FACULTY OF COMPUTER APPLICATIONS
Bachelor of Computer Applications

- **Sem.** : 3
- **Subject Code** : 05BC3301
- **Subject** : Database Management System - 2 (DBMS-2)
- **Course Objectives** :

1. To understand the basics of PL/SQL.
2. To perform cursor management in PL/SQL.
3. To get familiarized with the concepts of Exception Handling.
4. To get familiarized with workings of various database objects like stored procedures and functions.
5. To create and implement database triggers.

- **Prerequisites** :

1. Knowledge of Fundamental Database Management System Concepts.
2. Working Knowledge of SQL.

Unit No	Topics Covered	No of lectures required
1	**PL/SQL Basics:** Brief introduction to SQL Fundamentals, Basics of PL/SQL, Advantages of PL/SQL, PL/SQL Block Structure. 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.	6
2	**Cursor Management:** Introduction to Cursor, Types of Cursors, Implicit Cursor, Cursor Attributes, Explicit Cursors: Cursor declaration, opening, fetching data from cursor, closing, Cursor FOR loop, Parameterized Cursor.	6
3	**Exception Handling:** Introduction, Exception Types, Pre-defined Exception with example, Exception Trapping Functions, User Defined Exception with example, Raise_Application_Error procedure.	6

4	**Stored Procedures and Functions:** Introduction to Procedures and Functions, Creating Procedures, Formal and Actual parameters: (IN, OUT and INOUT parameters), Stored Functions, User Defined Functions, Procedures v/s Functions.	**6**
5	**Triggers:** Brief overview of Triggers, Types of triggers, Creating DML Triggers (Row trigger, Statement triggers, Before and after triggers, using OLD and NEW qualifier), Dropping a Trigger, Applications of Triggers.	**6**

Course Outcomes:

1. Students will be able to understand the basic concept of PL/SQL.
2. Students will be able to manage implicit and explicit cursors.
3. Students will be able to trace and correct the errors by using the concepts of exception handling.
4. Students will be able to work with database objects like stored procedures and functions.
5. Students will develop an ability to create and implement database triggers.

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L		L			M		
CO2		H			L			M
CO3				L			M	
CO4	M				M			M
CO5		M		L			H	

Text Book:

1. "SQL, PL/SQL the programming Language of Oracle", Ivan Byross, BPB, 4th Edition.

Reference Books:

1. "Oracle PL/SQL by Example 5th Edition", Benjamin Rosenzweig, Elena Rakhimov, Pearson Publication, 5th Edition.
2. "Oracle Database 11g: The Complete Reference", Kevin Loney, Oracle Press.

3. "SQL and PL/SQL for Oracle 11g" Black Book, P.S.Deshpande, Dreamtech Publication.

Web References:

1. **https://docs.oracle.com/en/database/oracle/oracle-database/12.2/tutorials.html**
2. **https://www.oracletutorial.com/**
3. **https://www.plsqltutorial.com/**
4. **https://www.guru99.com/pl-sql-tutorials.html**
5. **https://www.techonthenet.com/oracle/index.php**

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. **http://orasql.org/2014/12/30/simple-android-oracle-client/**
5. **https://play.google.com/store/apps/details?id=com.msh.plsqllearning&hl=en_IN&gl=US**

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

Unit No	Chapter Numbers
1	Book – 1: Chapter 15
2	Book – 1: Chapter 16
3	Book – 1: Chapter 17
4	Book – 1: Chapter 18 (Procedures & Functions)
5	Book – 1: Chapter 18 (Triggers)

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PRACTICALS

Unit No	List of Practical
1	1) Write a PL/SQL block that calculates the simple interest based on the given principal amount, rate of interest and number of years. 2) Write a PL/SQL block to calculate the square and cube of the given number. 3) Write a PL/SQL block to accept product name, qty and price from user and then calculate discount in Rs. based on the given (%). 4) Write a PL/SQL block which accepts measurement in feet and displays it in cm, inch and meter. 5) Write a PL/SQL block which converts temperature from Celsius to Fahrenheit. 6) Write a program to generate the numbers using LOOP, FOR LOOP and WHILE LOOP up to the number inputted by the user. 7) Write a PL/SQL block to calculate the total, percentage and grade of student based on his/her Rollno from the RESULT table. (Create RESULT table with Rollno, Name, Sub1, Sub2, Sub3, Sub4, Sub5, Total, Per, Grade attributes with appropriate data type). 8) Write a PL/SQL block which displays the gross salary of employees as per user input EID. (Consider an 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. 9) Write a PL/SQL block which displays all records of Male employees working in the HR Dept from the EMP table. 10) Write a PL/SQL block to delete the record of an employee for a given EID.

