

# I

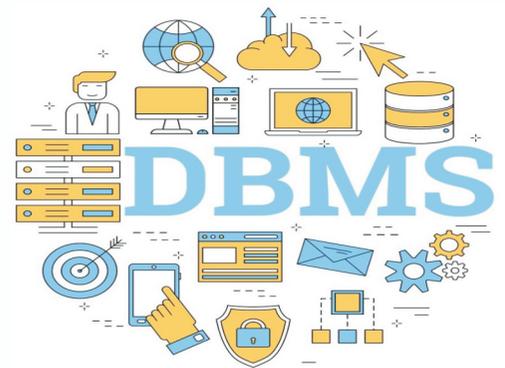
Name \_\_\_\_\_

Roll No. \_\_\_\_\_ Year 20 \_\_\_\_\_ 20 \_\_\_\_\_

Exam Seat No. \_\_\_\_\_

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

# A LABORATORY MANUAL FOR DATABASE MANAGEMENT (22416)



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**

**(22416)**

**Semester – (IV)**

**(IF)**



**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 November 2018)



# Maharashtra State Board of Technical Education

## Certificate

This is to certify that Mr. / Ms. ....  
Roll No.....of Fourth Semester of Diploma in  
..... of Institute  
.....  
(Code .....) has attained predefined practical outcomes  
(PROs) satisfactorily in course **Database Management (22416)** for  
the academic year 20.....to 20..... as prescribed in the curriculum.

Place: .....

Enrollment No.: .....

Date: .....

Exam Seat No.: .....

**Course Teacher**

**Head of the Department**

**Principal**





## 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 practical's to *focus* on *outcomes*, rather than the traditional age old practice of conducting practical's 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 the concerned practical procedure that they will do the next day and understand 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. 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.

Database system is used as backend for almost every application. This course aims to manage Database System using SQL. Using SQL students will create tables, store and manipulate data and extract information from database as per their requirement. The student will also able to create advance database object and perform necessary operation for database tuning.

Although all care has been taken to check for mistakes in this laboratory manual, yet it is impossible to claim perfection especially as this is the first edition. Any such errors and suggestions for improvement can be brought to our notice and are highly welcome.

## **Programme Outcomes (POs) to be achieved through Practicals of this Course**

Following programme outcomes are expected to be achieved significantly out of the ten programme outcomes and Information Technology programme specific outcomes through the practicals of the course on **Database Management**.

**PO 1. Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.

**PO 2. Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.

**PO 3. Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.

**PO 4. Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.

**PO 5. The engineer and society:** Assess societal, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Information technology.

**PO 6. Environment and sustainability:** Apply Information Technology related engineering solutions for sustainable development practices in environmental contexts.

**PO 7. Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of practice in the field of Information Technology.

**PO 8. Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.

**PO 9. Communication:** Communicate effectively in oral and written form.

**PO 10. Life-long learning:** Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

### Practical - Course Outcome Matrix

S. No.	Title of the Practical	CO a.	CO b.	CO c.	CO d.	CO e.
1	Installation and Configuring Database Product	√	-	-	-	-
2	Use of Relational Algebraic operations.	√	-	-	-	-
3	Use of Command Based on Data Definition Language (Part – I)	√	-	-	-	-
4	Use of Command Based on Data Definition Language (Part – II)	√	-	-	-	-
5	Apply Constraints on Relation.	√	-	-	-	-
6	Apply Domain Integrity Constraints on Relation	√	-	-	-	-
7	Use DML Command on Relation – Part I.	-	√	-	-	-
8	Use DML Command on Relation – Part II.	-	√	-	-	-
9	Use of operators in SQL Queries	-	√	-	-	-
10	Use of special operators in SQL	-		-	-	-
11	Manipulate String and Arithmetic Functions using SQL	-	√	-	-	-
12	Execute queries using Date and Time Functions.	-	√	-	-	-
13	Execute queries using Aggregate Functions	-	√	-	-	-
14 & 15	Apply clauses on single row or group of rows.	-	√	-	-	-
16 & 17	Write queries using Inner and Outer Joins	-	√	-	-	-
18.	Create and manipulate Views in database.	-	-	√		
19 & 20	Implement Indexes, Sequences, Synonyms in SQL.	-	-	√	-	-
21 & 22	Execute conditional statement and loop structure of PL/SQL.	-	-	-	√	-
23 & 24	Implement Implicit and Explicit cursors in PL/SQL.	-	-	-	√	-
25 & 26	Perform Exception handling in PL/SQL.(predefined and user defined exceptions)	-	-	-	√	-
27	Use of Procedures in PL-SQL	-	-	-	√	-
28	Use of Function in PL/SQL	-	-	-	√	-
29 & 30	Apply triggers on Relation	-	-	-	√	-
31	Use of DCL Commands on Database	-	-	-	-	√

## **List of Industry Relevant Skills**

The following industry relevant skills of the competency “Apply database Management Concepts using SQL” are expected to be developed in you by performing practicals of this laboratory manual.

1. Create Databases.
2. Apply constraints on them.
3. Write and execute SQL queries.
4. Write and execute PL/SQL code

## **Brief Guidelines to Teachers**

### **Hints regarding strategies to be used:-**

1. Teacher shall explain prior concepts to the students before starting each experiment.
2. For practical's requiring tools to be used, teacher should provide the demonstration of the practical emphasizing the skills, which the student should achieve.
3. Involve students in the activities during the conduct of each experiment.
4. Teachers should give opportunity to students for hands-on after the demonstration.
5. Assess the skill achievement of the students and COs of each unit.
6. Teacher is expected to share the skills and competencies to be developed in the students.
7. Teacher should ensure that the respective skills and competencies are developed in the students after the completion of the practical exercise.
8. Teacher may provide additional knowledge and skills to the students even though that may not be covered in the manual but are expected from the students by the industries.
9. Teacher may suggest the students to refer additional related literature of the reference books/websites/seminar proceedings etc.
10. During assessment teacher is expected to ask questions to the students to tap their knowledge and skill related to that practical.

## **Instructions for Students**

Student shall read the points given below for understanding the theoretical concepts and practical applications.

1. Students shall listen carefully the lecture given by teacher about importance of subject, learning structure, course outcomes.
2. Students shall organize the work in the group of two or three members and make a record of all observations.
3. Students shall understand the purpose of experiment and its practical implementation.
4. Students shall write the answers of the questions during practical.
5. Student should feel free to discuss any difficulty faced during the conduct of practical.
6. Students shall develop database designing and manipulation skills as expected by the industries.
7. Student shall attempt to develop related hands on skills and gain confidence.
8. Students shall refer technical magazines; websites related to the scope of the subjects and update their knowledge and skills.
9. Students shall develop self-learning techniques.
10. Students should develop habit to submit the write-ups on the scheduled dates and time.

**Content Page**  
**List of Practicals and Progressive Assessment Sheet**

S. No.	Title of the practical	Page No.	Date of performance	Date of submission	Assessment marks(50)	Dated sign. of teacher	Remarks (if any)
1.	Installation and Configuring Database Product	01					
2.	Use of Relational Algebraic operations.	07					
3.	Use of Command Based on Data Definition Language (Part – 1)	12					
4.	Use of Command Based on Data Definition Language (Part – II)	18					
5.	Apply Constraints on Relation.	23					
6.	Apply Domain Integrity Constraints on Relation	29					
7.	Use DML Command on Relation – Part I.	34					
8.	Use DML Command on Relation – Part II.	39					
9.	Use of operators in SQL Queries	44					
10.	Use of special operators in SQL	49					
11.	Manipulate String and Arithmetic Functions using SQL	54					
12.	Execute queries using Date and Time Functions.	60					
13.	Execute queries using Aggregate Functions	66					
14 & 15	Apply clauses on single row or group of rows.	71					
16 & 17	Write queries using Inner and Outer Joins	76					
18.	Create and manipulate Views in database.	82					
19 & 20	Implement Indexes, Sequences, Synonyms in SQL.	87					
21 & 22	Execute conditional statement and loop structure of PL/SQL.	93					
23 & 24	Implement Implicit and Explicit cursors in PL/SQL.	99					
25 & 26	Perform Exception handling in PL/SQL.(predefined and user defined exceptions)	105					
27.	Use of Procedures in PL-SQL	111					
28.	Use of Function in PL/SQL	116					
29 & 30	Apply triggers on Relation	121					
31	Use of DCL Commands on Database	126					
<b>Total Marks</b>							

- To be transferred to Proforma of CIAAN-2017.

## **Practical No. 1: Installation and configuring database product**

### **I. Practical Significance**

Database is heart of most of the computer application. In Structured, Database is a collection of table where as in Unstructured or Semi Structured database it is a collection of documents where data is stored. The database is known as “Backend application” There are various Database products available both open source and proprietary as well. One needs to select appropriate Database product based on the technology used in implementing front end application. This practical will make learner to get acquainted with Installation of database product and make necessary configuration.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Life-long learning:** Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills in you

#### **Apply Database Management concepts using SQL.**

1. Select appropriate Database Product.
2. Get familiar with environment and options of the Database Product.
3. Availability of various options of databases and commands with their uses.
4. Check output and verify various properties/parameters of table/database.

### **IV. Relevant Course Outcome(s)**

- Create Database using SQL commands.

### **V. Practical Outcome (PrOs)**

- a) Install and configure Database product (such as MySQL, ORACLE or any other relational database product).

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Participate in team problem solving activities.
3. Prioritizes time effectively to meet the needs of the team and self.

**VII. Minimum Theoretical Background**

Data is most important thing for any organization. To preserve the data in efficient manner so that it can be easily retrieve as and when it is require one need to have solid backend. Database makes sure that all important data is stored with its relationship with other data. A good database management tool must ensure that all data is stored and made available as and when required in stipulated time. One need to choose appropriate database product depending upon the application is to be built.

**Procedure:**

1. Select appropriate database tool/product.
2. Run installation file.
3. Enter product key and accept license terms (if any, for proprietary software).
4. Select desired path/drive where installation files needs to be store.
5. Select configuration settings i.e. custom/recommended settings.
6. Install Database product.
7. Create admin login and note down password for same.
8. Create other user and note down password for particular user.
9. Create temporary database to check functionality for installed product.

