table-2), and the matched records from the left table (table-1). The result is NULL from the left side, when there is no match.
- FULL OUTER JOIN or FULL JOIN: The FULL OUTER JOIN keyword return all records when there is a match in either left (table-1) or right (table-2) table records. FULL OUTER JOIN can potentially return very large result-sets.
- Cross join with example



RIGHT OUTER JOIN



LEFT OUTER JOIN



FULL OUTER JOIN

VIII. Procedure

i) Create two tables by using appropriate software.
ii) Write and execute inner join query.
iii) Write and execute left outer join query.
iv) Write and execute right outer join query.
v) Write and execute full outer join query.

IX. Resources required

Sr. No.	Name of Resource	Specification	Qty.	Remarks
1	Hardware: computer system	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD 500GB	As per batch size	For all Experiments
2	Operating system:	Windows 7 and above /LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions

1. All SQL statements must end with a semicolon (;).
2. Follow safety practices.

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Results (Output of the executed query)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of following query
   Select * from emp, dept where emp.deptno = dept.deptno;
2. Write output of following query
   Select * from emp LEFT OUTER JOIN dept on(emp.deptno=dept.deptno);
3. Write output of following query
   Select * from emp RIGHT OUTER JOIN dept on(emp.deptno=dept.deptno);
4. Write output of following query
   Select * from emp FULL OUTER JOIN dept on(emp.deptno=dept.deptno);

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XIV. Exercise

Attempt Q1. and Q. 2 to Q.3 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Perform RIGHT JOIN on EMP and DEPT table.
2. Perform INNER JOIN on EMP and DEPT table.
3. Perform LEFT JOIN on EMP and DEPT table.
4. Cross join with suitable example.

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XV. References / Suggestions for further Reading

1. https://www.w3schools.com/sql/default.asp

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.10: Create and Modify View.

I. Practical Significance

Student is able to create View which derives its data from one or more than one table columns. Student should be able to insert, modify and delete records through views.

II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical is expect to develop the following skills:

Develop SQL query to solve computer engineering related problems.

1. Write SQL query to create view.
2. Write SQL query to insert, modify and delete record through views.
3. Write query to delete view.
4. Execute SQL query.
5. Follow ethical practices.

IV. Relevant Course Outcomes(s)

- Create and Manage Database using SQL command.

V. Practical Outcome (POs)

Implement Views

i) Create different views

ii) Insert, modify and delete records through views.

iii) Delete the views.

VI. Relevant Affective domain related Outcome(s)

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background

View can be a virtual table which derived its data from one or more than one table. View can be created using tables of same database or different database. It is used for security purposes because they provide encapsulation of the name of the table. Data is in the virtual table, not stored permanently. It displays only selected data. A view provides several benefits.

1. Views can hide complexity.
2. Views can be used as a security mechanism.

3. Views can simplify supporting legacy code.
4. Define view with its features.
5. Differentiate between table & view.

VIII. Procedure

i) Write and execute query for view.
ii) Write and execute query to insert, modify and delete records through view.
iii) Write and execute query to delete view.

IX. Resources required

Sr. No.	Name of Resource	Specification	Qty.	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD 500GB	As per batch size	For all Experiments
2	Operating system:	Windows 7 and above /LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions

1. All SQL statements must end with a semicolon (;).
2. Follow safety practices.

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the executed query)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

1. Write output of the following query
   Create view emp_view as select emp_no, e_name, salary from emp;
2. Write output of the following query
   Update emp_view set e_name=’Ramesh’ where emp_no=1001;

3. Write output of the following query
   Delete from emp_view where emp_no=1005;
4. Write output of the following query: Delete view emp_view;

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XIV. Exercise

Attempt Q1. and teacher shall allot Q. 2 TO Q.5 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create dept_view on dept table.
2. Insert new record in dept_view view.
3. Modify location of deptno 10 of dept_view.
4. Delete the record of deptno 20 from dept_view view.
5. Delete the view dept_view.

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XV. References / Suggestions for further Reading

https://www.w3schools.com/sql/default.asp

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.11: Write Query for Indexes, Sequences, and Synonyms.

I. Practical Significance

Index, Sequence and synonym are database object. Student should be able to create and execute different types of index, sequence and synonym query.

II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical is expect to develop the following skills :

Develop SQL query to solve computer engineering related problems.

1. Write SQL query to create and execute index.
2. Write SQL query to create and execute sequence.
3. Write query to create and execute synonym.
4. Follow ethical practices.

IV. Relevant Course Outcomes

- Create and Manage Database using SQL command.

V. Practical Outcome (POs)

- Create and Execute Indexes, Sequences, and synonyms in SQL.

VI. Relevant Affective domain related Outcome(s)

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background

Index, Sequence and Synonym are database object. Index provides a fast access path to column that is indexed. Indexes are stored independently from actual data. It is mostly useful on large tables and on column that are frequently appear in WHERE clause. When table dropped, index will also drop. More than one indexes are allow in one table.

Type of index:

Simple index: A simple index on column.

Composite index: An index created on more than one column of table.

A **sequence** is a set of integers 1, 2, 3, 4 that are generated in order on demand.

Sequences are commonly used in databases because many applications require each row in a table to contain a unique value and sequences provide an easy way to generate them.

A **synonym** is an alternative name for objects such as tables, views, sequences, stored procedures, and other database objects. DML operation performed on synonym will affect the table. The main functionality of synonym is to access the database objects between different schemas without using the schema names.

VIII. Procedure

i) Write and execute query for simple and composite index.
ii) Write and execute query for creating, altering and dropping sequence.
iii) Write and execute query for creating and dropping synonym.

