



<b>BSc</b>	<b>Computer Science (Semester: III)</b>	<b>Credits: 4</b>
<b>Paper: 3</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>Hrs/Wk: 4</b>

1. Aim and objectives of Course:

The objective of the course is to introduce the design and development of databases with special emphasis on relational databases.

2. Learning outcomes of Course:

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

On completing the subject, students will be able to:

1. Gain knowledge of Database and DBMS.
2. Understand the fundamental concepts of DBMS with special emphasis on relational data model.
3. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database
4. Model database using ER Diagrams and design database schemas based on the model.
5. Create a small database using SQL.
6. Store, Retrieve data in database.

3. Detailed Syllabus: (Five units with each unit having 12 hours of class work)

**UNIT I**

**Overview of Database Management System:** Introduction to data, information, database, database management systems, file-based system, Drawbacks of file-Based System, database approach, Classification of Database Management Systems, advantages of database approach, Various Data Models, Components of Database Management System, three schema architecture of data base, costs and risks of database approach.

**UNIT II**

**Entity-Relationship Model:** Introduction, the building blocks of an entity relationship diagram, classification of entity sets, attribute classification, relationship degree, relationship classification, reducing ER diagram to tables, enhanced entity-relationship model (EER model), generalization and specialization, **IS A** relationship and attribute inheritance, multiple inheritance, constraints on specialization and generalization, advantages of ER modelling.



### UNIT III

**Relational Model:** Introduction, CODD Rules, relational data model, concept of key, relational integrity, relational algebra, relational algebra operations, advantages of relational algebra, limitations of relational algebra, relational calculus, tuple relational calculus, domain relational Calculus (DRC), Functional dependencies and normal forms upto 3<sup>rd</sup> normal form.

### UNIT IV

**Structured Query Language:** Introduction, History of SQL Standard, Commands in SQL, Data Types in SQL, Data Definition Language, Selection Operation, Projection Operation, Aggregate functions, Data Manipulation Language, Table Modification Commands, Join Operation, Set Operations, View, Sub Query.

### UNIT V

**PL/SQL:** Introduction, Shortcomings of SQL, Structure of PL/SQL, PL/SQL Language Elements, Data Types, Operators Precedence, Control Structure, Steps to Create a PL/SQL, Program, Iterative Control, Procedure, Function, Database Triggers, Types of Triggers.

### TEXT BOOKS:

1. Database System Concepts by Abraham Silberschatz, Henry Korth, and S. Sudarshan, McGrawhill
2. Database Management Systems by Raghu Ramakrishnan, McGrawhill

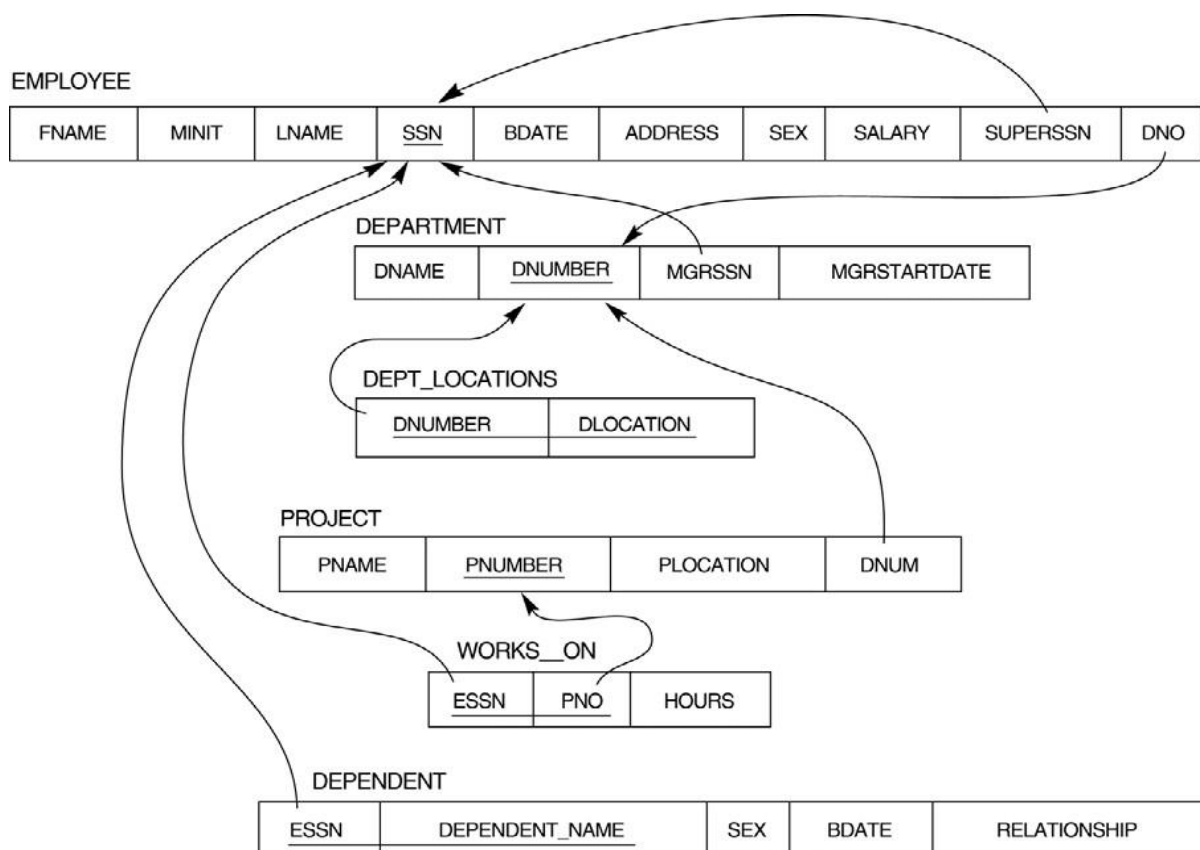
### REFERENCES:

1. Principles of Database Systems by J. D. Ullman
2. Fundamentals of Database Systems by R. Elmasri and S. Navathe
3. SQL: The Ultimate Beginners Guide by Steve Tale.