**VIII. Additional 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 free Space 1GB or More	As per batch size	For all Practical of SQL and PL/SQL
2	Operating system	Windows 7 or latest/LINUX version 5.0 or later		
3	Software	MySQL /MongoDB /PostgreSQL /Microsoft SQL/ Oracle 10g or Higher		

**IX. Precautions**

1. Note down the password for admin carefully.
2. Ensure all installation steps for database product are followed.

**X. Additional Resources used**

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**XIV. References / Suggestions for further Reading**

1. <https://www.tutorialspoint.com/mysql/index.htm>
2. <http://www.mysqltutorial.org/>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Sr.No</b>	<b>Process related (15 Marks)</b>	<b>30%</b>
1.	Tool Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Verifying of System Requirement for Installation	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(S)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 2: Use of Relational Algebraic operations

### I. Practical Significance

In a database all statements which are used for retrieve data or information are known query. This query can be written in high level language or by using special type of structure known as *Relation Algebra*. In Relational Algebra, one can make use of certain symbols known as operators. Relational Algebra takes relation i.e. table as an argument executes specified operator on it and returns result based on condition. This practical allows student to use Relational Algebra and retrieve data from given table.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of practice in the field of Information Technology.
- **Life-long learning:** Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database Product.
2. Get familiar with environment and options of the Database Product.
3. Availability of various options and commands with their uses.
4. Check output and verify various properties/parameters of table/database.

### IV. Relevant Course Outcome(s)

- Create Database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Write Queries using Relational Algebraic operations.

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practices.
2. Demonstrate analytical and logical knowledge as an Individual.
3. Participate in team problem solving activities.
4. Prioritizes time effectively to meet the needs of the team and self.

### VII. Minimum Theoretical Background

Data is most important thing for any organization. To preserve the data in efficient manner so that it can be easily retrieve as and when it is require one need to have solid backend. Database makes sure that all important data is stored with its relationship with other data. A good database management tool must ensure that all data is stored and made

available as and when required in stipulated time. One need to choose appropriate database product depending upon the application is to be built.

**Procedure:**

1. Select appropriate database.
2. Choose required Schema.
3. Write Relational Algebra Statement with the help of suitable operator(s).
4. Verify and note down the result.

**VIII. Additional Resources required**

Sr. No.	Name of Resource	Specification	Quantity	Remarks
1	Software	<a href="https://dbis-uibk.github.io/relax/calc.htm">https://dbis-uibk.github.io/relax/calc.htm</a>	As per batch size	

**IX. Precautions**

1. Use of appropriate operators.
2. Select required relations and use relevant conditions.

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. What is tuple calculus?
2. What are different operators available Relational Algebra?

**(Space for answers)**

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**XIV. References / Suggestions for further Reading**

1. <https://db.grussell.org/section010.html>
2. <https://dbis-uibk.github.io/relax/calc.htm>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Sr.No</b>	<b>Process related(15 Marks)</b>	<b>30%</b>
1.	Tool Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	25%
4.	Correctness in Use of Operators	15%
5.	Use of Attribute(s)/Options	10%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 3: Use of Command Based on Data Definition Language (Part – I)**

### **I. Practical Significance**

Data Definition Language (DDL) commands are used to define new table structure also known as *schema*. With the help of DDL command one can make significant changes in existing table schema as well. Whenever a user wants to create new database object like Table, View, Indexes, Procedures, Sequences, Synonyms, etc. Database Administrator uses DDL Command. This practical makes learner acquainted with various DDL Commands.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.
- **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- **Communication:** Communicate effectively in oral and written form.

### **III. Competency and Practical skills**

This practical is expected to develop the following skills in you

#### **Apply Database Management concepts using SQL.**

1. Select appropriate Database Product.
2. Get familiar with environment and options of the Database Product.
3. Availability of various options and commands with their uses.
4. Check output and verify various properties/parameters of table/database.

### **IV. Relevant Course Outcome(s)**

- Create Database using SQL commands.

### **V. Practical Outcome (PrOs)**

- a) Create and Execute DDL commands using SQL Part I (i.e. Create, Alter and Rename).

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Demonstrate working as a leader / a team member.
3. Participate in team problem solving activities.
4. Prioritizes time effectively to meet the needs of the team and self.

## VII. Minimum Theoretical Background

Database's DDL supports various commands to execute these commands the user needs to have certain privileges or user need to be an Admin. Data Definition Language supports 6 different commands as follows.

1. Create
2. Alter
3. Rename
4. Truncate
5. Drop
6. Describe.

1. **Create command:** This command is used to create a database object schema by supplementing the name of object. Whenever a user wants to create a database object one can create it by specifying following syntax.

*create database\_object object\_name (attributes/options);*

For e.g. user wants to create a table the syntax would be as follows.

*create table table\_name(attribute\_name1 data\_type1, attribute\_name2 data\_type2 ...);*

2. **Alter Command:** This command is use to make significant change in object schema. This command will let Admin / Owner to add, delete, modify, and rename certain properties /attributes of database. The user can use following syntax to alter database object.

*alter database\_object option(new properties/constraints);*

The Alter command provides following 4 options.

- Add: This option is use to add attributes/constraints to table.
- Modify: This option is use to modify current structure of attribute/constraints of table.
- Change/Rename: This option is use to rename existing name of attribute of table.
- Drop: This option is use to drop existing attribute of table.

3. **Rename Command:** This command is use to rename the database object by changing old name to new one. All references to old name will be automatically gets changed. One can use following syntax to rename database object.

*rename old\_database\_object\_name to new\_database\_object\_name;*

### **Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Write appropriate SQL Statement with the help of suitable option.
4. Execute SQL Statement.
5. Verify and note down the result.

## VIII. Additional Resources required

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**XIV. References / Suggestions for further Reading**

1. [https://www.tutorialspoint.com/sql\\_certificate/using\\_ddl\\_statements.htm](https://www.tutorialspoint.com/sql_certificate/using_ddl_statements.htm)
2. [https://www.oracle-dba-online.com/sql/oracle\\_data\\_definition\\_language.htm](https://www.oracle-dba-online.com/sql/oracle_data_definition_language.htm)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Tool Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	25%
4.	Correctness in Use of Data types and Schema	15%
5.	Use of Attribute(s)/Options	10%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 4: Use of Command Based on Data Definition Language (Part – II)**

### **I. Practical Significance**

Data Definition Language (DDL) commands are used to define new table structure also known as *schema*. With the help of DDL command one can make significant changes in existing table schema as well. Whenever a user wants to create new database object like Table, View, Indexes, Procedures, Sequences, Synonyms, etc. Database Administrator uses DDL Command. This practical makes learner acquainted with various DDL Commands.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
- **Engineering Tools:** Apply appropriate technologies and tools with an understanding of the limitations.
- **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- **Communication:** An ability to communicate effectively

### **III. Competency and Practical skills**

This practical is expected to develop the following skills in you

#### **Apply Database Management concepts using SQL.**

1. Select appropriate Database Product.
2. Get familiar with environment and options of the Database Product.
3. Availability of various options and commands with their uses.
4. Check output and verify various properties/parameters of table/database.

### **IV. Relevant Course Outcome(s)**

- Create Database using SQL commands.

### **V. Practical Outcome (PrOs)**

- a) Create and Execute DDL commands using SQL Part II (i.e. Drop, Delete and Truncate).

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Demonstrate working as a leader / a team member.
3. Participate in team problem solving activities.
4. Prioritizes time effectively to meet the needs of the team and self.

**VII. Minimum Theoretical Background**

Database’s DDL supports various commands to execute these commands the user needs to have certain privileges or user need to be an Admin. Data Definition Language supports 6 different commands as follows.

1. Truncate
2. Drop
3. Describe.

**1. Truncate command:** This command is used to delete all data from table by keeping table structure (schema) as it is. Truncate table is unconditional delete operation and ensures that all data will be deleted without any confirmation. User can follow a simple syntax to truncate table. Truncate is an administrative command and hence to execute this command one need to be owner of a table or administrator of database.

*truncate table table\_name;*

**2. Drop Command:** This command is use to delete the data from database object and also eliminate the schema of database object from database as well. Like truncate the user needs to be owner of a database object or admin of database.

To execute drop command one can use following syntax.

*drop database\_object Object\_name;*

To Drop table from database one can use following syntax.

*Drop table table\_name;*

**3. Describe Command:** This command is use to retrieve the schema of database object. Many a time user is unaware of schema of database object so one can get aware of with it by using Describe command. Note that one can get schema of specific object like table, procedure and view only with Describe command.

*Desc database\_object\_name;*

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Write appropriate SQL Statement with the help of suitable option.
4. Execute SQL Statement.
5. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate command.
2. Select required options and use relevant constraints/name.

**X. Additional Resources used**

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**XIV. References / Suggestions for further Reading**

1. [https://www.oracle-dba-online.com/sql/oracle\\_data\\_definition\\_language.htm](https://www.oracle-dba-online.com/sql/oracle_data_definition_language.htm)
2. [https://docs.oracle.com/cd/B19306\\_01/server.102/b14220/sqlplsql.htm#i18507](https://docs.oracle.com/cd/B19306_01/server.102/b14220/sqlplsql.htm#i18507)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 5: Apply Constraints on Relation.

### I. Practical Significance

Constraints are certain condition(s) that is to be followed by data before inserting into a relation. These constraints ensure that uniformity is achieved on particular attribute. The user can specify constraints while creating a table or same can be apply even after creation of table as well. Most of the time constraints are act as mean for maintaining reliability of data. The data entry which doesn't suits to this constraint(s) such data is not entered in table. This practical will let student to apply various constrains on relations.

### II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of practice in the field of Information Technology.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database/Table.
2. Availability of various options and commands with their uses.
3. Check output and verify various properties/parameters of table/database.

### IV. Relevant Course Outcome(s)

- Create Database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Apply following Integrity constraints on table. Primary key, Foreign key, Unique key constraint.

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practices.
2. Demonstrate working as a leader / a team member.
3. Apply/Modify desired constraints on table/attribute.
4. Prioritizes time effectively to meet the needs of the team and self.

## VII. Minimum Theoretical Background

Entity Integrity constraints are means of forming relationship between attribute or between relations. Entity Integrity constraints ensure that all attributes maintains some relations by virtue of which one can retrieve a value for an attribute by referring some other attribute. Usually a user can produce the value for any attribute by referring a prime attribute. Entity Integrity Constraint can be employ using primary key constraint. One can add primary key constraint while creating a table or it can also be employ after creation of table as well. Primary key holds only unique values and hence allows unique identifications. One need to ensure while entering a data, Prime attribute does not hold null value.

