

**FACULTY OF COMPUTER APPLICATIONS**  
**Master of Computer Applications**

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□ **Sem.** : 1

□ **Subject Code** : 05MC0108

□ **Subject** : Database Management Systems

□ **Course Objectives** :

1. To apply PL/SQL variables, data types, attributes, and control structures to develop structured database programs.
2. To analyze and develop modular PL/SQL programs using procedures, functions, and packages with appropriate parameter handling.
3. To design and evaluate database triggers to enforce business rules and maintain data integrity.
4. To understand concept of big data and NoSQL databases.
5. To work with Document-based NoSQL databases using MongoDB.

□ **Prerequisites** :

Fundamental knowledge SQL and basic computer operations.

<b>Unit No</b>	<b>Topics Covered</b>	<b>No of lectures required</b>

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<b>1</b>	<p><b>PL/SQL Foundations</b></p> <p><b>PL/SQL Essentials:</b></p> <p>Overview of SQL Fundamentals, Overview of PL/SQL, Advantages, of PL/SQL, Generic PL/SQL Block. PL/SQL Fundamentals: PL/SQL Variables and PL/SQL Data types, Variable attribute (%type, %rowtype). PL/SQL Control Structure (Conditional Control, Iterative Control and Sequential Control).</p>	<b>10</b>
<b>2</b>	<p><b>PL/SQL Constructs</b></p> <p><b>Procedures and Functions:</b></p> <p>Define: Procedure &amp; Function, Creating Procedures, IN, OUT and INOUT parameters, Creating Functions, Stored Functions, User Defined Functions, Procedures v/s Functions.</p> <p><b>Packages:</b></p> <p>Introduction to Packages, Creating Package Specification, Creating Package Body, Calling PL/SQL objects through Package.</p>	<b>10</b>
<b>3</b>	<p><b>Database Triggers</b></p> <p>Introduction, Types of triggers, Creating DML Triggers (Row trigger, Statement triggers, Before and after triggers, using OLD and NEW qualifier), Dropping a Trigger.</p>	<b>7</b>

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<p><b>4</b></p>	<p><b>NOSQL database using MongoDB</b></p> <ul style="list-style-type: none"><li>● Introduction of NoSQL, its characteristics and history, and the primary benefits for using NoSQL databases.</li><li>● Differentiate between SQL and NoSQL database</li><li>● Define the major types of NoSQL databases (key-value, Document Based, Column family, Graph database) including a primary use case and advantages/disadvantages of each type.</li><li>● Introduction to MongoDB- What is MongoDB? Why Mongo DB? , Advantages of MongoDB</li><li>● MongoDB concepts - Databases, collections, and documents</li></ul>	<p><b>8</b></p>
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5	<p><b>Working with MongoDB</b></p> <ul style="list-style-type: none"><li>● Database handling commands: Create , use , drop and db</li><li>● Collection commands: Create, Drop, copy, Rename, command to View collection size &amp; data size</li><li>● CRUD Operation: Insert, Update &amp; Deleting documents in MongoDB</li><li>● Querying documents in collection.</li><li>● Operators: Relational Operators, Logical Operators, Array Operators, Element Query operator</li><li>● Field update operators: (\$set, \$unset,\$rename,\$inc)</li></ul> <p><b>Advance query using MongoDB</b></p> <ul style="list-style-type: none"><li>● Distinct and Count</li><li>● Projection , Limiting Records , sorting Records</li><li>● Indexing in MongoDB</li><li>● Aggregation Pipeline with MongoDB</li><li>● Arithmetic accumulators/ expressions</li><li>● Backup &amp; restore data using MongoDB</li></ul>	10
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**Course Outcomes:**

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1. Student will be able to apply PL/SQL fundamentals including variables, data types, attributes, and control structures to develop structured database programs.
2. Student will be able to analyze and construct modular PL/SQL programs using procedures, functions, and packages with appropriate parameter passing mechanisms.
3. Student will be able to design and evaluate database triggers and PL/SQL constructs to enforce business rules and ensure data integrity in database applications.
4. Student will be able to describe the concept of NoSQL databases, their usage areas, need, types, advantages, and role in modern data-intensive applications
5. Student will be able to demonstrate practical skills in creating, querying, updating, and deleting documents using the MongoDB

**Text Book :**

1. "SQL, PL/SQL the programming Language of Oracle", Ivan Byross, BPB Publication, 4th Edition.
2. Professional NoSQL, Shashank Tiwari, WROX, First Edition
3. MongoDB in Action - Kyle Banker Manning Sheltar Island.