IX. Resources required

Sr. No.	Name of Resource	Specification	Qty.	Remarks
1	Hardware: computer system,	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD 500GB	As per batch size	For all Experiments
2	Operating system:	Windows 7 and above /LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions

i) All SQL statements must end with a semicolon (;).
ii) Follow safety practices.

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the executed query)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

(a) How to distinguish between index & view?
(b) What is an unique index?

(c) Write output of following query

1. create index sid on emp(empno);
2. create index cid on emp(empno,ename);
3. create sequence emp_sequence
   increment by 1
   start with 1
   nomaxvalue
   nocycle
   cache 10;
4. alter sequence emp_sequence
   increment by 15
   maxvalue 1000
   cycle
   cache 20;
5. drop sequence emp_sequence;
6. create synonym emp_synonym for emp; drop synonym emp_synonym;

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XIV. Exercise

Attempt Q1. and teacher shall allot Q. 2 TO Q.7 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create simple index dept_simple_index on dept table.
2. Create composite index dept_composite_index on dept table.
3. Drop index dept_simple_index and dept_composite_index
4. Create sequence dept_sequence on dept table.
5. Alter sequence dept_sequence.
6. Create synonym dept_synonym on dept table.
7. Drop synonym dept_synonym.

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XV. References / Suggestions for further Reading

https://docs.oracle.com/cd/B19306_01/server.102/b14231/views.htm#i1106548

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Student Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No. 12: Pl/Sql Programs Using if then Else, for, While and Nested Loop

I. Practical Significance

PL/SQL Control Structures Procedural computer programs use the basic control structures. The selection structure tests a condition, and then executes one sequence of statements instead of another, depending on whether the condition is true or false.

II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve broad- based Conputer related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.
- **Life-long learning:** Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

III. Competency and Practical skills

This practical is expect to develop the following skills in you

Develop PL/SQL programs to solve database based problems.

1. Write a PL/SQL Program
2. Save PL/SQL program .
3. Execute PL/SQL program.

IV. Relevant Course Outcome(s)

Write PL/SQL code for given database.

V. Practical Outcome (POs)

a) Write/ Compile / Execute PL/SQL program using any RDBMS software
b) Write PL/SQL program using control structures.

VI. Relevant Affective domain related Outcome(s)

1. Select proper programming environment for PL/SQL
2. Follow safety measures
3. Follow ethical practices.

VII. Minimum Theoretical Background

- **PL/SQL Control Structures:**
  - Procedural computer programs use the basic control structures
  - The selection structure tests a condition, then executes one sequence of statements instead of another, depending on whether the condition is true or false. A condition is any variable or expression that returns a BOOLEAN value (TRUE or FALSE).
  - The iteration structure executes a sequence of statements repeatedly as long as a condition holds true.
  - The sequence structure simply executes a sequence of statements in the order in which they occur.

- **IF-THEN-ELSE Statement**
  - A sequence of IF-THEN statements can be followed by an optional sequence of ELSE statements, which execute when the condition is FALSE.
  - Syntax

```
IF condition THEN
S1;
ELSE
S2;
END IF;;
```

- **CASE Statement**
  - Like the IF statement, the CASE statement selects one sequence of statements to execute. However, to select the sequence, the CASE statement uses a selector rather than multiple Boolean expressions. A selector is an expression, the value of which is used to select one of several alternatives.
  - Syntax

The syntax for the case statement in PL/SQL is:

```
CASE selector
WHEN 'value1' THEN S1;
WHEN 'value2' THEN S2;
WHEN 'value3' THEN S3;
...
ELSE Sn; -- default case
END CASE;
```

- **Basic Loop Statement**
  - Basic loop structure encloses sequence of statements in between the LOOP and END
  - LOOP statements: With each iteration, the sequence of statements is executed and then control resumes at the top of the loop.
  - Syntax

```
LOOP
Sequence of
statements;
END LOOP;
```

- **WHILE LOOP Statement**
  - A WHILE LOOP statement in PL/SQL programming language repeatedly executes a target statement as long as a given condition is true.
  - Syntax

```
WHILE
condition LOOP
sequence_of_sta
tements END
LOOP;
```

- **FOR LOOP Statement**
  - A FOR LOOP is a repetition control structure that allows you to efficiently write a loop that needs to execute a specific number of times.
  - Syntax

```
FOR counter IN initial_value .. final_value LOOP
sequence_of_statements;
END LOOP;
```

- **Nested Loops**
  - PL/SQL allows using one loop inside another loop. Following section shows a few examples to illustrate the concept.
  - The syntax for a nested basic LOOP statement in PL/SQL is as follows:

```
LOOP
Sequence of statements1
LOOP
Sequence of statements2
```

END LOOP;

END LOOP;

VIII. Procedure

i) Write a program on SQL's command prompt.
ii) Execute the program
iii) Check the output

IX. Resources required

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards and HDD minimum 5GB	As per batch size	For all Experiments
2	Operating system	Windows XP/Windows 7/LINUX version 5.0 or later		
3	Software	Oracle /MySQL/SQL Server 2005/2008/2011		

X. Precautions

1. All Program statements must end with a semicolon (**;**).
2. Use proper format specifier for DBMS_OUTPUT.PUT_LINE statement.
3. Follow safety practices

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the Program)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

How to declare constant in PL-SQL

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Write a PL/SQL program to display 1 to 10 numbers in reverse order using for loop.

2. Write PL/SQL program to find factorial of number 5 using while loop

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XIV. Exercise

Attempt Q1. and teacher shall allot Q. 2 OR Q.3 from the following:
(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

Theory-Enlist data types available in PLSQL.