To create primary key constraint one can use two method as follows.

### **While creating a table:**

*Create table table\_name( attribute\_name data\_type primary key, ..... );*

### **After creating a table:**

*Alter table table\_name add constraint constraint\_name primary key (attribute\_name(s));*

Note: one can create a primary key by having combination of two or more attribute by specifying their names in alter command.

E.g. *Alter table table\_name add constraint constraint\_name primary key (attr1, attr2, ...);*

**Foreign key constraint** is use to impose relationship between multiple tables. This can be achieved by referring a value of prime attribute from one table (parent table) in another table (child table). This will ensure that only those values which are available in parent table's prime attribute are allowed in Child table. While creating such relation one must ensure that the child table's attribute must have same data type that of parent table's attribute. To create foreign key constraint one can use following steps.

*Create parent table with prime attribute.*

*Create child table with following syntax.*

*Create table table\_name (attribute\_name data\_type foreign key references parent\_table(prime\_attribute), ....);*

**Unique key constraint** will allow user to have an attribute which holds only unique values. This attribute can hold null values as well but redundant values are not accepted. There can be multiple unique key.

Syntax:

### **While Creating Table:**

*Create Table Table\_name (attribute\_name data\_type UNIQUE, . . . . .);*

### **After creation of table:**

*Alter Table Table\_name ADD **unique**(attribute\_name);*

**Procedure:**

1. Select appropriate database.
2. Create/Select appropriate Table and apply desired constraints on required attribute
3. Write SQL Statement with all options.
4. Execute SQL Statement.
5. Execute *Describe* command to check the effect of constraints.
6. Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate command.
2. Use appropriate Constraint name.
3. Select required options and use relevant constraints.

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. Differentiate between primary key constraint and unique key constraint. (Any 3 Points)
2. Describe on delete cascade with example.

**(Space for answers)**

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**XIV. References / Suggestions for further Reading**

1. <https://www.geeksforgeeks.org/sql-constraints/>
2. [https://www.w3schools.com/sql/sql\\_constraints.asp](https://www.w3schools.com/sql/sql_constraints.asp)

**XV. Assessment Scheme**

Performance indicators		Weightage (Marks)
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

***List of Students /Team Members***

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 6: Apply Domain Integrity Constraints on Relation**

### **I. Practical Significance**

Domain Integrity constraints are conditions that are to be followed by domain i.e. pool of legitimated values. Domain Integrity Constraints ensures that only certain values are entered in database table and hence control can be achieved. These constraints can be specified while creation of table or table's attribute can be altered as per requirement. In this practical student will choose and apply certain Domain Integrity Constraints on specific table's attribute.

### **II. Relevant Program Outcomes (POs)**

- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **Ethics:** Apply ethical principles for commitment to professional ethics, responsibilities and norms of practice in the field of Information Technology.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills in you

#### **Apply Database Management concepts using SQL.**

1. Select appropriate Database Product.
2. Availability of various options and commands with their uses.
3. Apply relevant Domain Integrity constraints on desired attribute(s).
4. Check output and verify various properties/parameters of table/database.

### **IV. Relevant Course Outcome(s)**

- Create Database using SQL commands.

### **V. Practical Outcome (PrOs)**

- a) Apply following Integrity constraints on table. Null. Not Null and Check constraint.

### **VI. Relevant Affective domain related Outcome(s)**

1. Use valid constraints and conditional operators.
2. Avoid use of complicated conditions.
3. Demonstrate working as a leader / a team member.
4. Prioritizes time effectively to meet the needs of the team and self.

### **VII. Minimum Theoretical Background**

Domain integrity constraints are way of imposing certain conditions on attribute. Relational Database supports various constraints like Null, Not Null and Check. These constraints are helpful in view of restricting few values to get entered in database or making few values as mandatory.

**Null and Not Null:** The null constraint is use to specify that specific attribute can hold null values i.e. user gets exempted from entering values in an attribute. By default all attributes can hold null values. Whereas Not Null constraint is use to ensure that user must enter a value for certain attribute hence such attribute cannot hold Null (blank) values.

To specify not null constraint one can use following syntax:

*Create table table\_name (attribute\_name data\_type not null, ....);*

**Check Constraint:** - The Check constraints are used to specify that value in table/attribute will be entered only if it satisfies certain condition. This ensures only valid values are entered in a table/attribute. One can use following syntax to impose check constraints.

*Create table table\_name (attribute\_name data\_type check (condition), ....);*

**Procedure:**

1. Select appropriate database.
2. Create/Select appropriate Table and Apply desired constraints on required attribute
3. Write appropriate SQL Statement with the help of suitable option.
4. Execute SQL Statement.
5. Execute Describe command to check the effect of constraints.
6. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate command.
2. Use appropriate Constraint name.
3. Select required options and use relevant constraints/condition(s).

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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**XIV. References / Suggestions for further Reading**

1. <https://www.geeksforgeeks.org/sql-constraints/>
2. [https://www.w3schools.com/sql/sql\\_constraints.asp](https://www.w3schools.com/sql/sql_constraints.asp)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

***List of Students /Team Members***

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 7: Use DML Command on Relation – Part I

### I. Practical Significance

Data Manipulation Language (DML) command are use to make necessary changes in existing datum in a table/relation. Whenever user wants to insert, update, or delete existing data then user can make use of DML command. In this practical the student will able to write and execute DML command to perform specified operation.

### II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.
- **The engineer and society:** Assess societal, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Information technology.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Life-long learning:** Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database Product.
2. Availability of various options and commands with their uses.
3. Write appropriate DML Command and execute to achieve desired result.
4. Check output and verify various properties/parameters of table/database.

### IV. Relevant Course Outcome(s)

- Manage Database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Create and Execute DML commands using SQL Part-I (i.e. Insert Command).

### VI. Relevant Affective domain related Outcome(s)

1. Use of appropriate values for each attribute.
2. Maintain constraints while entering values.
3. Demonstrate working as a leader / a team member.
4. Prioritizes time effectively to meet the needs of the team and self.

### VII. Minimum Theoretical Background

Data manipulation language (DML) is a way of making modification in existing data in a table. One can make use of appropriate DML command to perform operations like Insert, Update, and Delete. *CRUD* operations are achieved with DML Command.

Insert Command: This command is use to enter new value in a table. This command makes sure that new tuple is created in a relation and memory will be allocated for same.

While inserting a value one need to ensure that if numerical values are to be entered then direct values can be supplemented but if character values are to be entered then one must use pair of single quote to either side of value.

To insert a data there are 4 different ways:

**Direct Method:** In this method one can specify the values in a command/query itself. This method is useful when a user is familiar with table schema.

*Syntax: Insert into table\_name values (value1, value2, .... , value\_n);*

**Reference Method:** In this method the user can specify the values for specific attribute. This method is used when user is unaware about the table schema but knows which values to be entered.

*Syntax: Insert into table\_name (attribute1, attribute2, ..) values(value1, value2, ...);*

**Inserting multiple values:** This method is use to insert bulk values in a table. The user can simply specify the attribute names preceded by ‘&’ operator.

*Syntax: Insert Into table\_name values (&attribute1\_name, &attribute2\_name, ....);*

**Copy from other source:** This method is use to copy the data from one source like table/view to another relation.

*Syntax: insert into table\_name (select \* from table2\_name);*

**Procedure:**

1. Select appropriate database.
2. Select the *Table* where new record is to be inserted.
3. Check constraints imposed on table/relation (if any).
4. Write necessary DML Statement to insert data with the help of suitable option.
5. Execute SQL Statement.
6. Execute *select* command to check the effect of *insert* command.
7. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate command.
2. Use appropriate attribute/relation name.
3. Select required options and maintain specified constraints/condition(s).

**X. Additional Resources used**

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**XIV. References / Suggestions for further Reading**

1. <https://www.techonthenet.com/sql/insert.php>
2. <https://www.dofactory.com/sql/insert>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 8: Use DML Command on Relation – Part II

### I. Practical Significance

Data Manipulation Language (DML) command are used to make necessary changes in existing datum in a table/relation. DML commands also supports updating and deletion existing data. In this practical the student will able to write and execute DML command to perform conditional/unconditional update and delete operation on existing data.

### II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.
- **The engineer and society:** Assess societal, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Information technology.
- **Individual and team work:** Function effectively as a leader and team member in diverse/ multidisciplinary teams.
- **Life-long learning:** Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database Product.
2. Availability of various options and commands with their uses.
3. Write DML Command and execute to update / delete existing data.
4. Check output and verify various properties/parameters of table/database.

### IV. Relevant Course Outcome(s)

- Manage Database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Create and Execute DML commands using SQL Part-II (i.e. Update, Delete Command).

### VI. Relevant Affective domain related Outcome(s)

1. Use of appropriate condition for update and delete.
2. Maintain constraints while updating values.
3. Demonstrate working as a leader / a team member.
4. Prioritizes time effectively to meet the needs of the team and self.

### VII. Minimum Theoretical Background

DML command support both conditional and unconditional update and delete operation. The update operation is use to update the value of specific attribute. Usually one can make use of primary key in condition to ensure desire tuple gets affected. If the user wants to affect all tuples then they need not to specify the condition. While specifying

condition one need to take care that all tuple which satisfy the conditions will get affected.

Syntax for updating specific tuple:

*Update table\_name set attribute\_name = value where condition;*

Syntax for updating all tuples:

*Update table\_name set attribute\_name = value;*

Delete Command:

This command is use to delete unwanted datum from table. To delete a data one can make use of primary key attribute to uniquely identify an attribute. Same command can be used to delete all record from a table without specifying any condition.

Syntax for delete specific record from a table:

*Delete from table\_name where (condition);*

Syntax to delete all records from a table:

*Delete from table\_name;*

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Check constraints imposed on table/relation (if any).
4. Write appropriate DML Statement to update / delete data with required condition.
5. Execute SQL Statement.
6. Execute select command to check the effect of command.
7. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate command.
2. Use appropriate attribute/relation name.
3. Select required options and maintain specified constraints/condition(s).

