COURSE STRUCTURE

Course Code	**CSE00050**				
Course Category	**Program Major**				
Course Title	**Relational Database Management System Concepts**				
Teaching Scheme	**Lectures**	**Tutorials**	**Laboratory / Practical**	**Project**	**Total**
Weekly load hours	**3**	**-**	**2**	**-**	**4**
Credits	**3**	**-**	**1**	**-**	**4**
Assessment Schema Code	**TL3**				

Prerequisites:

Fundamentals of Database Management

Course Objectives:

1.To Make ER diagram for a defined problem.
2.Define the normalized table from the ER diagram.
3.Write various SQL based queries.
4.To become familiar with the basics of Storage Processing and Transaction processing

Course Outcomes:

After completion of this course students will be able to:

1. Demonstrate the basic elements of a relational database management system.
2. Identify the data models for relevant problems.
3. Design E-R diagrams into RDBMS and formulate SQL queries on the respective data
4. Demonstrate the understanding of storage Strategies.
5. Implement the transaction Processing

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Course Contents:

Unit 1: Database System Concept & Data Modeling

Basic concepts, Advantages of a DBMS over file processing system, Data Abstraction, Database Languages, Instance and Schema, Data Independence, Database Users, Functions of Database Administrator. Components of a DBMS and overall structure of a DBMS ,Query Processor and Storage Manager.

Data Models: Network Model, Hierarchical Model, E-R Model-Entity Sets, E-R Diagram ,Mapping Cardinalities. Introduction to Client Server Architecture.

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Unit 2: Relational Database Design

Relational Model: Fundamental concepts, attributes and domains, Keys concept: Candidate and primary Key, Integrity constraints: Dom ain, Entity Integrity constraints, Referential constraints and On delete Cascade. Normalization- Process of Normalization using 1NF, 2NF, 3NF, multivalued dependencies and BCNF.

Introduction of Structured Query Language (SQL) , Data Types of attributes , Data Integrity Constraints .Difference between SQL and No SQL.

Unit 3: Structured Query Language (SQL)

SQL For Data Definition(DDL) ,SQL For Data Manipulation(DML) ,

Transaction control language(TCL) : commit, savepoint, rollback, Security and Authorization, Data Control language: (DCL): Grant, Revoke. SQL For Data Query Operators: Arithmetic Operator, Comparison Operator and Logical Operator, Set Operators-Range, Searching Operators, Between ,Pattern Matching.

In -Built Function : String, Arithmetic, Date Function and Time Functions, Aggregate Functions, Queries Using Group By And Having Clause And Order Clause , Sub Queries With(Insert, Update and Delete) , Join Concepts(Inner, Outer). Nested Queries . Concepts Of Index (Create, Drop), Views and Sequences.

Unit 4: Storage Strategies

Storage Strategies: Indices, B-Trees, Hashing, Transaction processing: Recovery and Concurrency Control, Locking and Timestamp based Schedulers, Multiversion and Optimistic Concurrency Control Schemes. Advanced Topics: Object-Oriented and Object Relational databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Unit 5: Database Security and Transaction Processing :

Database Security Concept-Creating Database Users, altering, deleting users, Protecting data within database privileges- Grant and Revoke Commands. Database recovery Concept.

Concept of transaction, States of transactions, ACID properties, Serial Execution, Concurrent Execution, Serializability ,Deadlock handling, Deadlock Detection Scheme & recovery scheme.

Laboratory Exercises / Practical:

Assign 1 : Draw E-R diagram for the following example.

Construct an E-R diagram for a car-insurance company that has a set of customers, each of whom owns one or more cars. Each car has associated with it zero to any number of recorded accidents.

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Assign 2 : Implementation of DDL commands of SQL with suitable examples Create table Alter table Drop Table

1. Create a table EMPLOYEE with following schema: (Emp_no, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id , Salary)
2. Add a new column; HIREDATE to the existing relation.
3. Change the datatype of JOB_ID from char to varchar2.
4. Change the name of column/field Emp_no to E_no.
5. Modify the column width of the job field of emp table

Assign 3 : Study & Implementation of different types of constraints

Create a table called EMP with the following structure. Name Type EMPNO NUMBER (6) ENAME VARCHAR2 (20) JOB VARCHAR2 (10) DEPTNO NUMBER (3) SAL NUMBER (7,2) Allow NULL for all columns except ename and job.

1. Add constraints to check, while entering the empno value (i.e) empno > 100.
2. Define the field DEPTNO as unique.
3. Create a primary key constraint for the table(EMPNO).
4. Write queries to implement and practice constraints.

Assign 4: Implementation of DML commands of SQL with suitable examples Insert table Update table Delete Table

Create a table EMPLOYEE with following schema: (Emp_no, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id , Salary)

Write SQL queries for following question:

1. Insert at least 5 rows in the table.
2. Display all the information of EMP table.
3. Display the record of each employee who works in department D10.
4. Update the city of Emp_no-12 with the current city as Nagpur.
5. Delete the email_id of employee James.
6. Display the complete record of employees working in the SALES Department.