1. Write a PL/SQL program to accept three numbers and display the largest number.
2. Write a PL/SQL program to display even numbers between 1 to 100.
3. Complete the given table:

Program Code	Write Output

a) DECLARE
i number := 0;
BEGIN
LOOP
dbms_output.put_line ('i = '‖i);
i:=i+1;
EXIT WHEN i>=11;
END LOOP;
END;
/	

b) DECLARE
num Number(3) :=123;
ans Number(3) :=0;
i Number(3) :=0;
BEGIN
WHILE num != 0
LOOP
i:=mod(num,10);
ans:=(ans * 10) + i;
num:=floor(num/10);
END LOOP;
dbms_output.put_line('reverse of given number is: ' || ans);
END;
/	

(Space for answers)

XV. References / Suggestions for further Reading

1. https://www.tutorialspoint.com/plsql/plsql_case_statement.htm
2. https://intellipaat.com/tutorial/oracle-plsql-tutorial/plsql-control-structures/
3. http://w3school.com

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students /Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No. 13: PL/SQL Programs Based on Implicit and Explicit Cursors

I. Practical Significance

To create RDBMS Private Area i.e Cursor.PL/SQL Block uses a select command that returns more than one rows, Oracle displays error message for displaying too many rows. For resolving such problem cursors are used.

II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve broad- based Computer related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical is expect to develop the following skills:

Develop PL/SQL programs to solve database based problems.

1. Write a PL/SQL Program
2. Save PL/SQL program
3. Execute PL/SQL program.

IV. Relevant Course Outcome(s)

Write PL/SQL code for given database.

V. Practical Outcome (POs)

a) Write/ Compile / Execute PL/SQL program using any RDBMS software
b) Write PL/SQL program for implementation of Implicit and Explicit Cursor.

VI. Relevant Affective domain related Outcome(s)

1. Select proper programming environment for PL/SQL
2. Follow safety measures
3. Follow ethical practices.

VII. Minimum Theoretical

Background Types of Cursor:

Cursors are classified depending on the circumstances under which they are opened. Types are as follows

i) **Implicit Cursor:** If the RDBMS engine opened a cursor for internal processing it is known as an Implicit Cursor.

ii) **Explicit Cursor:** A cursor can also be opened for processing data through a PL/SQL block, on demand. Such a user defined cursors is known as Explicit cursor.

Steps for Executing Explicit Cursor:

1) Declaration of cursor
2) Open the Cursor
3) Fetch data from the cursor one row at time into memory variables.
4) Process the data held in memory variables as required using loop.
5) Exit from the loop after processing is complete.
6) Close the cursor.

VIII. Procedure

i) Open notepad and write program in it.
ii) Save the program using .sql extension.
iii) Take that program on SQL's command prompt.
iv) Execute the program.
v) Check the output.

IX. Resources required

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards and HDD minimum 5GB	As per batch size	For all Experiments
2	Operating system	Windows XP/Windows 7/LINUX version 5.0 or later		
3	Software	Oracle /MySQL/SQL Server 2005/2008/2011		

X. Precautions

1. All Program statements must end with a semicolon (**;**).
2. Use proper format specifier for DBMS_OUTPUT_PUT_LINE statement.
3. Follow safety practices

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Result (Output of the Program)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Write a PL/SQL program for displaying details of employees working in Computer department using cursor.
2. Write PL/SQL program using cursor to print the name, job of employees having Designation as Manager or Analyst.
3. Write a PL/SQL code to print 4^{th},6^{th} and 8^{th} records from emp table.

Theory Related Questions:

(a)Difference between implicit & explicit cursor.

(b)Give the syntax of 'fetch into' keyword with suitable example.

(Space for answers)

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XIV. Exercise

Attempt Q1. and teacher shall allot Q. 2 OR Q.3 from the following:
(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Write a PL/SQL program to print the details of first five highest salary earner employees.
2. Write a PL/SQL program to update salary by 15% of employees working in IT Department and store this information in emp table as empno, sysdate and changed salary.
3. Complete the given table:

Program Code	Write Output
a) Declare Cursor c1 is select * from emp where salary=10000; Emp_rec c1%rowtype; Begin Dbms_output.put_line('Name salary '); For emp_rec.salary:=10000 Dbms_output.put_line(emp_rec.ename ‖''‖emp_rec.sal); End loop; End **Note: create emp table using required attributes for execution of above program**	

b) DECLARE
V_no emp.empno%type:=v_no;
V_name emp.ename%type;
V_designation emp.designation%type
V_sal emp.sal%type;
BEGIN
Select ename,designation ,sal into v_name ,v_deisgnation from emp where empno=v_no;
If SQL%found then
Dbms_output.put_line(v_name ‖ '' ‖v_deisgnation‖ ''‖v_sal);
EXCEPTION
When no_data_found then
Dbms_output.put_line('Emp does not exists');
End;	

(Space for answers)

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XV. References / Suggestions for further Reading

1. www.w3school.com

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students /Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No. 14: PL/SQL Programs Using Based on Exception Handling

I. Practical Significance

The use of PL/SQL EXCEPTION block in the program and an appropriate action is taken against the error condition.

II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer related problems.
- **Discipline knowledge:** Apply Computer Programming knowledge to solve broad- based Computer related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer related problems.
- **Engineering tools:** Apply relevant Computer programming technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical is expect to develop the following skills:

Develop PL/SQL programs to solve database based problems.

1. Write a PL/SQL Program
2. Save PL/SQL program .
3. Execute PL/SQL program.

IV. Relevant Course Outcome(s)

Write PL/SQL code for given database.

V. Practical Outcome (POs)

a) Write/ Compile / Execute PL/SQL program using any RDBMS software
b) Write PL/SQL program using control structures.