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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**XIV. References / Suggestions for further Reading**

1. <https://www.1keydata.com/sql/sqldelete.html>
2. <http://www.wideskills.com/sql/sql-delete-records-tables>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related (15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 9: Use of operators in SQL Queries

### I. Practical Significance

Operators are the very useful in specifying any condition in Database query. Almost all clauses in Database need to have some conditions. One can make use of appropriate operator(s) to specify condition. Upon successful satisfaction of these conditions result will be displayed. In this practical the student will able to write and execute DML command using conditional operators on existing dataset.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.
- **Life-long learning:** Engage in independent and life-long learning along with the technological changes in the IT and allied industry.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database Product.
2. Availability of various options and commands with their uses.
3. Write DML Command and execute using various operators.
4. Check output and verify various properties/parameters of table/database.

### IV. Relevant Course Outcome(s)

- Manage Database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Write Queries using following operators: Arithmetic Operators, Comparison Operators, and Logical Operators.

### VI. Relevant Affective domain related Outcome(s)

1. Use of appropriate condition to form query.
2. Maintain constraints while forming query.
3. Demonstrate working as a leader / a team member.

### VII. Minimum Theoretical Background

Operators are used to formulate the query with certain condition(s). By using an operator one can restrict the effect of query as the effect will take place to only those tuple which satisfies defined conditions. One can use these operators in condition along with 'where' clause. The SQL supports following Operators.

- Arithmetic Operators: These operators are used to perform arithmetic operations.
- Comparison Operators: These operators used to perform comparative operations
- Logical Operators: These operators are used to validate logic between two attribute.

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Check constraints imposed on table/relation (if any).
4. Write appropriate SQL Statement with required condition using required operator(s).
5. Execute SQL Statement.
6. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate operator(s).
2. Use appropriate attribute/relation name.
3. Select required options and maintain specified constraints/condition(s).

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. List any 7 operators used with Logical operator.
2. List any 5 operators used with Comparison operator.

**(Space for answers)**

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**XIV. References / Suggestions for further Reading**

1. <http://www.wideskills.com/sql/sql-operator>
2. <https://www.tutorialspoint.com/sql/sql-operators.htm>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

***List of Students /Team Members***

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 10: Use of special operators in SQL

### I. Practical Significance

Database supports various operators to extract records based on certain conditions. These conditions can be satisfied with the help of operators. Whenever a user want to retrieve specific data then user can fire a query with the help of these special operators. This practical will allow student to write and execute query with the help of special operators to retrieve data with certain format/condition.

### II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
- **Experiments and practice:** An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
- **Engineering Tools:** Apply appropriate technologies and tools with an understanding of the limitations.
- **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.
- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Availability of various options and commands with their uses.
2. Write appropriate SQL Command with required operator and execute.
3. Check output and verify various properties/parameters of table/database.

### IV. Relevant Course Outcome(s)

- Manage Database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Write Queries using following operators: Set Operators, Range Searching operators- Between, Patterns matching operators-like.

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practices.
2. Appropriate use of operators to generate result.
3. Demonstrate working as a leader / a team member.
4. Prioritizes time effectively to meet the needs of the team and self.

### VII. Minimum Theoretical Background

The Database product supports various special operators to retrieve the desired outcome of a query. One can make use of these operators instead of writing complicated queries and hence simplified queries can fired on database results into quick execution of same.

One can make use of Set operators which consider more than one relation as input/set and performs operation on it. One can perform following set operations:

- Union
- Union all
- Intersect
- Minus

There are case where one need to check more than one condition to retrieve data from specific range in such cases one can make use of range searching operators. All most all database product supports following range searching operators.

- In
- Between

At time one need to have results based on certain conditions on textual input/attribute. In these cases a one can make use of pattern matching operators. Modern database product makes use of *Like* operator to perform pattern matching.

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Write appropriate SQL Statement to extract data using special operators.
4. Execute SQL Statement.
5. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate operator.
2. Use appropriate attribute/relation name.
3. Select required options and maintain specified constraints/condition(s).

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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**XIV. References / Suggestions for further Reading**

1. <https://www.studytonight.com/dbms/set-operation-in-sql.php>
2. <http://www.sqlcourse2.com/setoper.html>

**XV. Assessment Scheme**

Performance indicators		Weightage (Marks)
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 11: Use of String and Arithmetic Functions in SQL**

### **I. Practical Significance**

In database the data processed is of all formats, integer and character type of data is most frequent among all format. One needs to perform various operations that suits to the application. SQL provides various predefined functions to perform such operations. Database developer can make use of string/arithmetic functions to achieve desired result. This practical will make student acquainted with different string and arithmetic functions used in SQL.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills

#### **Apply Database Management concepts using SQL.**

1. Use arithmetic functions for numeric data/attribute in the database.
2. Use string functions on char data in the database.

### **IV. Relevant Course Outcome(s)**

- Manage database using SQL commands.

### **V. Practical Outcome (PrOs)**

- Write Queries using String and arithmetic functions.

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

## VII. Minimum Theoretical Background

Almost all SQL products support various String and Arithmetic functions to perform certain operations. Following are the common Functions used in the Databases.

### String Function:

Function	Description
CONCAT (str1, str2,..)	Return concatenated string
INSERT(str, pos, len, newstr)	Insert a substring at the specified position up to the specified number of characters
INSTR(str,substr)	Return the index of the first occurrence of substring
LCASE(str) / LOWER(str)	Synonym for LOWER()
LEFT(str,len)	Return the leftmost number of characters as specified
LENGTH(str)	Return the length of a string in bytes
MID(str,pos,len)	Return a substring starting from the specified position
REPLACE(str,from_str,to_str)	Replace occurrences of a specified string
REVERSE(str)	Reverse the characters in a string
STRCMP(expr1,expr2)	Compare two strings
SUBSTR(str,pos)	Return the substring as specified
UPPER(str) / UCASE(str)	Convert to uppercase.

### Arithmetic Functions:

ABS(n)	Absolute value of a number
CEIL(n)	Get the smallest integer which is higher than the input value.
COS(n)	COS() function takes input in Radian
FLOOR(n)	Returns the highest integer which is lower than the input value.
MOD(n, m)	Getting the remainder of a division and using in our Query
POW(n, m)	Power of a number
ROUND(n,[m])	Rounded to decimals
SIN(n)	SIN() function takes input in Radian
SQRT(n)	Square root of a number

### Procedure:

1. Select appropriate database/table.
2. Execute SQL using String and Arithmetic functions on appropriate attribute.
3. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use appropriate function to get desired result.
2. Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. Output of the Query**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. List string and arithmetic functions not listed here.
2. State the output of concat () function if any one of the arguments is NULL?
3. Differentiate between Floor (), Ceil () and Round () function.
4. State the result if negative value is used for number of decimal places in Round ().

**(Space for answers)**

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**XV. Assessment Scheme**

<b>Performance indicators</b>		<b>Weightage</b>
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

***List of Students /Team Members***

1. ....
2. ....
3. ....

<b>Marks Obtained</b>			<b>Dated signature of Teacher</b>
<b>Process Related(15)</b>	<b>Product Related(35)</b>	<b>Total(50)</b>	

**Practical No. 12: Execute queries using Date and Time Functions.****I. Practical Significance**

Database table contains data of varied type viz. number, character, and date as well. One can have an attribute with date as a data type. The DATE data type in SQL is used to store date and time information. This data type combines Day, Month, Year, Hour, Min, and Seconds together as a single value. This practical helps students to manipulate date and time related values in the table as a whole or separate.

**II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

**III. Competency and Practical skills**

This practical is expect to develop the following skills

**Apply Database Management concepts using SQL.**

1. Derive date/ time in specific format.
2. Manipulate various operations on date and time.

**IV. Relevant Course Outcome(s)**

- Manage database using SQL commands.

**V. Practical Outcome (PrOs)**

- Write Queries using Date and Time function.

**VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

**VII. Minimum Theoretical Background**

Following are some of the commonly used date and time functions in databases.

Date functions used in MySQL.

Function Name	Description
CURDATE()	Return the current date
CURTIME()	Return the current time
DATE(expr)	Extract the date part of a date or date-time expression

DATE_FORMAT(date,format)	Format date as specified
DAYOFMONTH(date)	Return the day of the month (0-31)
DAYOFYEAR(date)	Return the day of the year (1-366)
HOUR(time)	Extract the hour
MINUTE(time)	Return the minute from the argument
MONTH(date)	Return the month from the date passed
NOW()	Return the current date and time
TIME()	Extract the time portion of the expression passed
TIME_FORMAT(time,format)	Format as time
WEEK(date)	Return the week number
YEAR(date)	Return the year

### Date functions in Oracle.

Function Name	Description
SYS_DATE()	Current date and time
ADD_MONTHS(date, n)	Adds the specific number of months (n) to a date. The 'n' can be both negative and positive:
LAST_DAY(date)	Returns the last day in the month of the specified date
MONTHS_BETWEEN(date,date)	Calculates the number of months between two dates.
NEXT_DAY(date, day_of_week)	Returns the date of the first weekday specified that is later than the date.
TRUNC(date, [format])	Truncates the specified date of its time portion according to the format provided. If the 'format' is omitted, the hours, minutes or seconds will be truncated.

### Procedure:

1. Select appropriate database /table.
2. Execute SQL queries using date and time functions.
3. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Select appropriate function to get desired output.
2. Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. Output of the Query**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. List the functions to perform arithmetic operations on date and time.
2. State the need of Extract () function for Date data type.
3. Enlist different conversion functions related to date and time.

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**XV. Assessment Scheme**

<b>Performance indicators</b>		<b>Weightage</b>
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

<b>Marks Obtained</b>			<b>Dated signature of Teacher</b>
<b>Process Related(15)</b>	<b>Product Related(35)</b>	<b>Total(50)</b>	

## Practical No. 13: Execute queries using Aggregate Functions

### I. Practical Significance

Database tables with numerical values are used to generate other values which are essential for business logic. The database developer makes use of aggregate functions to derive such values. Aggregate functions usually work with attributes with numerical values. Aggregate functions provide certain predefined functions and produce required output. In this practical student will be able to apply aggregate functions on desired attribute to generate result.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### III. Competency and Practical skills

This practical is expected to develop the following skills

#### Apply Database Management concepts using SQL.

1. Perform calculations on a set of values in the table
2. Implement aggregate functions on given table.

### IV. Relevant Course Outcome(s)

- Manage database using SQL commands.

