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|---|---|
| **COURSE TITLE** | **DATABASE MANAGEMENT SYSTEM** |
| **COURSE CODE** | **09CE2302** |
| **COURSE CREDITS** | **4** |

**Objective:**

1 A major rationale of a database system is to provide users with an intangible view of the data. That is, the system conceals certain details of how the information are put away and maintained. Thereby, data can be stored in compound data structures that permit competent retrieval, yet users see a basic and easy-to-use view of the data. The lowest level of abstraction, the physical level, depicts how the information is really put away and details the data structures.

**Course Outcomes:** After completion of this course, student will be able to:

1 Apply techniques to identify business data issues and determine suitable requirements for resolving information-related problems.

2 Use appropriate methods to design and develop database systems that meet structural and performance requirements.

3 Apply data manipulation language (DML) commands to retrieve, modify, and manage data in a database.

4 Implement suitable physical storage and access methods to ensure efficient data retrieval and storage in database systems.

5 Apply normalization techniques to analyze and refine database schemas for improved data integrity and reduced redundancy.

**Pre-requisite of course:**NA

**Teaching and Examination Scheme**

| Theory Hours | Tutorial Hours | Practical Hours | ESE | IA | CSE | Viva | Term Work |
|---|---|---|---|---|---|---|---|
| 2 | 0 | 4 | 50 | 30 | 20 | 25 | 25 |

| Contents : Unit | Topics | Contact Hours |
|---|---|---|
| 1 | **Database Systems Data Models**<br>Introducing the database and DBMS, Files and File Systems, Problems with File System and advantages of Database Management systems, The importance of Data models, Data Model Basic Building Blocks, Business Rules, Degree of Data Abstraction | 4 |
| 2 | **Relational Data Model**<br>Structure of relational databases, Domains, Relations, Relational algebra, Relational algebra-Primary Operators, Relational algebra-syntax, Rrelational algebra queries | 7 |

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| Contents : Unit | Topics | Contact Hours |
|---|---|---|
| 3 | **Entity Relationship Model**<br>Basic Entity ± Relationship Concepts: Entities, Relationship, Attributes, E ± R Diagram symbols, Conversion of Entity ± Relationship Model into Relations, Problems with Entity ± Relationship Models, Concepts: Specialisation and Generalisation | 4 |
| 4 | **Relational Database Design**<br>Normalization of database tables: Database Tables and Normalization, The need for Normalization, The Normal forms:1NF , 2NF, The Normal form: 3NF , The Normal forms: BCNF , Denormalization | 6 |
| 5 | **SQL Concepts**<br>Introduction to SQL : Data Definition Commands, Data Manipulation Commands, Select queries, Advanced Data Definition Commands, Advanced Select queries, Virtual Tables, Joining Database Tables | 7 |
| **Total Hours** | | **28** |

**Suggested List of Experiments:**

| Contents : Unit | Topics | Contact Hours |
|---|---|---|
| 1 | **Practical-1**<br>Create database tables using CREATE statement (define fields, data types, and constraints). | 4 |
| 2 | **Practical-2**<br>Insert records into the tables created in Practical 1 using INSERT statement. | 4 |
| 3 | **Practical-3**<br>Retrieve all records and specific columns using basic SELECT statement. | 4 |
| 4 | **Practical-4**<br>Delete specific records from the tables using DELETE statement with condition. | 4 |
| 5 | **Practical-5**<br>Modify existing records in the tables using UPDATE statement with condition. | 4 |
| 6 | **Practical-6**<br>Retrieve filtered rows using WHERE clause and select specific columns. | 4 |
| 7 | **Practical-7**<br>Display records using ORDER BY clause and remove duplicate values using DISTINCT.(Sorting and Distinct Values) | 4 |
| 8 | **Practical-8**<br>Apply aggregate functions such as COUNT, SUM, AVG, MIN, and MAX on table data. | 5 |

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**Suggested List of Experiments:**

| Contents : Unit | Topics | Contact Hours |
|---|---|---|
| 9 | **Practical-9**<br>Group records using GROUP BY clause and filter grouped data using HAVING clause. | 5 |
| 10 | **Practical-10**<br>Retrieve data from multiple tables using different types of JOIN operations. | 6 |
| 11 | **Practical-11**<br>Retrieve data using nested SELECT statements (subqueries). | 6 |
| 12 | **Practical-12**<br>Modify table structure using ALTER statement and apply constraints like PRIMARY KEY, FOREIGN KEY, UNIQUE, and NOT NULL. | 6 |
| **Total Hours** | | **56** |

**Textbook :**

1 Learning SQL, 3rd Edition, Alan Beaulieu, O'Reilly Media, 2019

2 Fundamentals of Database Systems, 7th Edition , Ramez Elmasri, Shamkant B. Navathe, Pearson Education, 2022

3 SQL in 10 Minutes a Day, 5th Edition, Ben Forta, Sams Publishing / Pearson Education, 2019

**References:**

1 Database System Concepts, Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw Hill, 2019

2 SQL, PL/SQL, SQL, PL/SQL, Ivan Bayross, BPB Publications, 2022

**Suggested Theory Distribution:**

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

| Remember / Knowledge | Understand | Apply | Analyze | Evaluate | Higher order Thinking / Creative |
|---|---|---|---|---|---|
| 0.00 | 0.00 | 35.00 | 35.00 | 30.00 | 0.00 |

**Instructional Method:**

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.

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**Instructional Method:**

3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

**Supplementary Resources:**

1 https://ilearning.oracle.com/

2 https://apex.oracle.com/en/

3 https://lagunita.stanford.edu/courses/DB/2014/SelfPaced/about