VI. Relevant Affective domain related Outcome(s)

1. Select proper programming environment for PL/SQL
2. Follow safety measures
3. Follow ethical practices.

VII. Minimum Theoretical Background

- **Exception :**
  - An exception is an error condition during a program execution.
  - PL/SQL supports programmers to catch such conditions using **EXCEPTION** block in the program and an appropriate action is taken against the error condition.
  - There are two types of exceptions –
    1) System-defined exceptions 2) User-defined

- Syntax for Exception Handling

```
DECLARE
<declarations section> BEGIN
<executable command(s)>
EXCEPTION
<exception handling goes here > WHEN
exception1 THEN exception1-handling-
statements WHEN exception2 THEN
exception2-handling-statements WHEN
exception3 THEN exception3-handling-
statements
.....
WHEN others THEN exception3-
handling-statements END;
```

- Raising Exceptions

- Exceptions are raised by the database server automatically whenever there is any internal database error, but exceptions can be raised explicitly by the programmer by using the command RAISE.
- Following is the simple syntax for raising an exception:

```
DECLARE
    exception_name EXCEPTION;
    BEGIN
    IF condition THEN RAISE
    exception_name; END IF;
    EXCEPTION
    WHEN exception_name THEN
    statement;
    END;
```

System exceptions are automatically raised by Oracle, when a program violates a RDBMS rule. There are some system exceptions which are raised frequently, so they are pre-defined and given a name in Oracle which are known as Named System Exceptions.

For example: NO_DATA_FOUND and ZERO_DIVIDE are called Named System exceptions.

User-defined Exceptions

part from sytem exceptions we can explicity define exceptions based on business rules. These are known as user-defined exceptions.

Steps to be followed to use user-defined exceptions:
• They should be explicitly declared in the declaration section.
• They should be explicitly raised in the Execution Section.
• They should be handled by referencing the user-defined exception name in the exception section.

For Example: Lets consider the product table and order_items table from sql joins to explain user-defined exception.

- A user-defined exception must be declared and then raised explicitly, using either a RAISE statement or the procedure

  DBMS_STANDARD.RAISE_APPLICATION_ERROR.
- The syntax for declaring an exception is:

  DECLARE
  my-exception EXCEPTION

VIII Procedure

i) Write a program on SQL's command prompt.
ii) Execute the program
iii) Check the output

VIII. Resources required

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards and HDD minimum 5GB	As per batch size	For all Experiments
2	Operating system	Windows XP/Windows 7/LINUX version 5.0 or later		
3	Software	Oracle /MySQL/SQL Server 2005/2008/2011		

IX. Precautions

1. All Program statements must end with a semicolon (**;**).
2. Use proper format specifier for DBMS_OUTPUT_PUT_LINE statement.
3. Follow safety practices

X. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XI. Result (Output of the Program)

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XII. Practical Related Questions

Note: Below given are few sample questions for reference. Teacher must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Which of the following is handled with the help of exception-handling section in an PL/SQL block. For eg, SELECT INTO statement, which does not return any rows.

   a. A runtime error b. A syntax error
   c. Both A & B d. None of the above

2. For a user-defined exception, SQLCODE returns 1, and SQLERRM returns _____.

   a. "User-defined Exception" b. 1
   c. 0 d. None of the above

(Space for answers)

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XIII. Exercise

Attempt Q1. and teacher shall allot Q. 2 OR Q.3 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Write a PL/SQL program by using predefined exception.
2. Write a PL/SQL program by using user exception
3. Complete the given table:

Program Code	Write Output

a)
DECLARE
stock_price NUMBER := 9.73;
net_earnings NUMBER := 0;
pe_ratio NUMBER;
BEGIN
pe_ratio := stock_price / net_earnings
DBMS_OUTPUT.PUT_LINE('Price/earnings ratio = ' || pe_ratio);
EXCEPTION
WHEN ZERO_DIVIDE THEN
DBMS_OUTPUT.PUT_LINE('Company had zero earnings.');
pe_ratio := NULL;
END;
/	

b)
DECLARE
c_id customers.id%type := &cc_id;
c_name customerS.No.ame%type;
c_addr customers.address%type;
-- user defined exception
ex_invalid_id EXCEPTION;
BEGIN
IF c_id <= 0 THEN
RAISE ex_invalid_id;
ELSE
SELECT name, address INTO c_name, c_addr
FROM customers
WHERE id = c_id;
DBMS_OUTPUT.PUT_LINE ('Name: '|| c_name);
DBMS_OUTPUT.PUT_LINE ('Address: ' || c_addr);
END IF;
EXCEPTION
WHEN ex_invalid_id THEN
dbms_output.put_line('ID must be greater than zero!');
WHEN no_data_found THEN
dbms_output.put_line('No such customer!');
WHEN others THEN
dbms_output.put_line('Error!');
END;
/	

(Space for answers)

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XIV. References / Suggestions for further Reading

1. https://docs.oracle.com/cd/E11882_01/timesten.112/e21639/exceptions.htm#TT PLS196
2. https://www.db.bme.hu/files/Manuals/Oracle/Oracle11gR2/appdev.112/e17126/ errors.htm
3. https://www.careerride.com/mcq/plsql-errors-plsql-mcq-questions-and-answers- 95.aspx

XV. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students /Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.15 Write PL/SQL Code to Create Procedures and Functions.

I. Practical Significance

Student should be able to write and execute PL/SQL procedures and functions.. These practical skills will help the student to write procedures and functions using SQL queries and execute them.

II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Engineering tools:** Apply relevant Computer technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical develop the following skills:

Write and Execute Procedures and Functions using PL/SQL to retrieve the information from database.

