INT306:DATABASE MANAGEMENT SYSTEMS

L:3 T:0 P:2 Credits:4

Course Outcomes: Through this course students should be able to

CO1 :: explain the Database components and logical design of databases

CO2 :: practice relational constructs like algebra, constraints and SQL

CO3 :: possess knowledge on the different issues involved in the design and implementation of relational database system

CO4 :: learn the transaction management systems in single and concurrent environment

CO5 :: practice programming constructs such as functions, stored procedures and triggers that can be shared by multiple forms

CO6 :: discuss file organization techniques, reports and data management applications

Unit I

Introduction to Databases : purpose of database systems, components of dbms, applications of dbms, three tier dbms architecture, data independence, database schema, instance, data modeling, entity relationship model, relational model

Unit II

Relational query language : relational algebra, introduction to data definition language, data manipulation, data control and transaction control language, integrity constraints, database keys, SQL basic operations, Aggregate functions, Sql joins, set operators, views, subqueries

Unit III

Relational Database Design : data integrity rules, functional dependency, need of normalization, first normal form, second normal form, third normal form, boyce codd normal form, multivalued dependencies, fourth normal form, join dependencies, fifth normal form and pitfalls in relational database design

Unit IV

Database Transaction Processing : transaction system concepts, desirable properties of transactions, schedules, serializability of schedules, concurrency control, recoverability

Unit V

Programming constructs in Database : flow control statements, functions, stored procedures, cursors, triggers, exception handling

Unit VI

File Organization and Trends in Databases : file organizations and its types, indexing, types of indexing, hashing, hashing techniques, introduction to big data, nosql systems

List of Practicals / Experiments:

SQL,PL/SQL

- Set Operations, Basic Structure, Aggregate functions, DDL, DML, DCL
- Views,Nested Queries, Joins, Complex Queries
- Language elements, Subprograms
- Packages, Cursors, Triggers

Data Manipulation

- Add New Rows to a Table
- Change the Data in a Table
- Use the DELETE and TRUNCATE Statements
- How to save and discard changes with the COMMIT and ROLLBACK statements
- Implement Read Consistency
- Describe the FOR UPDATE Clause

Retrieve Data using the SQL SELECT Statement

- List the capabilities of SQL SELECT statements
- Generate a report of data from the output of a basic SELECT statement
- Use arithmetic expressions and NULL values in the SELECT statement
- Invoke Column aliases
- Concatenation operator, literal character strings, alternative quote operator, and the DISTINCT keyword
- Display the table structure using the DESCRIBE command

Aggregated Data Using the Group Functions

- Usage of the aggregation functions in SELECT statements to produce meaningful reports
- Describe the AVG, SUM, MIN, and MAX function
- How to handle Null Values in a group function?
- Divide the data in groups by using the GROUP BY clause
- Exclude groups of date by using the HAVING clause

Usage of Subqueries to Solve Queries

- Use a Subquery to Solve a Problem
- Single-Row Subqueries
- Group Functions in a Subquery
- Multiple-Row Subqueries
- Use the ANY and ALL Operator in Multiple-Row Subqueries
- Use the EXISTS Operator

SET Operators

- Describe the SET operators
- Use a SET operator to combine multiple queries into a single query
- Describe the UNION, UNION ALL, INTERSECT, and MINUS Operators
- Matching the SELECT statements
- Use the ORDER BY Clause in Set Operations

Creating Views

- Create, modify, and retrieve data from a view
- Perform Data manipulation language (DML) operations on a view
- How to drop a view?

Manipulating Data by Using Subqueries

- Using Subqueries to Manipulate Data
- Inserting by Using a Subquery as a Target
- Using the WITH CHECK OPTION Keyword on DML Statements
- Using Correlated Subqueries to Update and Delete rows

Introduction to PL/SQL

- PL/SQL Overview
- List the benefits of PL/SQL Subprograms
- Overview of the Types of PL/SQL blocks
- Create a Simple Anonymous Block
- Generate the Output from a PL/SQL Block

PL/SQL Identifiers

- List the different Types of Identifiers in a PL/SQL subprogram
- Usage of the Declarative Section to Define Identifiers
- Use of variables to store data
- Scalar Data Types
- %TYPE Attribute
- Bind Variables
- Sequences in PL/SQL Expressions

Write Executable Statements

- Basic PL/SQL Block Syntax Guidelines
- How to comment code?
- SQL Functions in PL/SQL
- Data Type Conversion
- Nested Blocks
- Operators in PL/SQL

Explicit Cursors

- Understand Explicit Cursors
- Declare the Cursor
- How to open the Cursor?
- Fetching data from the Cursor
- How to close the Cursor?
- Cursor FOR loop
- Explicit Cursor Attributes
- FOR UPDATE Clause and WHERE CURRENT Clause

Exception Handling

- What are Exceptions?
- Handle Exceptions with PL/SQL
- Trap Predefined Oracle Server Errors
- Trap Non-Predefined Oracle Server Errors
- Trap User-Defined Exceptions
- Propagate Exceptions
- RAISE_APPLICATION_ERROR Procedure

Stored Procedures and Functions

- What are Stored Procedures and Functions?
- Differentiate between anonymous blocks and subprograms
- Create a Simple Procedure
- Create a Simple Procedure with IN parameter
- Create a Simple Function
- Execute a Simple Procedure
- Execute a Simple Function

Text Books:

1. DATABASE SYSTEM CONCEPTS by HENRY F. KORTH, ABRAHAM SILBERSCHATZ, S. SUDARSHAN, MCGRAW HILL EDUCATION

References:

1. THE PROGRAMMING LANGUAGE OF ORACLE by IVAN BYROSS, BPB PUBLICATIONS

2. DATABASE SYSTEMS: MODELS, LANGUAGES, DESIGN AND APPLICATION PROGRAMMING by RAMEZ ELMASRI, SHAMKANT B. NAVATHE, PEARSON

3. AN INTRODUCTION TO DATABASE SYSTEMS by C. J. DATE, S. SWAMYNATHAN, A. KANNAN, PEARSON