### V. Practical Outcome (PrOs)

- a) Write Queries using Aggregate functions-Min, Max, Sum, Avg., and Count.

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

### VII. Minimum Theoretical Background

Aggregate functions perform a specified operation on attribute to produce a result. Most of the popular SQL tool supports all aggregate function like AVG, COUNT, DISTINCT, MAX, MIN, SUM etc.

Function	Description
AVG([DISTINCT] expr)	Retrieves the average value of a given expression. If the function does not find a matching row, it returns NULL. <i>DISTINCT</i> option can be used to return the average of the distinct values of expr.
COUNT([[DISTINCT] expr)	Returns a count of a number of non-NULL values of a given expression. If it does not find any matching row, it returns 0.
DISTINCT(expr)	Returns distinct value by eliminating redundant values.
MAX(expr)	Returns the maximum value of an expression.
MIN(expr)	Returns the minimum value of an expression. MIN() function returns NULL when the return set has no rows
SUM([DISTINCT] expr)	Returns the sum of an expression. SUM () function returns NULL when the return set has no rows.

**Procedure:**

1. Select appropriate database / table.
2. Execute SQL queries on desired attribute using aggregate functions.
3. Verify and note down the result.

**VIII. Resources required**

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**IX. Precautions**

1. Use appropriate aggregate function to get desired output.
2. Select desired attribute to get required result.
3. Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. Output of the Query**

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**XIV. References / Suggestions for further Reading**

1. <https://www.tutorialgateway.org/sql-aggregate-functions/>
2. [http://www.sqlcourse2.com/agg\\_functions.html](http://www.sqlcourse2.com/agg_functions.html)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 14 and 15: Apply clauses on single row or group of rows.**

### **I. Practical Significance**

A WHERE clause in SQL specifies that a SQL Data Manipulation Language (DML) statement should only affect rows that meet specified criteria. But *WHERE* clause could not be used with aggregate functions, so *HAVING* clause is introduced. It specifies that an SQL SELECT statement should only return rows where aggregate values meet the specified conditions.

In database table, often records are stored in sequential manner which results into data to be in random order. In some of the database application the data is needed to be in certain order. Also performing an operation on some group of tuples produces a result for specific group which is the case in real time application. In this practical students will be able to apply various clauses on Database table.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills

#### **Apply Database Management concepts using SQL.**

1. Apply conditions on row/s to get desired result.
2. Implement WHERE and HAVING clauses.
3. Sort the records in ascending or descending order using Order by clause.
4. Group the records on a common attribute value using Group by clause

### **IV. Relevant Course Outcome(s)**

- a) Manage database using SQL commands.

### **V. Practical Outcome (PrOs)**

- Execute queries using Select command with Where, Having clauses.
- Executing queries using Select command with Group by and Order by clauses.

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

**VII. Minimum Theoretical Background**

To retrieve information based on some condition or predicate, “WHERE” clause is used. The SELECT statement displays all rows but combined with WHERE clause displayed only the rows satisfying given condition.

Syntax:

```
SELECT <colname1>, <colname2> FROM <table-name> WHERE <condition>;
```

Similarly conditions can be applied on group of tuples. The HAVING clause is used in conjunction with the GROUP BY clause which further filters the groups created by the GROUP BY clause. The column in HAVING clause must be in list of columns named in GROUP BY clause.

Syntax:

```
SELECT <colname1>, <colname2> FROM <tablename> [WHERE <condition>] GROUP BY <COLNAME/S> HAVING <condition>;
```

The database tool supports various clause group by and order by are some of them. Group by and Order by clauses works on table row and attribute respectively. The SQL developer must use these clauses wisely to produce required output.

**Group by Clause:** The Group by clause is one which automatically forms a group of tuple in table and performs specified operation on that group. The programmer can use following syntax to write and execute SQL statement with group by clause.

Syntax:

```
Select attribute-name from table-name where condition group by attribute-name;
```

**Order by Clause:** Since the data stored in a database table is likely to be in random order, one may need to have these records in sorted order before or after query execution. The Order by clause displays table result in sorted way. By default the results are sorted in ascending order but same can be displayed in descending order by using parameter as DESC. One can make use of following syntax to display the result in sorted order.

Syntax:

```
Select attribute-name from table name order by attribute—name [ASC|DESC]
```

Note: ASC option is applied automatically on query to sort in ascending order wherein DESC option is used to reverse the order of result.

**Procedure:**

1. Select appropriate database / table.
2. Execute SQL queries using WHERE and HAVING with suitable Group by/ Order by Clauses .
3. Verify and note down the result.

**VIII. Additional Resources required**

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**XIV. References / Suggestions for further Reading**

1. <https://docs.oracle.com/javadb/10.8.3.0/ref/rrefclauses.html>
2. <http://www.sqlclauses.com/>

**XV. Assessment Scheme**

Performance indicators		Weightage (Marks)
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 16 and 17: Write queries using Inner and Outer Joins.**

### **I. Practical Significance**

Every database is a collection of one or more tables. Sometimes, the information are scattered in more than one table. When one need to display the information from both tables then it is need to join these tables together using the join clause. Join clause allows SQL developer to join two or more tables if they have at least one common field and have a relationship between them. In this practical the student will able to apply various join on table and execute query on such relation to retrieve data from multiple tables.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills

#### **Apply Database Management concepts using SQL.**

- a. Implement concept of Inner join.
- b. Implement concept of Outer join.

### **IV. Relevant Course Outcome(s)**

- a) Manage database using SQL commands.

### **V. Practical Outcome (PrOs)**

- a) Execute Queries using Inner joins.
- b) Executing Queries using Outer joins.

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

### **VII. Minimum Theoretical Background**

SQL JOIN combines data records which exist in more than one table. To retrieve the data from various tables there must exist certain relation among participating table. These relations can be achieved by having at least one attribute common in these tables. SQL support various join operations as follows.

- INNER JOIN is the same as JOIN; the keyword INNER is optional.

Syntax for inner join

```
SELECT column-names
    FROM table-name1 INNER JOIN table-name2
    ON column-name1 = column-name2
    WHERE condition;
```

- Outer Join:

The SQL OUTER JOIN returns all rows from both the participating tables which satisfy the join condition along with rows which do not satisfy the join condition. The SQL OUTER JOIN operator (+) is used only on one side of the join condition only.

The subtypes are

- LEFT (OUTER) JOIN: Select records from the first (left-most) table with matching right table records.

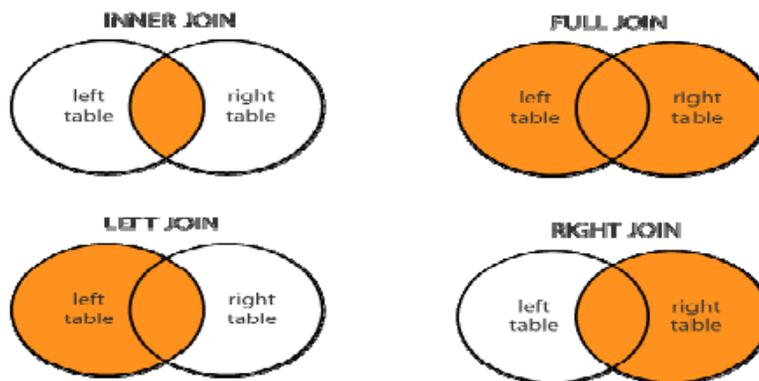
```
SELECT column_name(s)
FROM table1
LEFT OUTER JOIN table2 ON table1.column_name = table2.column_name;
```

- RIGHT (OUTER) JOIN: Select records from the second (right-most) table with matching left table records.

```
SELECT column_name(s)
FROM table1
RIGHT OUTER JOIN table2 ON table1.column_name = table2.column_name;
```

- FULL (OUTER) JOIN: Selects all records that match either left or right table records.

```
SELECT column_name(s)
FROM table1
FULL OUTER JOIN table2 ON table1.column_name = table2.column_name;
```



**Procedure:**

1. Select appropriate database. /Table.
2. Execute SQL queries using Inner join and outer join.
3. Verify and note down the result.

**VIII. Additional Resources required**

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**XV. Assessment Scheme**

<b>Performance indicators</b>		<b>Weightage</b>
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

*List of Students /Team Members*

1. ....
2. ....
3. ....

<b>Marks Obtained</b>			<b>Dated signature of Teacher</b>
<b>Process Related(15)</b>	<b>Product Related(35)</b>	<b>Total(50)</b>	

## **Practical No. 18: Create and manipulate Views in database.**

### **I. Practical Significance**

A VIEW in SQL is a logical subset of data from one or more tables. If user wants to give restricted access to the data, views are used. It hides unnecessary data from the user e.g. customer has restricted access to bank database. View is also known as database object. This practical allows student to create views and implement the security mechanism on database table.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills in you

#### **Apply Database Management concepts using SQL.**

- a. Design views.
- b. Perform various operations on View.

### **IV. Relevant Course Outcome(s)**

- a) Implement advanced SQL concepts on Database.

### **V. Practical Outcome (PrOs)**

- a) Implement views to perform following operations:
  - a. Create/Remove Views.
  - b. Insert, modify, and delete records through views.

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Effective time management.

### **VII. Minimum Theoretical Background**

View can be described as virtual table which derived its data from one or more than one table columns. It is stored in the database. View can be created using tables of same database or different database. The view is stored as a select statement in the data dictionary. A view does not contain data. A view is evaluated each time whenever it is accessed.

Syntax for creating View is

```
CREATE [or REPLACE] VIEW view_name AS
SELECT attribute1, attribute2,
FROM table_name
WHERE condition [with check option [constraint <name>]];
```

Syntax for removing View.

```
DROP VIEW view_name;
```

Rows can be inserted through views using INSERT statement. Similarly DELETE, UPDATE are used to delete or modify data from the view respectively.

Read only views can be defined as below.

```
CREATE VIEW myView AS
SELECT * FROM employee
WITH READ ONLY CONSTRAINT my_view_read_only;
```

**Procedure:**

1. Select appropriate database / Table.
2. Create views.
3. Perform various operations on views.
4. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

- a) Create appropriate view get desired output.
- b) Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. Output of the Query**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. List advantages of views.
2. Give the table name where the definition of view is stored.