1. Write and Execute PL/SQL code for Procedures.
2. Write and Execute PL/SQL code for Functions.

IV. Relevant Course Outcome(s)

- Apply triggers to database ,also create procedure and Function according to condition..

V. Practical Outcome (POs)

a) Write PL/SQL Code to execute Procedures and functions using:
Create Procedure and Create Function statements.

VI. Relevant Affective domain related Outcome(s)

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background

Procedure is a subprogram used to perform a specific action. A subprogram is a named block of PL/SQL. There are two types of subprograms in PL/SQL namely Procedures and Functions. Every subprogram will have a declarative part, an executable part or body, and an exception handling part, which is optional. Declarative part contains variable declarations. Body of a subprogram contains executable statements of SQL and PL/SQL. Statements to handle exceptions are written in exception part. Procedure specification begins with CREATE and ends with procedure name or parameters list.

Procedures that do not take parameters are written without a parenthesis. The body of the procedure starts after the keyword IS or AS and ends with keyword END.

Syntax for Procedure:

```
CREATE [OR REPLACE] PROCEDURE     procedure_name
 [(parameter_name [IN | OUT | IN OUT] type [, ...])]
 {IS | AS}
 BEGIN
procedure_body
EXCEPTION
Exception handling
 END procedure_name;
```

Procedure is created using CREATE PROCEDURE statement.
OR REPLACE specifies the procedure is to replace an existing procedure if present.
A procedure may be passed multiple parameters. IN | OUT | IN OUT specifies the mode of the parameter. Type specifies the data type of the parameter.
IN - The parameter can be referenced by the procedure or function. The value of the parameter cannot be overwritten by the procedure or function.
OUT - The parameter cannot be referenced by the procedure or function, but the value of the parameter can be overwritten by the procedure or function.
IN OUT - The parameter can be referenced by the procedure or function and the value of the parameter can be overwritten by the procedure or function.

A function is a named PL/SQL Block which is similar to a procedure. The major difference between a procedure and a function is, a function must always return a value, but a procedure may or may not return a value.

Syntax for Function:

```
CREATE [OR REPLACE] FUNCTION function_name [parameters]
RETURN return_datatype; IS Declaration_section BEGIN Execution_section
Return return_variable; EXCEPTION exception section Return
return_variable; END;
```

VIII. Procedure

i. Use the Emp and Dept Table created in practical 4 and practical 5.
ii. Display the information of the tables using SELECT statement.
iii. Write PL/SQL code for Procedures and Functions.
iv. Execute PL/SQL code for Procedures and Functions.

IX. Resources required

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards,HDD of 160GB	As per batch size	For all Experiments
2	Operating system	Windows 7 and Above/LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions

1. All SQL statements must end with a semicolon (;).
2. Follow safety practices

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Results (Output of the Program)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

Consider the table EMPLOYEE and DEPARTMENT.

Emp(empno as primary key ,empname, salary, phno)
Dept(deptno primary key, empno foreign key, deptname,location)

Give the significance of following statements:

(1) Create or replace function
(2) Set server output ON

Write Output of the Following:

1.
```
SET SERVER OUTPUT ON;
CREATE OR REPLACE PROCEDURE proc1
AS
BEGIN
dbms_output.put_line('Hello World!');
END;
/
```

2.
```
SET SERVER OUTPUT ON;
DECLARE
a number;
b number;
c number;
PROCEDURE Min(x IN number, y IN number, z OUT number) IS
BEGIN
IF x < y THEN
z:= x;
ELSE
 z:= y;
END IF;
```

```
END; BEGIN
a:= 40;
b:= 50;
 Min(a, b, c);
dbms_output.put_line(' Minimum of (40, 50) : ' || c);
END;
/
```

3. SET SERVER OUTPUT ON;
CREATE PRO2.SQL IN NOTEPAD EDITOR AND TYPE THE PROCEDURE

```
SQL>ED PRO2.SQL

CREATE OR REPLACE PROCEDURE PRO2(P-NO IN NUMBER)
IS
SAL NUMBER(8,2);
BEGIN
SELECT SALARY INTO SAL FROM EMP WHERE EMPNO=P-NO;
IF SAL>20000 THEN
UPDATE EMP SET SALARY=SAL*0.2 WHERE EMPNO=P-NO;
ELSE
UPDATE EMP SET SALARY=10000 WHERE EMPNO=P-NO;
END IF;
END PROC1;

CREATE PRO2_CALL.SQL IN NOTEPAD EDITOR AND TYPE THE CALLING
PROGRAM
SQL>ED PRO2_CALL.SQL
DECLARE
TEMP_EMPNO NUMBER;
BEGIN

PRO2(&TEMP_EMPNO);
END;
/
SQL>/
```

4. CREATE FUNC1.SQL IN NOTEPAD EDITOR AND TYPE THE PROCEDURE

```
SQL>ED FUNC1.SQL

        CREATE OR REPLACE FUNCTION FUNC1(F_NO IN NUMBER)
RETURN NUMBER    AS V_NO NUMBER;
V_COUNT NUMBER;
BEGIN
SELECT DEPTNO INT V_NO FROM DEPT WHERE DEPTNO-F_NO;
IF(V_NO=F_NO) THEN
SELECT COUNT(*) INTO V_COUNT FROM EMP WHERE DEPTNO=F_NO;
RETURN V_COUNT;
END  IF;
END FUNC1;
/
CREATE FUNC1_CALL.SQL IN NOTEPAD EDITOR AND TYPE THE
```