### 4. Details of Lab Syllabus: **DATABASE MANAGEMENT SYSTEMS LAB**

1. Draw ER diagram for hospital administration
2. Creation of college database and establish relationships between tables
3. Relational database schema of a company is given in the following figure.

Relational Database Schema - COMPANY



**Questions to be performed on above schema**

1. Create above tables with relevant **Primary Key, Foreign Key and other constraints**
2. Populate the tables with data
3. Display all the details of all employees working in the company.
4. Display **ssn, lname, fname, address** of employees who work in department no 7.
5. Retrieve the **Birthdate and Address** of the employee whose name is 'Franklin T. Wong'
6. Retrieve the name and salary of every employee
7. Retrieve all distinct salary values
8. Retrieve all employee names whose address is in 'Bellaire'
9. Retrieve all employees who were born during the 1950s
10. Retrieve all employees in department 5 whose salary is between 50,000 and 60,000(inclusive)
11. Retrieve the names of all employees who do not have supervisors
12. Retrieve SSN and department name for all employees



13. Retrieve the name and address of all employees who work for the 'Research' department
14. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
15. For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
16. Retrieve all combinations of Employee Name and Department Name
17. Make a list of all project numbers for projects that involve an employee whose last name is 'Narayan' either as a worker or as a manager of the department that controls the project.
18. Increase the salary of all employees working on the 'ProductX' project by 15%. Retrieve employee name and increased salary of these employees.
19. Retrieve a list of employees and the project name each works in, ordered by the employee's department, and within each department ordered alphabetically by employee first name.
20. Select the names of employees whose salary does not match with salary of any employee in department 10.
21. Retrieve the employee numbers of all employees who work on project located in Bellaire, Houston, or Stafford.
22. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. Display with proper headings.
23. Find the sum of the salaries and number of employees of all employees of the 'Marketing' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
24. Select the names of employees whose salary is greater than the average salary of all employees in department 10.
25. Delete all dependents of employee whose *ssn* is '123456789'.
26. Perform a query using alter command to drop/add field and a constraint in Employee table.



## 5. RECOMMENDED CO-CURRICULAR ACTIVITIES:

(Co-curricular activities shall not promote copying from textbook or from others work and shall encourage self/independent and group learning)

### A. Measurable

1. Assignments (in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity))
3. Quiz (on topics where the content can be compiled by smaller aspects and data (Individuals or groups as teams))
4. Study projects (by very small groups of students on selected local real-time problems pertaining to syllabus or related areas. The individual participation and contribution of students shall be ensured (team activity))

### B. General

1. Group Discussion
2. Try to solve MCQ's available online.
3. Others

## 6. RECOMMENDED CONTINUOUS ASSESSMENT METHODS:

Some of the following suggested assessment methodologies could be adopted;

1. The oral and written examinations (Scheduled and surprise tests),
2. Closed-book and open-book tests,
3. Problem-solving exercises,
4. Practical assignments and laboratory reports,
5. Observation of practical skills,
6. Individual and group project reports like "Creating Text Editor in C".
7. Efficient delivery using seminar presentations,
8. Viva voce interviews.
9. Computerized adaptive testing, literature surveys and evaluations,
10. Peers and self-assessment, outputs from individual and collaborative work.



**MODEL QUESTION PAPER (Sem-end. Exam)**

<b>BSc</b>	<b>Computer Science(Semester: III)</b>	<b>Max. Marks: 75M</b>
<b>Paper: 3</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	<b>3Hrs</b>

**Answer any 5 question**

**5X5 = 25M**

1. Explain disadvantages of file processing system?
2. Explain the concept of entity and entity set with suitable example.
3. Explain about various attribute classification.
4. What are the advantages of Relational algebra? Explain.
5. Explain various types of keys.
6. Explain the selection command with an example.
7. Explain sub queries.
8. Explain structure of PL/SQL.

**Answer following question**

**5X10 = 50M**

9. a) With a neat diagram, explain the architecture of a DBMS.

**(OR)**

- b) Explain about Data Models.

10. a) Explain about Specialization and Generalization in EER model.

**(OR)**

- b) What is ER-Modeling? Write advantages and disadvantages of ER-Modelling.

11. a) What is Functional Dependency? Explain difference between 3NF and BCNF?

**(OR)**

- b) What is relational model? Write about key features of relational model.

12. a) What is SQL? Explain different types of commands in SQL.

**(OR)**

- b) What is Nested Queries? How to create them? Discuss it with relevant example.

13. a) Explain steps in creating a PL/SQL Program.

**(OR)**

- b) Explain about Triggers and types of triggers.