**XIV. References / Suggestions for further Reading**

1. <https://www.tutorialspoint.com/sql/sql-using-views.htm>
2. [https://www.w3schools.com/sql/sql\\_view.asp](https://www.w3schools.com/sql/sql_view.asp)
3. <https://dev.mysql.com/doc/refman/8.0/en/view-syntax.html>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 19 and 20: Implement Indexes, Sequences, Synonyms in SQL

### I. Practical Significance

A database object is any defined object in a database that is used to store or reference data. Some examples of database objects include tables, views, sequences, indexes, and synonyms. These objects can be viewed and queried when required. These Database Objects provide a number of advantages, including Database Independence, Security, and multilevel validations. This practical allows students to create the database objects and manipulate them.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### III. Competency and Practical skills

This practical is expect to develop the following skills

#### Apply Database Management concepts using SQL.

- a. Create different database objects.
- b. Perform various operations on these objects.

### IV. Relevant Course Outcome(s)

- a) Implement advanced SQL concepts on Database.

### V. Practical Outcome (PrOs)

- a) Create Indexes, Sequences, and Synonyms in SQL.
- b) Execute views , Indexes, Sequences, Synonyms in SQL

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient Time management.

### VII. Minimum Theoretical Background

Index:

An index is used to speed up the performance of queries. It does this by reducing the number of database data pages that have to be scanned. An index helps to speed up SELECT queries and WHERE clauses. But it slows down data input, with the UPDATE and the INSERT statements. Indexes can be created or dropped with no effect on the data.

Syntax for creating Index.

*CREATE INDEX index\_name ON table\_name (column\_name);*

Or for multiple column use following syntax.

*CREATE INDEX index\_name on table\_name (column1, column2);*

Syntax to drop Index.

*DROP INDEX index\_name;* (Note: use Oracle)

*ALTER TABLE table\_name DROP INDEX index\_name ;* (Note: use MySQL)

### **Sequence:**

Sequence is a feature supported by some database systems to produce unique values on demand. Some DBMS like MySQL supports `AUTO_INCREMENT` in place of Sequence. `AUTO_INCREMENT` is applied on columns, it automatically increments the column value by 1 each time a new record is inserted into the table.

A sequence is a user-defined schema bound object that generates a sequence of numeric values according to the specification with which the sequence was created. The sequence of numeric values is generated in an ascending or descending order at a defined interval.

Syntax for creating Sequence:

```
CREATE SEQUENCE sequence-name  
START WITH initial-value  
INCREMENT BY increment-value  
MINVALUE minimum-value  
MAXVALUE maximum-value CYCLE | NOCYCLE;
```

Using sequence with insert command.

```
INSERT INTO class VALUE (seq_name.nextval,'anu');
```

MySQL supports `AUTO_INCREMENT` in place of Sequence e.g.

```
mysql> CREATE TABLE STUDENT (  
id INT UNSIGNED NOT NULL AUTO_INCREMENT,  
PRIMARY KEY (id), name VARCHAR (30) NOT NULL);
```

### **Synonym:**

A synonym is an alternative name for objects such as tables, views, sequences, stored procedures, and other database objects. You generally use synonyms when you are granting access to an object from another schema and you don't want the users to have to worry about knowing which schema owns the object.

Synonyms provide both data independence and location transparency. Synonyms permit applications to function without modification regardless of which user owns the table or view and regardless of which database holds the table or view. However, synonyms are not a substitute for privileges on database objects. Appropriate privileges must be granted to a user before the user can use the synonym.

Syntax for creating synonym:

```
create [public]synonym synonym_name for object_name;
```

The 'public' keyword is used to provide global access to schema object.

Remove a synonym: To remove a synonym ,we can use drop synonym statement.

Syntax: *drop synonym synonym\_name;*

### **Procedure:**

1. Select appropriate database / table.

2. Create required database object i.e. Indexes, Sequences, and Synonyms as per specification.
3. Execute Indexes, Sequences, and Synonyms.
4. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Create appropriate database object as per specification.
2. Follow given restriction for the database objects.

**X. Additional Resources used**

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**XI. Output of the Query**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. List the situation when indexes should be avoided?.
2. Who can create or drop a public synonym?
3. Give need for sequences.

**(Space for answers)**

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**XIV. References / Suggestions for further Reading**

1. <https://www.tutorialspoint.com/sql/sql-using-sequences.htm>
2. <https://www.studytonight.com/dbms/sql-sequences.php>
3. [https://docs.oracle.com/cd/B19306\\_01/server.102/b14200/statements\\_7001.htm](https://docs.oracle.com/cd/B19306_01/server.102/b14200/statements_7001.htm)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 21 and 22: Use conditional statement and loop structure in PL/SQL.

### I. Practical Significance

PL/SQL structure is a coding environment which allows developer to write certain code blocks which are executed to perform certain task. One needs to have decision making statements along with loop structures to achieve desired result. PL/SQL supports all major conditional statements and loop structure. PL/SQL Supports various data types like any other programming language. This practical will make learner acquainted with decision making statements and loop structures used in PL/SQL.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### III. Competency and Practical skills

This practical is expect to develop the following skills

#### Apply Database Management concepts using SQL.

- a. Implement conditional statement in PL/SQL program.
- b. Implement loop structure in PL/SQL program.

### IV. Relevant Course Outcome(s)

- a) Write PL/SQL code for database application.

### V. Practical Outcome (PrOs)

- Write PL/SQL programs using *if then else* and *for*.

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

### VII. Minimum Theoretical Background

Conditional Statements in PL/SQL

The **PL/SQL IF statement** allows user to execute a sequence of statements conditionally. The *IF* statement evaluates condition. The condition can be anything that evaluates to a logical value of true or false such as comparison expression or a combination of multiple comparison expressions. One can compare two variables of the same type or convertible type or even a Boolean variable can be used as a condition.

The PL/SQL IF statement has three forms: IF-THEN, IF-THEN-ELSE and IF-THEN-ELSIF.

**Syntax for IF-THEN**

```
IF condition THEN
    statements
END IF;
```

If condition is true then only the statements are executed.

**Syntax for IF-THEN-ELSE**

```
IF condition THEN
    sequence_of_if_statements;
ELSE
    sequence_of_else_statements;
END IF;
```

If condition is true then the first set of statements is executed and if it is false the ELSE part is executed.

**Syntax for IF-THEN-ELSIF**

```
IF condition1 THEN
    sequence_of_statements1
ELSIF condition2 THEN
    sequence_of_statements2
ELSE
    sequence_of_statements3
END IF;
```

It is used for more than two conditions are to be tested.

**Loop Structure in PL/SQL**

Loop structure allows executing a set of statements multiple times. There are 3 types of loop.

**Simple loop**

In this loop structure, sequence of statements is enclosed between the LOOP and the END LOOP statements.

For all iteration sequence of statements is executed and then control resumes at the top of the loop. The EXIT statement is used to come out from this loop.

Syntax of Simple loop

```
LOOP
    sequence_of_statements;
EXIT;
END LOOP;
```

**While loop**

While loop repeats a statement or group of statements while a given condition is true. It tests the condition before executing the loop body.

Syntax of while loop

```
WHILE condition LOOP
    sequence_of_statements
END LOOP;
```

**For loop**

For loop executes a sequence of statements multiple times and abbreviates the code that manages the loop variable. When no of iterations are fixed this loop is used.

Syntax of For loop:

```
FOR counter IN [REVERSE] initial_value .. final_value LOOP
    sequence_of_statements;
END LOOP;
```

**Procedure:**

1. Select appropriate database /table.
2. Write PL/SQL program using conditional statements and loop structure.
3. Execute the program.
4. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

- a) Follow correct syntactic rules
- b) Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. 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 practical exercise use blank pages provided or attach more pages if needed.)

1. Give the use of CASE statement in PL/SQL.
2. State use of EXIT WHEN statement used in simple loop.
3. List some special characteristics of PL/SQL for loop
4. Give an example of nested loop.

(Space for answers)

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**XIV. References / Suggestions for further Reading**

1. <http://www.plsqltutorial.com/plsql-if-statement/>
2. <http://www.plsqltutorial.com/plsql-loop-statement/>

**XV. Assessment Scheme**

Performance indicators		Weightage (Marks)
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

***List of Students /Team Members***

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 23 and 24: Implement Implicit and Explicit cursors in PL/SQL.**

### **I. Practical Significance**

For processing an SQL statement database application creates memory area, known as the context area. This contains all the information needed for processing the statement; for example, the number of rows processed, etc. A cursor is a pointer to this context area. This practical allows students to control the context area through a cursor.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### **III. Competency and Practical skills**

**This practical is expect to develop the following skills**

**Apply Database Management concepts using SQL.**

- a. Implement implicit cursor in PL/SQL.
- b. Implement explicit cursor in PL/SQL.

### **IV. Relevant Course Outcome(s)**

- a) Write PL/SQL code for database application.

### **V. Practical Outcome (PrOs)**

- Write PL/SQL code to implement implicit cursors.
- Write PL/SQL code to implement explicit cursors.

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

### **VII. Minimum Theoretical Background**

A cursor is a temporary work area created in the system memory when a SQL statement is executed. A cursor contains information on a select statement and rows of data accessed by it. A cursor can hold many rows, but it can process only one row at a time.

There are two types of cursors

- Implicit cursor
- Explicit cursor

### Implicit cursor

Implicit cursors are automatically created whenever an SQL statement is executed. Whenever a DML statement (INSERT, UPDATE and DELETE) is issued, an implicit cursor is associated with this statement. For INSERT operations, the cursor holds the data that needs to be inserted. For UPDATE and DELETE operations, the cursor identifies the rows that would be affected. In Oracle a user can access the implicit cursor with the name SQL. In MySQL a user can access the implicit cursor with the name **MySQL**.