CALLING PROGRAM

```
SQL>ED FUNC1_CALL.SQL DECLARE
V_NO NUMBER;
R NUMBER;
BEGIN
V_NO:=&v_no;
R:=FUNC1(v_no);
IF(R>0) THEN
DBMS_OUTPUT.PUT_LINE('NO. OF EMPLOYEES IN DEPT'||v_no||'ARE'||R);
ELSE
IF(R=0) THEN
DBMS_OUTPUT.PUT_LINE('DEPT NO'||v_no||'EXISTS BUT NO EMPLOYEES
IN DEPT');
ELSE
DBMS_OUTPUT.PUT_LINE('DEPT NO'||v_no||'NOT EXISTS ');
END IF;
END;
/
SQL>/
```

(**Space for answers**)

XIV. Exercise

Attempt Q1. and teacher shall allot Q. 2 OR Q.3 from the following:

(Note: Use Point VIII to X and XIII to XIV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

Consider the table EMPLOYEE and DEPARTMENT.

Emp(empno as primary key ,empname, salary, phno) Dept(deptno primary key, empno foreign key, deptname,location)

1. Write procedure to update the salary of all employees by 25%.
2. Write Function to calculate factorial of given no.
3. Write Function to display the empno ,salary of employee Shreyas.

(Space for answers)

XV. References / Suggestions for further Reading

1.https://www.w3schools.com

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.16: Write PL/SQL Code to Create Triggers on Given Database

I. Practical Significance

Database triggers are database objects created via the SQL Plus tool on the client and stored on the Server. Student should be able to create and execute triggers.

II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.
- **Discipline knowledge:** Apply Computer engineering discipline – specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical is expect to develop the following skills:

Develop PL/SQL code to solve computer engineering related problems.

1. Write PL/SQL code to create and execute Before Statement Trigger.
2. Write PL/SQL code to create and execute Before Row Trigger.
3. Write query to create and execute After Statement Trigger.
4. Write query to create and execute After Row Trigger.
5. Follow ethical practices.

IV. Relevant Course Outcomes

- Apply triggers on database. Also create procedure and function according to condition.

V. Practical Outcome (Pos)

- Write PL/SQL code to create triggers on given database.

VI. Relevant Affective domain related Outcome(s)

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background

Oracle allows you to define procedures that are implicitly executed when an INSERT, UPDATE, or DELETE statement is issued against the associated table. These procedures are called database triggers.

Triggers are similar to stored procedures. A trigger can include SQL and PL/SQL statements to execute as a unit and can invoke stored procedures. However, procedures and triggers differ in the way that they are invoked. While a procedure is explicitly executed by a user, application, or trigger, one or more triggers are implicitly fired (executed) by Oracle when a triggering INSERT, UPDATE, or

DELETE statement is issued, no matter which user is connected or which application is being used.
Triggers can be defined only on tables, not on views. However, triggers on the base table(s) of a view are fired if an INSERT, UPDATE, or DELETE statement is issued against a view.

Types of Triggers:

1. BEFORE Trigger: BEFORE trigger execute before the triggering DML statement (INSERT, UPDATE, DELETE) execute. Triggering SQL statement is may or may not execute, depending on the BEFORE trigger conditions block.
2. AFTER Trigger: AFTER trigger execute after the triggering DML statement (INSERT, UPDATE, DELETE) executed. Triggering SQL statement is execute as soon as followed by the code of trigger before performing Database operation.
3. ROW Trigger: ROW trigger fire for each and every record which are performing INSERT, UPDATE, DELETE from the database table. If row deleting is define as trigger event, when trigger file, deletes the five rows each times from the table.
4. Statement Trigger: Statement trigger fire only once for each statement. If row deleting is define as trigger event, when trigger file, deletes the five rows at once from the table.
5. Combination Trigger: Combination trigger are combination of two trigger type,
    1. Before Statement Trigger: Trigger fire only once for each statement before the triggering DML statement.
    2. Before Row Trigger : Trigger fire for each and every record before the triggering DML statement.
    3. After Statement Trigger: Trigger fire only once for each statement after the triggering DML statement executing.
    4. After Row Trigger: Trigger fire for each and every record after the triggering DML statement executing.

VIII. Procedure

i) Write and execute PL/SQL code for Before Statement Trigger.
ii) Write and execute PL/SQL code for Before Row Trigger.
iii) Write and execute PL/SQL code for After Statement Trigger.
iv) Write and execute PL/SQL code for After Row Trigger.

IX. Resources required

Sr. No.	Name of Resource	Specification	Qty.	Remarks
1	Hardware: computer system,	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards, HDD 500GB	As per batch size	For all Experiments
2	Operating system:	Windows 7 and above /LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions

i) All SQL statements must end with a semicolon (;).
ii) Follow safety practices.

XI. Resources used

S. No.	Name of Resource	Specification
4	Computer System with broad specifications	
5	Software	
6	Any other resource used	

XII Result (Output of the executed query)

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XIII Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

Write output of following query

(a) Does trigger fired on table affect on its view? Justify.

(b) Difference between statement level & row level trigger.

