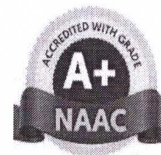


SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE



(AUTONOMOUS)
Course 5: Database Management Systems (MAJOR)
SEMESTER III
(W.E.F.2024-25)
Program: BCA (All Groups)



Hours per week: 4

Credits: 3

Course Objectives:

- **To introduce** the basic concepts and characteristics of database systems, including their advantages over traditional file systems, different types of database users, and data models.
- **To understand** the relational model, key constraints, and entity-relationship modeling, and how they form the foundation for designing logical database schemas.
- **To explain** the process of normalization and schema refinement using functional dependencies, and to introduce basic SQL operations for querying and manipulating data.
- **To provide knowledge** of advanced SQL features, including joins, subqueries, indexing, views, transaction control, and data control operations to manage databases effectively.
- **To familiarize** students with PL/SQL programming constructs such as procedures, functions, triggers, and to introduce NoSQL databases.

Course Outcomes:

Upon successful completion of the course, students will be able to:

- **Understand** the fundamental concepts of database systems, types of data models, schema, and architecture, and **compare** them with traditional file systems.
- **Design** entity-relationship (ER) diagrams, define relational schemas, and **apply** integrity and key constraints based on the relational model.
- **Apply** normalization techniques (1NF, 2NF, 3NF, BCNF) and **write** SQL queries using DDL, DML, and basic querying clauses for structured data handling.
- **Construct** advanced SQL queries using joins, subqueries, views, and **implement** indexing and transaction control for performance and consistency in large databases.
- **Develop** PL/SQL programs using procedures, functions, triggers, and **evaluate** NoSQL models (MongoDB, Cassandra, Redis) for handling big, unstructured, or distributed data.

UNIT I

Overview of Database Systems: Introduction, Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications

Data Models: Introduction, Types of data models, Concepts of Schema, Instance and data independence, Three tier schema architecture for data independence



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UNIT II

Relational Model: Introduction to relational model, Codd's rules, Concepts of domain, attribute, tuple, relation, constraints (Domain, Key constraints, integrity constraints) and their importance, Concept of keys (super key, candidate key, primary key, foreign key)

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, Relationship, relationship set, constraints, EER Model, Subclasses, super class, inheritance, specialization, generalization using ER Diagrams,

UNIT III

Normalization: Purpose of Normalization or schema refinement Concept of functional dependency, Normal forms based on functional dependency (1NF, 2NF and 3NF), Boyce-codd normal form (BCNF)

BASIC SQL: Data types, DDL operations (create, alter, drop, rename), DML operations (insert, delete, update), Basic SQL querying (select and project) using where clause, Arithmetic & logical operations, Aggregation, grouping and ordering

UNIT IV

SQL: Nested queries/sub queries, Implementation of different types of joins, SQL functions (Date, Numeric, String, Conversion functions), Creating tables with relationship, Implementation of key and integrity constraints, Views and relational set operations, Transaction Control Language: commit, Rollback, Save point, DCL: Grant, Revoke

UNIT V

PL/SQL: Introduction, PL/SQL program Structure, Data types, Control Structures, Cursors, Procedure, Function, Exception Handling, Triggers, Packages.

References:

Online references :

- <https://www.w3schools.com/sql>
- <https://www.geeksforgeeks.org/dbms/>
- <https://www.tutorialspoint.com/dbms/index.html>

Reference Books :

1. Database Management Systems, 3rd Edition, Raghurama Krishnan, Johannes Gehrke, TMH
2. Database System Concepts, 5th Edition, Silberschatz, Korth, TMH
3. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, Database System Concepts, McGraw-Hill Education.
4. Ramez Elmasri and Shamkant B. Navathe, Fundamentals of Database Systems, Pearson Education



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SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE



(AUTONOMOUS)
Course 5: Database Management Systems (MAJOR)- Practicals
SEMESTER III
(W.E.F.2024-25)
Program: BCA (All Groups)



Hours per week: 2

Credits: 1

List of Experiments

Experiment 1: Introduction to Database Systems

Problem Statement:

Explain the differences between database systems and file systems. List the advantages of using a database system with real-world examples.

Experiment 2: Exploring Data Models

Problem Statement:

Describe various types of data models (hierarchical, network, relational). Explain their advantages and disadvantages with examples.

Experiment 3: Creating ER Diagrams

Problem Statement:

Design an Entity-Relationship (ER) diagram for a simple university database including entities, attributes, and relationships.

Experiment 4: Understanding Relational Model Concepts

Problem Statement:

Define domain, attribute, tuple, relation, and constraints. Illustrate these concepts by creating a sample relation for an employee database.

Experiment 5: Working with Keys in Relational Databases

Problem Statement:

Identify and explain super key, candidate key, primary key, and foreign key using sample tables. Demonstrate how keys enforce data integrity.

Experiment 6: Normalization up to 3NF

Problem Statement:

Given an unnormalized table, perform normalization steps to convert it into First, Second, and Third Normal Forms with explanations.

Experiment 7: Boyce-Codd Normal Form (BCNF) Normalization

Problem Statement:

Normalize a given relation into BCNF by identifying and removing functional dependencies that violate BCNF rules.

Experiment 8: Basic SQL DDL Commands

Problem Statement:

Write SQL queries to create, alter, drop, and rename tables for a library management database.



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Experiment 9: Basic SQL DML Operations

Problem Statement:

Write SQL statements to insert, update, and delete records in a student information table.

Experiment 10: Simple SQL Queries

Problem Statement:

Write SQL queries using SELECT and WHERE clauses to fetch records based on different conditions from an employee database.

Experiment 11: Aggregation and Grouping in SQL

Problem Statement:

Use SQL aggregate functions like SUM, AVG, COUNT, MIN, MAX, and GROUP BY clause to analyze sales data.

Experiment 12: Nested Queries and Subqueries

Problem Statement:

Write nested SQL queries to find employees who earn more than the average salary in their department.

Experiment 13: Implementing SQL Joins

Problem Statement:

Write SQL queries to demonstrate INNER JOIN, LEFT JOIN, RIGHT JOIN, and FULL OUTER JOIN on two related tables.

Experiment 14: Using SQL Functions

Problem Statement:

Use date, string, numeric, and conversion SQL functions to format and manipulate data in a customer database.

Experiment 15: Creating and Using Views

Problem Statement:

Create SQL views to simplify complex queries on a sales database and demonstrate updating data through views.



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SHRI GNANAMBICA DEGREE COLLEGE: MADANAPALLE

(AUTONOMOUS)

Course 5: Database Management Systems (MAJOR)

SEMESTER III

(W.E.F.2024-25)

Program: BCA (All Groups)

Question Paper – Blue Print

Time : 3 Hrs

Marks : 70

PART-A

Answer any 4 of the 8. Each Question Carries 5 marks.

(4 x 5 =20)

1. Question
2. Question
3. Question
4. Question
5. Question
6. Question
7. Question
8. Question

PART-B

Answer one from each unit. Each Question Carries 10 marks.

(5X10=50)

UNIT 1

9. Question

OR

10. Question

UNIT 2

11. Question

OR

12. Question

UNIT 3

13. Question

OR

14. Question

UNIT 4

15. Question

OR

16. Question

UNIT 5

17. Question

OR

18. Question



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