Sample implicit cursor in Oracle.

```

DECLARE
    total_rows number(2);
BEGIN
    UPDATE customers
    SET salary = salary + 500;
    IF sql%notfound THEN
        dbms_output.put_line('no customers selected');
    ELSIF sql%found THEN
        total_rows := sql%rowcount;
        dbms_output.put_line( total_rows || ' customers selected ');
    END IF;
END;
```

### Explicit cursor

Explicit cursors are programmer-defined cursors for gaining more control over the context area. An explicit cursor should be defined in the declaration section of the PL/SQL Block. It is created on a SELECT Statement which returns more than one row. Working with an explicit cursor includes the following steps –

- Declaring the cursor for initializing the memory
- Opening the cursor for allocating the memory
- Fetching the cursor for retrieving the data
- Closing the cursor to release the allocated memory

Oracle syntax for explicit cursor

```

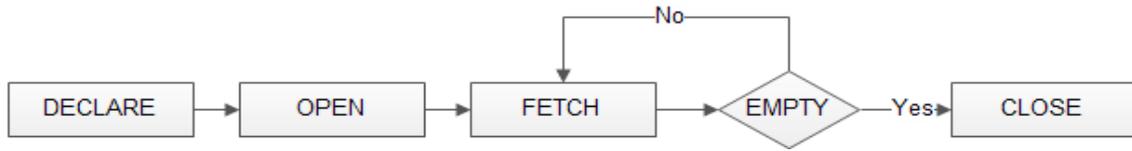
DECLARE
    CURSOR <cursor_name> IS <SELECT statement^>
    <cursor_variable declaration>
BEGIN
    OPEN <cursor_name>;
    FETCH <cursor_name> INTO <cursor_variable>;
    .
    CLOSE <cursor_name>;
END;
```

My-Sql syntax for Explicit Cursor.

```

DECLARE    cursor_name    CURSOR    FOR
SELECT_statement;
OPEN cursor_name;
FETCH cursor_name INTO variables list;
CLOSE cursor_name;
```

The following diagram illustrates working of Explicit cursor.



**Procedure:**

1. Select appropriate database / table.
2. Write PL/SQL program to implement implicit and explicit cursor.
3. Execute the program.
4. Verify and note down the result.

**VIII. Additional Resources Required**

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**IX. Precautions**

- a) Follow correct syntactic rules.
- b) Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. 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 practical exercise use blank pages provided or attach more pages if needed.)*

1. Differentiate between Implicit and Explicit cursors.
2. List attributes of cursor with their meaning.
3. Can we use ISOPEN attribute with implicit cursor?
4. State advantage and drawback of cursors.





**XIV. References / Suggestions for further Reading**

1. <http://www.mysqltutorial.org/mysql-cursor/>
2. [https://www.tutorialspoint.com/plsql/plsql\\_cursors.htm](https://www.tutorialspoint.com/plsql/plsql_cursors.htm)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## **Practical No. 25 and 26: Perform Exception handling in PL/SQL.**

### **I. Practical Significance**

An exception is an error condition during a program execution. When an error occurs, an exception is raised. That is, normal execution stops and control transfers to the exception-handling part of the PL/SQL block or subprogram. Using Exception Handling we can test the code and avoid it from exiting abnormally. This practical allows students to catch the runtime errors and take an appropriate action against the error condition.

### **II. Relevant Program Outcomes (POs)**

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.

### **III. Competency and Practical skills**

This practical is expect to develop the following skills

#### **Apply Database Management concepts using SQL.**

- a. Implement and raise Pre-Defined and user defined exception(s) in PL/SQL.

### **IV. Relevant Course Outcome(s)**

- a) Write PL/SQL code for database application.

### **V. Practical Outcome (PrOs)**

- a) Write PL/SQL programs based on Exception handling(Predefined exceptions)
- b) Write PL/SQL programs based on Exception handling(User defined exceptions)

### **VI. Relevant Affective domain related Outcome(s)**

1. Follow ethical practices.
2. Follow precautionary measures.
3. Efficient time management.

### **VII. Minimum Theoretical Background**

In PL/SQL, a warning or error condition is called an exception. PL/SQL provides a feature to handle the Exceptions which occur in a PL/SQL Block known as exception Handling. PL/SQL Exception message consists of three parts.

1. Type of Exception
2. An Error Code
3. A message

#### **There are two types of exceptions.**

Predefined or system defined-these are raised automatically whenever corresponding occurs. The most common errors that can occur during the execution of PL/SQL Programs

are handled by system defined exceptions. The default exception will be handled using WHEN others THEN –

```

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;
```

Here are some predefined exceptions in Oracle.

Exception	Oracle Error	Description
INVALID_CURSOR	01001	It is raised when attempts are made to make a cursor operation that is not allowed, such as closing an unopened cursor.
INVALID_NUMBER	01722	It is raised when the conversion of a character string into a number fails because the string does not represent a valid number.
NO_DATA_FOUND	01403	It is raised when a SELECT INTO statement returns no rows.
TOO_MANY_ROWS	01422	It is raised when a SELECT INTO statement returns more than one row.
ZERO_DIVIDE	01476	It is raised when an attempt is made to divide a number by zero.

User defined-It must be declared by user in the declaration part of a block where the exception is used. 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;
```

**Procedure:**

1. Select appropriate database/Table.
2. Write PL/SQL program to handle system defined and user defined exception.
3. Execute the program.
4. Verify and note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

- a) Follow correct syntactic rules.
- b) Handle computer system and its peripherals carefully.

**X. Additional Resources used**

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**XI. 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 practical exercise use blank pages provided or attach more pages if needed.)

1. Differentiate between system defined and user defined Exceptions.
2. List steps in User defined Exception handling.





**XIV. References / Suggestions for further Reading**

1. [https://docs.oracle.com/cd/B28359\\_01/appdev.111/b28370/errors.htm#LNPLS007](https://docs.oracle.com/cd/B28359_01/appdev.111/b28370/errors.htm#LNPLS007)
2. [https://www.tutorialspoint.com/plsql/plsql\\_exceptions.htm](https://www.tutorialspoint.com/plsql/plsql_exceptions.htm)

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100% (50)</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 27: Use of Procedures in PL-SQL.

### I. Practical Significance

Procedures are set of instructions which are pre-compiled and use many times as per requirement. PL/SQL block supports creation of procedure and also calling procedures which are already created. One can make use of appropriate statements to create required procedures. Often Procedures are also known as '*stored procedures*'. In this practical a learner will be able to create a procedure and invoke it in other PL/SQL block structure.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.
- **Discipline knowledge:** An ability to apply discipline - specific knowledge to solve core and/or applied engineering problems.
- **Experiments and practice:** An ability to plan and perform experiments and practices and to use the results to solve engineering problems.
- **Engineering Tools:** Apply appropriate technologies and tools with an understanding of the limitations.
- **Environment and sustainability:** Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
- **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

### III. Competency and Practical skills

This practical is expected to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database Product.
2. Write and execute required Procedure.
3. Write PL/SQL block structure and call/invoke required Procedure.
4. Check output of PL/SQL Block and Procedure.

### IV. Relevant Course Outcome(s)

- Write PL/SQL code for database application.

### V. Practical Outcome (PrOs)

- a) Write PL/SQL code to create Procedures.

### VI. Relevant Affective domain related Outcome(s)

1. Use of appropriate statements to prepare procedure.
2. Use of Input and Output parameters modes in procedure.
3. Verify the working of Procedure before calling the same.
4. Demonstrate working as a leader / a team member.

### VII. Minimum Theoretical Background

Procedures are similar to that of functions in PL/SQL it is just that they do not return a value. Procedure comprises with set of instructions which will be executed again and again. Hence by using procedure one can save quality time in executing same blocks on

repetitive instances. The Procedure is always defined in a declare section of PL/SQL block. In general case one can perform following three operations on Procedure.

- Create Procedure
- Execute Procedure
- Delete Procedure.

**Create Procedure:** This section is used to create new procedure or replace existing procedure. It is written in Declare section of PL/SQL block. To create a Procedure one can use following syntax.

```
Create procedure procedure_name (<IN parameters>, <OUT parameters>) as
begin
    statements for procedure
end;
```

**Execute Procedure:** This section allows end user to test written procedure or also call procedures written earlier. One can use the procedure in PL/SQL block by specifying its name. To call/execute the existing procedure one can use following syntax.

Syntax 1: *Execute procedure\_name();*

Syntax 2: *call procedure\_name();* {Note: Use in mysql}

**Delete Procedure:** This operation is useful if any procedure needs to be deleted. One can use drop command to completely delete the procedure from database itself. To delete a procedure following syntax is used.

```
Drop Procedure procedure_name;
```

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Create procedure with specified name and required specifications.
4. Execute procedure to validate result/outcome of procedure.
5. Prepare PL/SQL block structure and call procedure in it (if any).
6. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate name for procedure.
2. Select valid IN parameters and OUT parameter (if any).
3. Execute / Call procedure at suitable PL/SQL block.

**X. Additional Resources used**

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**XIV. References / Suggestions for further Reading**

1. <https://www.javatpoint.com/pl-sql-procedure>
2. <https://www.w3resource.com/mysql/mysql-procedure.php>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(S)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

***List of Students /Team Members***

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 28: Use of Function in PL/SQL.

### I. Practical Significance

Functions are set of statements which are written to achieve certain task. The user can call functions any number of times. Unlike procedure functions do return a value. The user can call a function by supplementing required value as an argument to it. As the procedure are pre-compiled block of statement, functions needs to be executed every time it is called. In this practical a student will able to create a function and call it in PL/SQL block.

### II. Relevant Program Outcomes (POs)

- **Basic knowledge:** Apply knowledge of basic mathematics, science and basic engineering to solve the problems related to application of computers and communication services in storing, manipulating and transmitting data, often in the context of a business or other enterprise.
- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.
- **The engineer and society:** Assess societal, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Information technology.

### III. Competency and Practical skills

This practical is expect to develop the following skills in you

#### Apply Database Management concepts using SQL.

1. Select appropriate Database Product.
2. Write and call required function.
3. Write PL/SQL block structure and call/invoke required Function.
4. Check output of PL/SQL Block and Function.

### IV. Relevant Course Outcome(s)

- Write PL/SQL code for database application.

### V. Practical Outcome (PrOs)

- a) Write PL/SQL code to create Functions.

### VI. Relevant Affective domain related Outcome(s)

1. Use of appropriate statements to create function.
2. Produce flexible output by using arguments in function.
3. Calling function with appropriate arguments.

### VII. Minimum Theoretical Background

Functions are one of the main database objects that PL/SQL supports. By creating a function one can execute certain operations on regular basis. One difference between function and procedure is that function must return some value and hence it contains return statement at the end of function body.

In general case one can perform following two operations on function.

- Create function
- Call function.

**Create Function:** This section is used to create new function in PL/SQL. To call a function one can use function name in PL/SQL block. Following Syntax is use to create a function in PL/SQL.

**Syntax: -**