1. Inserting Trigger

This trigger execute BEFORE to convert ename field lowercase to uppercase.

```
CREATE or REPLACE TRIGGER trg1
   BEFORE
   INSERT ON emp1 FOR
   EACH ROW
BEGIN
   :new.ename := upper(:new.ename); END;
/
```

2. Restriction to Deleting Trigger

This trigger is preventing to deleting row. Delete Trigger Example CREATE

```
     or REPLACE TRIGGER trg1
        AFTER
        DELETE ON emp1 FOR
        EACH ROW
        BEGIN

IF :old.eno = 1 THEN
   raise_application_error(-20015, 'You can't delete this row'); END IF;
```

```
END;
/
```

Delete Trigger Result

```
SQL>delete from emp1 where eno = 1;
Error Code: 20015
Error Name: You can't delete this row
```

(Space for answers)

XIV Exercise

Attempt Q1. and teacher shall allot Q. 2 OR Q.3 from the following:

(Note: Use Point VIII to X and XIII to XV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create a row-level trigger for the EMP table that would fire for INSERT or UPDATE or DELETE operations performed on the EMP table. This trigger will display the salary difference between the old values and new values.
2. Execute following DML operations on the EMP table and write output. Here is one INSERT statement, which will create a new record in the table −
   INSERT INTO EMP (ID,NAME,AGE,ADDRESS,SALARY) VALUES (7, 'Kriti', 22, 'HP', 7500.00);
3. Execute following one more DML operation on the EMP table. The UPDATE statement will update an existing record in the table −
   UPDATE customers SET salary = salary + 500 WHERE id = 2;

(Space for answers)

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XV References / Suggestions for further Reading

1. https://docs.oracle.com/cd/B19306_01/server.102/b14231/views.htm#i1106548

XVI Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Student Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

Practical No.17: Executing DCL Commands Using SQL
I) Create Users
II) Grant Privileges To Users
III) Revoke Privileges From Users.

I. Practical Significance

Student should be able to create users and execute grant and revoke commands. These practical skills will help the student to create users with passwords and allocate and deallocate the system and object privileges to and from the users.

II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Computer engineering discipline – specific knowledge to solve core computer engineering related problems.
- **Experiments and practice:** Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.
- **Engineering tools:** Apply relevant Computer technologies and tools with an understanding of the limitations.
- **Communication:** Communicate effectively in oral and written form.

III. Competency and Practical skills

This practical develop the following skills:

Execute Queries using Built-In SQL functions to retrieve the information from database.

1. Execute create users, grant and revoke commands queries.
2. Allocate and deallocate the system and object privileges.

IV. Relevant Course Outcome(s)

- Create and Manage Database using SQL command.

V. Practical Outcome (Pos)

S) Write Queries using following commands: Create users, Grant and revoke.

VI. Relevant Affective domain related Outcome(s)

1. Follow safety measures
2. Follow ethical practices.

VII. Minimum Theoretical Background

DBA creates user by executing CREATE USER statement. A privilege is a right to execute an SQL statement or to access object. There are two types of privileges:

1. **System Privileges :** It is normally granted by DBA to users. Eg: Create Table, Create user etc.
2. **Object Privileges :** These allow access to objects or privileges on object, i.e. tables, table columns. Tables, views etc.. It includes alter, delete, insert, select update etc.

   The DBA uses the GRANT statement to allocate system privileges to other user.

   REVOKE statement is used to remove privileges granted to the users.

VIII. Procedure

i. Use the Emp and Dept Table created in practical 4 and practical 5.
ii. Display the information of the tables using SELECT statement.
iii. Execute the Create User Statement.
iv. Execute the Grant Statement.
v. Execute the Revoke Statement.

IX. Resources required

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Hardware: Computer System	Computer (i3-i5 preferable), RAM minimum 2 GB and onwards,HDD of 160GB	As per batch size	For all Experiments
2	Operating system	Windows 7 and Above/LINUX version 5.0 or later		
3	Software	Any RDBMS software (MySQL/SQL server/Oracle10g Express Edition)		

X. Precautions

1. All SQL statements must end with a semicolon (**;**).
2. Follow safety practices

XI. Resources used

S. No.	Name of Resource	Specification
1	Computer System with broad specifications	
2	Software	
3	Any other resource used	

XII. Results (Output of the Program)

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XIII. Practical Related Questions

Note: Below given are few sample questions for reference. Teachers must design more such questions so as to ensure the achievement of identified CO.

(a) State the use of 'with grant options' clause in grant command.

Consider tables EMPLOYEE and DEPARTMENT with following schema:
Emp(empno ,empname, salary, phno) Dept(deptno, empno, deptname,location,jobtype)

1. Write Output of the Following queries:

a. Create user jyoti identified by mitpoly;
b. Grant create table ,create view to jyoti;
c. Grant select,insert,update on Emp to jyoti;
d. Grant select,update(deptno,empno) on Dept to jyoti;
e. Alter user jyoti identified by mit;
f. Revoke create table,create views from jyoti;
g. Revoke select,insert,update on Emp from jyoti;
h. Create role emp_pvr;
i. Grant create table,create views to emp_pvr;
j. Grant emp_pvr to jyoti,john;

(Space for answers)

XIV. Exercise

Attempt Q1. and teacher shall allot Q. 2 to Q.9 from the following:

(Note: Use Point VIII to X and XIII to XIV for all relevant programming exercise use blank pages provided or attach more pages if needed.)

1. Create user john and implement the following commands on table Emp and Dept.
2. Write a query to grant select,insert,delete privileges on Emp and Dept table.
3. Write a query to grant update privileges on columns of empno and salary nts table.
4. Write a query to revoke all above privileges from Emp and Dept table.
5. Write query to create role dept_pvr;
6. Write query to assign system privileges-create table,create view to role dept_pvr;
7. Write query to assign above system privileges to users jyoti and john.
8. Write query to assign object privileges-select, insert, delete to role dept_pvr1;
9. Write query to assign above object privileges to users jyoti and john.