**Reference Books :**

1. "Database System Concepts", Silberschatz, Korth, Sudarshan, McGraw Hill Publication, 4th Edition.
2. "SQL and PL/SQL for Oracle 11g" Black Book, P.S.Deshpande, Dreamtech Publication.
3. "Oracle Database 11g: The Complete Reference", Kevin Loney, Oracle Press.
4. MongoDB in Action, Kyle Banker, PiterBakkum, Shaun Verch, Dream tech Press, First Edition MongoDB® Notes for Professionals
5. The Little MongoDB Book by Karl Seguin (*with assistance from Perry Neal*) , 1st Edition, Self-Published / Shaotian Dong (*varies by platform listing*)

**Web References :**

1. <https://www.plsqltutorial.com/>
2. <https://www.guru99.com/pl-sql-tutorials.html>
3. <https://www.techonthenet.com/oracle/index.php>
4. <http://www.mongodb.com>

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**App References :**

1. <https://livesql.oracle.com/apex/>
2. <https://apex.oracle.com/en/>
3. <https://www.oracle.com/database/technologies/appdev/plsql.html>
4. <https://onecompiler.com/mongodb>

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book - 1: Chapter 15, 16
2	Book - 2: Chapter 17
3	Book - 2: Chapter 18
4	Text Book – 2 : Chapter 1
5	Text Book – 3 :Chapter 4,5,6,10

**PRACTICALS**

# Tool: Oracle 10g or above, freesql.com, Oracle APEX, MongoDB

<b>Unit 1</b>	
<b>1</b>	Write a PL/SQL block that find 1 . Area Of Circle 2 . Area Of Rectangle 3. Circumference of Circle
<b>2</b>	Write a PL/SQL block to accept product name, qty and price from user and then calculate discount in Rs. based on the given (%).

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<b>3</b>	Write a PL/SQL block to calculate the total, percentage and grade of student based on his/her Rollno from RESULT table. (Create RESULT table with Rollno, Name, Sub1, Sub2, Sub3, Sub4, Sub5, Total, Per, Grade attributes with appropriate data type).
<b>4</b>	<p>1. Write a program that prints value 1 to 100 numbers using FOR LOOP.</p> <p>2. Write a program that prints value 1 to 100 number using LOOP Command.</p> <p>3. Write a program that prints value 1 to 100 number using WHILE LOOP Command</p>
<b>5</b>	Write a PL/SQL block which displays gross salary of employees as per user input EID. (Consider EMP table with EID, EName, Deptno, Deptname Gender, Age, BasicSal) with appropriate data types.) Gross_Salary: BASICSAL + (DA + HRA + Medical) – PF. Rules: HRA = 15% of basic, DA = 50% of basic, Medical = Rs. 500, PF = 10% of basic.
<b>6</b>	Write a PL/SQL block which accepts measurement in feet and displays it in cm, inch and meter.
<b>7</b>	Write a PL/SQL block which converts temperature from Celsius to Fahrenheit.
<b>8</b>	Write a PL/SQL block to delete the record of employee for given EID.
<b>9</b>	Write a PL/SQL block that calculates the simple interest based on given principal amount, rate of interest and number of years.
<b>10</b>	Write a PL/SQL block to calculate the square and cube of the given number.
<b>Unit 2</b>	
<b>11</b>	Write a simple procedure that increases by the salary of employees for the given department no. by percentage inputted by the user using IN parameter. Also handle the exception if inputted department number not found.

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<b>12</b>	Write a procedure that search whether the given employee number is present or not in the table if present then print name, salary and department number of that employee. (Use both IN and OUT mode variables) and also Write a PL/SQL block to call the SEARCH_EMP procedure.
<b>13</b>	Write a procedure that accept employee ID and remove records from employee table. Also create a calling program to call procedure.
<b>14</b>	Write a function that returns the age category of an employee.  Categories:  ● Age < 18 → Minor  ● 18–60 → Adult  ● 60 → Senior
<b>15</b>	Write a PACKAGE which includes Package Declaration, Package Body and call the individual object from the Package.
<b>Unit 3</b>	
<b>16</b>	Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table.
<b>17</b>	Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table.
<b>18</b>	Write a trigger to insert the values into the NEWEMP table when the records are inserted into the EMP table.
<b>19</b>	Write a trigger that restricts the entry of record if salary is greater than Rs.50000.
<b>20</b>	Write a trigger to restrict user form using the table on Sunday.
<b>Unit 5</b>	