Assign 5: Implementation of different types of functions with suitable examples. Number Function Aggregate Function Character Function Conversion Function Date Function.

Create a table EMPLOYEE with following schema: (Emp_no, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id, Designation , Salary)

Write SQL statements for the following query.

1. List the E_no, E_name, Salary of all employees working for MANAGER.
2. Display all the details of the employee whose salary is more than the Sal of any IT PROFF..
3. List the employees in the ascending order of Designations of those joined after 1981.
4. List the employees along with their Experience and Daily Salary.

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5. List the employees who are either 'CLERK' or 'ANALYST' .

Assign 6: Implementation of different types of functions with suitable examples.

Create a table EMPLOYEE with following schema: (Emp_no, E_name, E_address, E_ph_no, Dept_no, Dept_name,Job_id, Designation , Salary)

Write SQL statements for the following query.

1. List the employees who joined on 1-MAY-81, 3-DEC-81, 17-DEC-81,19-JAN-80 .
2. List the employees who are working for the Deptno 10 or20.
3. List the Enames that are starting with 'S' .
4. Display the name as well as the first five characters of name(s) starting with 'H' 10.
5. List all the emps except 'PRESIDENT' & 'MGR" in asc order of Salaries.

Assign 7: Implementation of different types of operators in SQL. Arithmetic Operator Logical Operator Comparison Operator Special Operator Set Operator

1. Display all the dept numbers available with the dept and emp tables avoiding duplicates.
2. Display all the dept numbers available with the dept and emp tables.
3. Display all the dept numbers available in emp and not in dept tables and vice versa.

Assign 8:Implementation of different types of Joins Inner Join Outer Join Natural Join..etc Consider the following schema: Sailors (sid, sname, rating, age),Boats (bid, bname, color) Reserves (sid, bid, day(date))

1. Find all information of sailors who have reserved boat number 101.
2. Find the name of a boat reserved by Bob.
3. Find the names of sailors who have reserved a red boat, and list in the order of age.
4. Find the names of sailors who have reserved at least one boat.
5. Find the ids and names of sailors who have reserved two different boats on the same day.

Assign 9:Implementation of different types of Joins Inner Join Outer Join Natural Join.Consider the following schema: Sailors (sid, sname, rating, age),Boats (bid, bname, color),Reserves (sid, bid, day(date))

1. Find the ids of sailors who have reserved a red boat or a green boat.
2. Find the name and the age of the youngest sailor.
3. Count the number of different sailor names.
4. Find the average age of sailors for each rating level.
5. Find the average age of sailors for each rating level that has at least two sailors.

Assign 10: Study & Implementation of Group by & Having Clause Order by Clause Indexing.
Create a relation and implement the following queries.

1. Display total salary spent for each job category.
2. Display lowest paid employee details under each manager.

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3. Display number of employees working in each department and their department name.
4. Display the details of employees sorting the salary in increasing order.
5. Show the record of employees earning salary greater than 16000 in each department.
6. Write queries to implement and practice the above clause.

Assign 11:Study & Implementation of Sub queries Views

Write subquery statement for the following queries.

1. Find all information of sailors who have reserved boat number 101.
2. Find the names of sailors who have reserved a red boat, and list in the order of age.
3. Find the ids of sailors who have reserved a red boat or a green boat.
4. Find the average age of sailors for each rating level that has at least two sailors.

Assign 12 : Study and Implementation of Database Backup & Recovery Commands. Study and Implementation of Rollback, Commit, Save point.

1. Write a query to implement the save point.
2. Write a query to implement the rollback.
3. Write a query to implement the commit.
4. Create a user and implement the following commands on relation (Emp and Dept).
5. Develop a query to grant some privileges of employees table into departments table.

Learning Resources:

Text Books/ Reference Books:

1. *Database System Concepts:* Fifth Edition , Avi Silberschatz, Henry F. Korth S. Sudarshan, Mcgraw-Hill , *ISBN* 0-07-295886-3.

2. Database Systems- Design, Implementation, & Management: 12th Edition,Carlos Coronel, Steven Morris,Cengage Learning, *ISBN -1305886844.*

*3. Introduction To Database System :*8th Edition, C.J.Date, Pearson, *ISBN-13. 978-0321197849.*

4. Database Systems: The Complete Book , Hector Garcia-Molina, Jeffrey D. Ullman, And Jennifer Widom, Pearson, *ISBN-* 3: 9780133002010.

Supplementary Reading:

Web Resources:

Weblinks:

1. https://mrcet.com/downloads/digital_notes/IT/Database%20Management%20Systems.pdf
2. https://www.geeksforgeeks.org/dbms/
3. https://www.academia.edu/34702134/Relational_Database_Management_System_Notes_for_MSBTE_Student
4. https://www.msuniv.ac.in/images/e-content/7.RDBMS%20Concepts%20and%20Oracle.pdf

MOOCs: Online courses for self learning

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1. https://www.udemy.com/course/introduction-to-relational-database-and-sql/
2. https://www.coursera.org/learn/introduction-to-relational-databases

Pedagogy:

- Powerpoint presentations
- Videos
- Demonstrations
- Systematic use of group work and project-based learning.

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