2	1) Write a PL/SQL block that uses a cursor attribute SQL%ROWCOUNT to raise the basic salary of employees by 10% that are working in department number 10 and also display the appropriate message based on the existence of the record in the EMP table. (Use Implicit Cursor) 2) Write a PL/SQL block that uses a cursor attribute %ISOPEN and %NOTFOUND to raise the basic salary of employees of department number 20 by 5% and also display the appropriate message based on the existence of the record in the EMP table. Whenever any such raise is given to the employees, a record for the same is maintained in the emp_update table. (Perform using both Implicit and Explicit Cursor) 3) Write a PL/SQL block that uses a cursor attribute %ROWCOUNT to display the name, department and basic salary of the first 5 employees getting the highest basic salary. (Use Explicit Cursor) 4) Write a PL/SQL block using a cursor FOR loop to display the name and the basic salary of the top 3 highest paid employees. (Use Cursor For Loop) 5) Write a PL/SQL block using a parameterized cursor that displays the department wise basic salary of each employee and department wise total gross salary. (Parameterized Cursor and Use Cursor For Loop) 6) Write a program using a cursor to insert the records of employees in the EMP_BACKUP table for given DEPT_NO, also raise a user-defined exception NO_DEPT_FOUND when no records are found for entered DEPT_NO. 7) Write a PL/SQL block to display records from the CUSTOMER table using an explicit cursor. 8) Write a PL/SQL block to display data with the use of LIKE Operator using cursor FOR Loop. 9) Write a PL/SQL block to show the records using ORDER BY clause using cursor. 10) Write a PL/SQL block to perform an update operation on the EMPLOYEE table using an implicit cursor.

3	1) Write a PL/SQL block that explains the use of the ZERO_DIVIDE exception. 2) Write a PL/SQL block to accept a student name from a user if it exists, display his/her result from the RESULT table otherwise display appropriate message using exception handling. 3) Write a PL/SQL block to accept employee name from a user if it exists, display his/her basic salary otherwise display appropriate message using exception handling. 4) Write a PL/SQL block to display the salary of that employee whose age is 50 years otherwise display appropriate messages using exception handling. 5) Write a PL/SQL block using a cursor to insert the records of employees in the EMP_BACKUP table for a given department number, also raise a user defined exception NO_DEPT_FOUND when no records are found for entered DEPT_NO. (Use User Defined Exception) 6) Write a program that explains the use of the NO_DATA_FOUND exception. 7) Write a program that explains the use of the INVALID_NUMBER exception. 8) Write a program that explains the use of the ZERO_DIVIDE exception. 9) Write a program using implicit cursor to display the commission of given EMPNO, also raise a user-defined exception NULL _COMMISSION when no value (NULL) is available for commission. (Use User Defined Exception) 10) Write a program that explains the use of exception trapping functions SQLCODE and SQLERRM.

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4	1) Write a simple procedure without any parameter that shows a user defined message on the screen. Call the procedure using a separate PL/SQL block and on the command line. 2) Write a simple procedure that increases the basic salary of employees for the given department number by percentage inputted by the user using the IN parameter. 3) Write a procedure that searches whether the given employee id is present or not in the table. If an employee is found then show its name otherwise raise appropriate error messages (Use both IN and OUT mode variables) and also write a PL/SQL block to call the procedure. 4) Write a function that returns the square of the given number. Execute the function using a separate PL/SQL block and on the command line. 5) Write a function that returns the balance for a given account number. (Create ACCOUNT table with ACNO, CNAME, BNAME, BALANCE columns using appropriate data types) 6) Write a simple procedure without any parameter that updates the values in the EMP table. 7) Write a simple procedure that increases the salary of employees for the given department not by percentage inputted by the user using the IN parameter. 8) Write a procedure that search“s whether the given employee number is present or not in the table. (Use both IN and OUT mode variables) and also Write a PL/SQL block to call the SEARCH_EMP procedure. 9) Write a function that returns the square of the given number. Execute this function using a separate PL/SQL block and also without using PL/SQL block on the command line. 10) Write a function that returns the balance for a given account number.

5	1) Write a trigger to restrict users from accessing the table on weekends. 2) Write a trigger that restricts the entry of records in the EMP table if the salary is greater than Rs 50000. 3) Write a trigger to insert the values into the NEWEMP table when the records are inserted into the EMP table. 4) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table. 5) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table. 6) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table. 7) Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table. 8) Write a trigger that restricts the entry of record if salary is greater than Rs.50000. 9) Write a trigger that identifies the gender of the employee and according to the gender sets MR. in front of MALE employees and MS. in front of FEMALE employees. 10) Write a trigger to restrict users from using the table on Sunday.