(Space for answers)

XV. References / Suggestions for further Reading

1. https://www.w3schools.com

XVI. Assessment Scheme

Performance indicators		Weightage
Process related (15 Marks)		**60%**
1.	Formation of MS Access Code	25%
2.	Execution of MS Access Code	25%
3.	Follow ethical practices.	10%
Product related (10 Marks)		**40%**
4.	Correctness of MS Access Code	15%
5.	Timely Submission of Practical	15%
6.	Answer to sample questions	10%
Total (25 Marks)		**100%**

List of Students / Team Members

1. ……..
2. ……..
3. ……..

Marks Obtained			Dated signature of Teacher
Process Related(15)	**Product Related(10)**	**Total(25)**	

List Of Laboratory Manuals Developed by MSBTE

First Semester:

1	Fundamentals of ICT	22001
2	English	22101
3	English Work Book	22101
4	Basic Science (Chemistry)	22102
5	Basic Science (Physics)	22102

Second Semester:

1	Bussiness Communication Using Computers	22009
2	Computer Peripherals & Hardware Maintenace	22013
3	Web Page Design with HTML	22014
4	Applied Science (Chemistry)	22202
5	Applied Science (Physics)	22202
6	Applied Machines	22203
7	Basic Surveying	22205
8	Applied Science (Chemistry)	22211
9	Applied Science (Physics)	22211
10	Fundamental of Electrical Engineering	22212
11	Elements of Electronics	22213
12	Elements of Electrical Engineering	22215
13	Basic Electronics	22216
14	'C' programming Language	22218
15	Basic Electronics	22225
16	Programming in "C"	22226
17	Fundamentals of Chemical Engineering	22231

Third Semester:

1	Applied Multimedia Techniques	22024
2	Advanced Serveying	22301
3	Highway Engineering	22302
4	Mechanics of Structures	22303
5	Building Construction	22304
6	Concrete Technology	22305
7	Strength Of Materials	22306
8	Automobile Engines	22308
9	Automobile Transmission System	22309
10	Mechanical Operations	22313
11	Technology Of Inorganic Chemicals	22314
12	Object Oriented Programming Using C++	22316
13	Data Structure Using 'C'	22317
14	Computer Graphics	22318
15	Database Management System	22319
16	Digital Techniques	22320
17	Principles Of Database	22321
18	Digital Techniques & Microprocessor	22323
19	Electrical Circuits	22324
20	Electrical & Electronic Measurment	22325
21	Fundamental Of Power Electronics	22326
22	Electrical Materials & Wiring Practice	22328
23	Applied Electronics	22329
24	Electrical Circuits & Networks	22330
25	Electronic Measurments & Instrumentation	22333
26	Principles Of Electronics Communication	22334
27	Thermal Engineering	22337
28	Engineering Matrology	22342
29	Mechanical Engineering Materials	22343
30	Theory Of Machines	22344

Fourth Semester:

1	Hydraulics	22401
2	Geo Technical Engineering	22404
3	Chemical Process Instrumentation & Control	22407
4	Fluid Flow Operation	22409
5	Technology Of Organic Chemicals	22410
6	Java Programming	22412
7	GUI Application Development Using VB.net	22034
8	Microprocessor	22415
9	Database Managment	22416
10	Electric Motors And Transformers	22418
11	Industrial Measurements	22420
12	Digital Electronics And Microcontroller Applications	22421
13	Linear Integrated Circuits	22423
14	Microcontroller & Applications	22426
15	Basic Power Electronics	22427
16	Digital Communication Systems	22428
17	Mechanical Engineering Measurments	22443
18	Fluid Mechanics and Machinery	22445
19	Fundamentals Of Mechatronics	22048

Fifth Semester:

1	Design of Steel and RCC Structures	22502
2	Public Health Engineering	22504
3	Heat Transfer Operation	22510
4	Environmental Technology	22511
5	Operating Systems	22516
6	Advanced Java Programming	22517
7	Software Testing	22518
8	Control Systems and PLC's	22531
9	Embedded Systems	22532
10	Mobile and Wireless Communication	22533
11	Industrial Machines	22523
12	Switchgear and Protection	22524
13	Energy Conservation and Audit	22525
14	Power Engineering and Refrigeration	22562
15	Solid Modeling and Additive Manufacturing	22053
16	Guidelines & Assessment Manual for Micro Projects & Industrial Training	22057

Sixth Semester:

1	Solid Modeling	17063
2	Highway Engineering	17602
3	Contracts & Accounts	17603
4	Design of R.C.C. Structures	17604
5	Industrial Fluid Power	17608
6	Design of Machine Elements	17610
7	Automotive Electrical and Electronic Systems	17617
8	Vehicle Systems Maintenance	17618
9	Software Testing	17624
10	Advanced Java Programming	17625
11	Mobile Computing	17632
12	System Programing	17634
13	Testing & Maintenance of Electrical Equipments	17637
14	Power Electronics	17638
15	Illumination Engineering	17639
16	Power System Operation & Control	17643
17	Environmental Technology	17646
18	Mass Transfer Operation	17648
19	Advanced Communication System	17656
20	Mobile Communication	17657
21	Embedded System	17658
22	Process Control System	17663
23	Industrial Automation	17664
24	Industrial Drives	17667
25	Video Engineering	17668
26	Optical Fiber & Mobile Communication	17669
27	Therapeutic Equipment	17671
28	Intensive Care Equipment	17672
29	Medical Imaging Equipment	17673

Pharmacy Lab Manual

First Year:

1	Pharmaceutics - I	0805
2	Pharmaceutical Chemistry - I	0806
3	Pharmacognosy	0807
4	Biochemistry and Clinical Pathology	0808
5	Human Anatomy and Physiology	0809

Second Year:

1	Pharmaceutics - II	0811
2	Pharmaceutical Chemistry - II	0812
3	Pharmacology & Toxicology	0813
4	Hospital and Clinical Pharmacy	0816

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