- **Sem.** : 3
- **Subject Code** : 05BC1302
- **Subject** : Database Management System – 2 (DBMS-2)
- **Course Objectives** :

1. To be able to understand the fundamentals of PL/SQL.
2. To be able to do cursor management in PL/SQL.
3. To get familiarize with the concepts of Exception Handing.
4. To get familiarize with workings of various database objects like stored procedures and functions.
5. To be able to create and implement various database triggers.

- **Prerequisites** :

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

Unit No	Topics Covered	No of lectures required
1	**Fundamentals of PL/SQL:** 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)	10
2	**Managing Cursor:** Overview of Cursor, Cursor Types, Implicit Cursor, Cursor Attributes, Writing Explicit Cursors (Cursor declaration, opening, fetching data from cursor, closing), Cursor FOR loop. Parameterized Cursor.	10
3	**Exception Handling:** Exception Types, Predefined Exception, User Defined Exception, Use of Raise_Application_Error.	10

4	**Functions and Procedures:** Define: Cursor & Procedures, Creating Procedures, formal and actual parameters, IN, OUT and INOUT parameters. Creating Functions, Stored Functions, User Defined Functions, Procedures v/s Functions.	**10**
5	**Database Triggers:** Introduction, 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.	**10**

- **Course Outcomes:**
  1. Student will be able to understand the various concept of PL/SQL.
  2. Student will be able to manage implicit and explicit cursors.
  3. Student will be able to trace and correct the errors by using the concepts of exception handling.
  4. Student will be able to manage 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**	**PO9**	**PO10**	**PO11**
CO1	H	M	L	L	M	-	M	L	M	M	H
CO2	H	H	M	L	H	-	M	L	M	L	H
CO3	H	H	M	M	H	-	L	L	M	L	H
CO4	H	H	M	M	H	-	M	L	M	L	H
CO5	H	H	M	M	H	-	M	L	M	M	H

- **Text Book:**
  1. "SQL, PL/SQL the programming Language of Oracle", Ivan Byross, BPB, 4th Edition

- **Reference Books :**
  1. "SQL and PL/SQL for Oracle 11g" Black Book, P.S.Deshpande, Dreamtech Publication.
  2. "Oracle Database 11g: The Complete Reference", Kevin Loney, Oracle Press.
  3. "Practice book on SQL and PL/SQL with examples", Ms. Anjali Jivani and Ms. Amisha Shingala, Nirav and Roopal Publications.

- **Web References:**
  1. https://plsql-tutorial.com/
  2. https://www.plsqltutorial.com/
  3. https://www.guru99.com/pl-sql-tutorials.html
  4. https://www.tutorialspoint.com/plsql/index.htm

- **App References:**
  1. https://www.oracle.com/database/technologies/appdev/plsql.html
  2. https://play.google.com/store/apps/details?id=com.learndba.plsql&hl=en_IN
  3. https://play.google.com/store/apps/details?id=onanmobilesoftware.plsqleasy&hl=en
  4. http://orasql.org/2014/12/30/simple-android-oracle-client/

- **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 (Procedure & Functions)
5	Book – 1: Chapter 18 (Database Triggers)

PRACTICALS

Unit No	List of Practicals
1	▪ Write a program to calculate the AREA and store that value in the table AREAS (RADIUS NUMBER (5), AREA NUMBER (14,2)) ▪ Write a program to calculate the square and cube of the given number ▪ Write a program that accepts 2 numbers from the user and interchange the values of those 2 numbers. ▪ Write a PL/SQL block to find the factorial of given number. ▪ Write a PL/SQL block to find whether the input number is palindrome or not. ▪ Write PL/SQL block to reverse the inputted number. ▪ Write a program that print 1 to 100 numbers using FOR LOOP. ▪ Write a program that prints 1 to 100 number using LOOP Command. ▪ Write a program that prints 1 to 100 number using WHILE LOOP Command. ▪ Write a program that displays the use of %TYPE and %ROWTYPE variables.
2	▪ Write a program that uses a cursor attribute SQL%FOUND to raise the salary of employees by 20% and also display the appropriate message based on the existence to the record in the EMP table. (Use Implicit Cursor) ▪ Write a program that uses a cursor attribute SQL%NOTFOUND to raise the salary of employees by 15% and also display the appropriate message based on the existence to the record in the EMP table. (Use Implicit Cursor) ▪ Write a program that uses a cursor attribute SQL%ROWCOUNT to raise the salary of employees by 10% that are working in department number 10 and also display the appropriate message based on the existence to the record in the EMP table. (Use Implicit Cursor) ▪ Write a program that displays the deletion of records using an IMPLICIT CURSOR. (Use Implicit Cursor) ▪ Write a program that uses a cursor attribute %ISOPEN and %NOTFOUND to raise the salary of employees of department number 20 by 5% and also display the appropriate message based on the existence to 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. (Use Explicit Cursor) ▪ Write a program that uses a cursor attribute %ROWCOUNT to display the name, department and salary of first 10 employees getting the highest salary. (Use Explicit Cursor) ▪ Write a program using a cursor to raise the salary of employees of

	department number 20 by 5% and also display the appropriate message based on the existence to 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. (Use Cursor For Loop) ▪ Write a program using a cursor FOR loop to display name and the basic salary of 3 highest paid employees. (Use Cursor For Loop) ▪ Write a program using a parameterized cursor that displays the department wise salary of each employee and department wise total gross salary. (Parameterized Cursor and Use Cursor For Loop)
3	▪ Write a program that explains the use of NO_DATA_FOUND exception. (Use System Exception) ▪ Write a program that explains the use of ZERO_DIVIDE exception. (Use System Exception) ▪ Write a program that explains the use of exception trapping functions SQLCODE and SQLERRM. ▪ Write a program using a cursor to insert the records of employee in 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. . (Use User Defined Exception) ▪ Write a program using an implicit cursor display the commission of given EMP_NO, also raise a user defined exception NULL _COMMISSION when no value (NULL) is available for commission. (Use User Defined Exception)
4	▪ Write a simple procedure without any parameter that updates the values in the EMP table. ▪ 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. ▪ 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. ▪ Write a function that returns the square of the given number. ▪ Execute both the above functions using block and without using PL/SQL block. ▪ Write a function that returns balance for given account number.
5	▪ Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table.

	▪ Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table. ▪ Write a trigger to insert the values into the NEWEMP table when the records are inserted into the EMP table. ▪ Write a trigger to restrict user form using the table on Sunday. ▪ 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 employee. ▪ Write a trigger that restricts the entry of record if salary is greater than 8000 Rs.