```
Create or replace function Function_name  
return data_type is return_variable  
begin  
    SQL Statement  
end;
```

**Call Function:** The Function can be called/invoke by using command call followed by function name and passing required arguments (if any). One can also call function by simply writing function name in required PL/SQL block. The Syntax for same is as follows:

Syntax 1: (In Mysql)

```
Call function_name(arguments);
```

Syntax 2: (Calling Function in PL/SQL Block)

```
Begin
```

```
    Variable_Name = Function_name( arguments);
```

```
End;
```

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table
3. Create function with specified name and required specifications.
4. Prepare PL/SQL block structure and call function in it.
5. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate name for function.
2. Select valid IN parameters and OUT parameter (if any).
3. Execute / Call procedure at suitable PL/SQL block.

**X. Additional Resources used**

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**XIV. References / Suggestions for further Reading**

1. <https://www.javatpoint.com/pl-sql-function>
2. [https://www.tutorialspoint.com/plsql/plsql\\_functions.htm](https://www.tutorialspoint.com/plsql/plsql_functions.htm)

**XV. Assessment Scheme**

Performance indicators		Weightage (Marks)
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 29 & 30: Apply triggers on Relation.

### I. Practical Significance

Triggers are very essential feature in any Database system to ensure that any data manipulation is observed automatically. Triggers are one which gets automatically executed whenever any Update, Delete, Insert or all operation gets performed. The trigger checks for specified condition, if the condition satisfied then only aforementioned operations will be performed. This practical will make student acquainted with creating triggers and validating its operation.

### II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/tools with an understanding of the limitations.
- **The engineer and society:** Assess societal, health, safety and legal issues and the consequent responsibilities relevant to practice in the field of Information technology.
- **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

#### Apply Database Management concepts using SQL.

1. Select required Database.
2. Create a trigger with suitable condition and also specify triggering event.
3. Define and raise exception in case of triggering event.
4. Check output of trigger by executing dummy queries.

### IV. Relevant Course Outcome(s)

- Write PL/SQL code for database application.

### V. Practical Outcome (PrOs)

- a) Write PL/SQL code to create triggers on given database part-I
- b) Write PL/SQL code to create triggers on given database part-II

### VI. Relevant Affective domain related Outcome(s)

1. Select appropriate table to create a trigger.
2. Use of relevant event to invoke trigger.
3. Create and raise exceptions in case of triggered event.

### VII. Minimum Theoretical Background

Triggers are a database object which gets invoke automatically when certain conditions holds true. One can achieve automated control on any DML operations performed on database. Triggers get invoked when user performs operations like update, insert, and/or delete. One can decide when the trigger shall invoke i.e. before execution of certain statement or after execution of certain statement. Based on these events if the condition is

satisfied then trigger will be invoked and appropriate event will be raised. To create a trigger one can use following syntax:

```
Create [or Replace] Trigger Trigger_name  
[After | Before | Instead of]  
[of Attribute_name(s)]  
On Table_name  
[For Each Row]  
When (Condition)  
Declare  
  
Begin          ....  
  
Exception     ....  
  
                Raise_Desired_Exception_Statement; (User Defined / System  
Defined Exception)  
End;
```

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table.
3. Create trigger with specified name and required specifications.
4. Create/Raise Appropriate Exception.
5. Execute SQL queries with dummy values.
6. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate name for Trigger.
2. Use relevant events to invoke Trigger.
3. Raise desired exception when trigger is invoked.

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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**XIV. References / Suggestions for further Reading**

1. <https://www.javatpoint.com/pl-sql-trigger>
2. <https://www.c-sharpcorner.com/UploadFile/63f5c2/triggers-in-sql-server/>

**XV. Assessment Scheme**

Performance indicators		Weightage
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	

## Practical No. 31: Use of DCL Commands on Database.

### I. Practical Significance

Data Control Language (DCL) Commands are used to control the access of data that is stored in database/table. This result into achieving authorization for data so that only legitimated user can access database object and perform required operations. This practical will make student acquainted with various DCL commands perform on Database.

### II. Relevant Program Outcomes (POs)

- **Discipline knowledge:** Apply Information Technology knowledge to solve broad-based Information Technology related problems.
- **Experiments and practice:** Plan to perform experiments, practices and to use the results to solve Information Technology related problems.
- **Engineering Tools:** Apply appropriate Information Technology related techniques/ tools with an understanding of the limitations.
- **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

#### Apply Database Management concepts using SQL.

1. Select required Database.
2. Select/Identify required user(s).
3. Assign/Revoke required privileges to/from user(s).
4. Execute SQL command and verify result.

### IV. Relevant Course Outcome(s)

- Apply security and safety on Database.

### V. Practical Outcome (PrOs)

- a) Executing DCL commands using SQL
  - a. Create Users
  - b. Grant privileges to users
  - c. Revoke privileges from users.

### VI. Relevant Affective domain related Outcome(s)

1. Follow ethical practice.
2. Follow safety measurement.

### VII. Minimum Theoretical Background

Data Control Language (DCL) is very essential to obtain control on database object. The administrator can use DCL to allow certain user(s) to access the database / database object. The administrator of a database can assign certain permissions to the user these permissions are also known as “*privileges*”. An administrator can grant/revoke privileges from user. To grant privileges Administrator needs to create a user by using following syntax.

*Create User user\_name identified by password*

Once the user is created the privileges can be granted by using following syntax.

*Grant [privilege\_name| ALL] privileges on database\_object\_name to user\_name;*

The administrator can also revoke privileges from user by using following syntax.

*Revoke [privilege\_name|ALL]on database\_object from user\_name;*

**Procedure:**

1. Select appropriate database.
2. Select appropriate Table.
3. Create user with required username and default password.
4. Grant/Revoke required privileges to/from user.
5. Execute SQL queries with dummy values.
6. Verify and Note down the result.

**VIII. Additional Resources required**

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**IX. Precautions**

1. Use of appropriate/unique name for user.
2. Avoid use of ALL privileges to standard user.

**X. Additional Resources used**

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**XI. Result (Output of the procedure)**

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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 practical exercise use blank pages provided or attach more pages if needed.)

1. Write the consequence of assigning ALL privileges to the standard user.
2. Give minimum privileges to be assigned to the standard user.

(Space for answers)

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**XIV. References / Suggestions for further Reading**

1. <https://dev.mysql.com/doc/refman/8.0/en/privileges-provided.html>
2. [https://www.techonthenet.com/oracle/grant\\_revoke.php](https://www.techonthenet.com/oracle/grant_revoke.php)

**XV. Assessment Scheme**

Performance indicators		Weightage (Marks)
<b>Process related(15 Marks)</b>		<b>30%</b>
1.	Command Selection Ability	20%
2.	Follow Ethical Practices.	10%
<b>Product related (35 Marks)</b>		<b>70%</b>
3.	Correctness of Syntax for Command	20%
4.	Correctness in Use of Command Tools	15%
5.	Use of Attribute(s)/Options	15%
6.	Timely Submission of Report	10%
7.	Answer to Sample Questions	10%
<b>Total (50 Marks)</b>		<b>100%</b>

**List of Students /Team Members**

1. ....
2. ....
3. ....

Marks Obtained			Dated signature of Teacher
Process Related(15)	Product Related(35)	Total(50)	



## List Of Laboratory Manuals Developed by MSBTE

### First Semester:

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

### Second Semester:

1	Bussiness Communication Using Computers	22009
2	Computer Peripherals & Hardware Maintenance	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 Engineering	22213
12	Elements of Electrical Engineering	22215
13	Basic Electronics	22216
14	C Language programming	22218
15	Basic Electronics	22225
16	Programming in C	22226
17	Fundamental of Chemical Engineering	22231

### Third Semester:

1	Applied Multimedia Techniques	22024
2	Advanced Surveying	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 Measurement	22325
21	Fundamental Of Power Electronics	22326
22	Electrical Materials & Wiring Practice	22328
23	Applied Electronics	22329
24	Electrical Circuits & Networks	22330
25	Electronic Measurements & 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 Chemical	22410
6	Java Programming	22412
7	GUI Application Development Using VB.net	22034
8	Microprocessor	22415
9	Database Management	22416
10	Electric Motors And Transformers	22418
11	Industrial Measurement	22420
12	Digital Electronic And Microcontroller Application	22421
13	Linear Integrated Circuits	22423
14	Microcontroller & Applications	22426
15	Basic Power Electronics	22427
16	Digital Communication Systems	22428
17	Mechanical Engineering Measurements	22443
18	Fluid Mechanics and Machinery	22445

19	Fundamentals Of Mechatronics	22048
20	Micro Project & Industrial Training Assessment Manual	22049

### Fifth Semester:

1	Network Management & Administration	17061
2	Solid Modeling	17063
3	CNC Machines	17064
4	Behavioral Science(Hand Book)	17075
5	Behavioral Science (Assignment Book)	17075
6	Windows Programming using VC++	17076
7	Estimation and Costing	17501
8	Public Health Engineering	17503
9	Concrete Technology	17504
10	Design of Steel Structures	17505
11	Switchgear and Protection	17508
12	Microprocessor & Application	17509
13	A.C. Machines	17511
14	Operating System	17512
15	Java Programming	17515
16	System Programming	17517
17	Communication Technology	17519
18	Hydraulic & Pneumatics	17522
19	Advanced Automobile Engines	17523
20	Basic Electrical & Electronics	17524
21	Measurement and Control	17528
22	Power Engineering	17529
23	Metrology & Quality Control	17530
24	Computer Hardware & Networking	17533
25	Microcontroller	17534
26	Digital Communication	17535
27	Control System & PLC	17536
28	Audio Video Engineering	17537
29	Control System	17538
30	Industrial Electronics and applications	17541
31	Heat Transfer Operations	17560
32	Chemical Process Instrumentation & control	17561

### 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 Programming	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

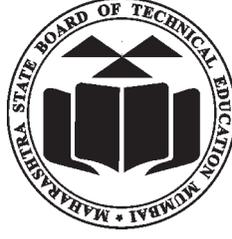
#### First Year:

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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