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**21** Create a database with name emp\_data & perform following

1. Create collection : employee & insert data as per given table

EMPNO	EMPNAME	JOB	MGR	HIREDATE	SAL	COMM.	DEP TNO
7369	SMITH	CLERK	7902	17-DEC-00	8000		20
7499	ALLEN	SALESMAN	7698	20-FEB-01	16000	300	30
7521	WARD	SALESMAN	7698	22-FEB-01	12500	500	30
7566	JONES	MANAGER	7839	02-APR-01	29750		20
7654	MARTIN	SALESMAN	7698	20-SEP-01	12500	1400	30
7698	BLAKE	MANAGER	7839	01-MAY-01	28500		30
7782	CLARK	MANAGER	7839	09-JUN-01	24500		10
7788	SCOTT	ANALYST	7566	19-APR-07	30000		20
7839	KING	PRESIDENT		17-NOV-01	50000		10
7844	TURNER	SALESMAN	7698	08-SEP-01	15000		30
7876	ADAMS	CLERK	7788	23-MAY-07	11000		20
7900	JAMES	CLERK	7698	03-DEC-01	9500		30
7902	FORD	ANALYST	7566	03-DEC-01	30000		20

2. Create collection: Department & insert data as per given table.

DEPTNO	DNAME	LOC
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	SALES	CHICAGO
40	OPERATING	BOSTON

3. Show all databases.
4. Show currently selected database.
5. Display all employee records.
6. Display details of employees working as CLERK.
7. Retrieve employees belonging to department number 30.
8. Find employees whose salary is greater than 20000.
9. Display employees whose job is SALESMAN.
10. Retrieve employees who do not belong to department 10.
11. Display employees with salary between 15000 and 30000.
12. Find employees whose commission is not null.
13. Display employees whose job is MANAGER and department is 20.
14. Retrieve employees hired after 01-JAN-01.
15. Display employees hired before 01-JAN-01.



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**22** Prepare following collection & solve queries:

Roll No	Name	Branch	Semester	Percentage	Grade
1	Amit	CSE	4	78	B
2	Neha	IT	4	85	A
3	Rahul	CSE	3	65	C
4	Priya	ECE	4	92	A
5	Karan	IT	2	55	D
6	Anita	CSE	1	88	A
7	Rakesh	ECE	3	72	B
8	Pooja	IT	4	90	A
9	Arjun	CSE	2	60	C
10	Sneha	ECE	1	82	B

1. Display all documents from the student collection.
2. Retrieve details of students belonging to the IT branch.
3. Find students whose percentage is greater than 75.
4. Display students who are in semester 3.
5. Retrieve students having grade = 'A'.
6. Display only name and branch of all students.
7. Find students whose percentage is less than 60.
8. Display students from CSE branch and semester 4.
9. Retrieve students whose percentage lies between 65 and 85.
10. Find students who are not from ECE branch.
11. Display student records sorted by percentage in ascending order.
12. Display student records sorted by name in descending order.
13. Retrieve top 5 students based on percentage.
14. Find students whose name starts with letter 'A'.
15. Find students whose name contains 'ra'.
16. Display students who belong to either CSE or IT branch.

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**23**

1. Create a database named "mydb"
2. Show all databases.
3. Show currently selected database.
4. Create a collection named "emp".
5. Show all collections of selected database.
6. Insert following documents in emp collection:

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Empno	Ename	Sal	Desig	Dept
1	Sachin	60000	Manager	Purchase
2	Kohli	50000	Manager	Sales
3	Dhoni	30000	Clerk	Admin
4	Dravid	40000	Manager	Purchase
5	Bumrah	50000	Manager	Sales
6	Jadeja	20000	Clerk	Admin
7	Ashwin	45000	Manager	Sales

Find()

1. List all documents.
2. List all documents with formatted output.
3. List the document of employee whose name is "achin"
4. List the documents of employee whose salary is less than 30000
5. List employees whose designation is manager and
6. department is sales.
7. List employees whose salary is less than 50000 and designation is manager or department is admin.
8. Arrange the records by name in descending order.
9. List first 3 documents of emp collection.
10. Skip first 3 documents of emp collection.
11. List 3<sup>rd</sup> and 4<sup>th</sup> documents of emp collection.
12. Count no. of employees.
13. List distinct designation.



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**CASE STUDY**