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| Course Code: CSE 311 | CIE Marks: 60 |
| Course Title: **Database Management System** | SEE Marks: 40 |
| Credits: 2 | |

Course Content (from syllabus):

Introduction to DBMS, Purpose of DBMS, Relational Model, Data Abstraction, Database Architecture, Keys, ER Model, ER Model Scenario and ER Model, Relational Schema, ER Model to Schema Practice Example, Relational Algebra, Basic SQL Queries, Join Operation, More Sql Queries, Sub-queries in DBMS, Stored Procedure and Views, Transaction, More about Transaction, Trigger, Normalization etc.

**Course Rationale**

Database Management Systems (DBMS) are vital components of modern information systems. Database applications are pervasive and range in size from small in-memory databases to terra bytes or even larger in various applications domains. The course focuses on the fundamentals of knowledge base and relational database management systems, and the current developments in database theory and their practice.

**Course Objective**

Upon successful completion of this course, students should be able to:

* Describe the fundamental elements of relational database management systems.
* Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
* Design ER-models to represent simple database application scenarios
* Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.
* Improve the database design by normalization.
* Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree and hashing.

**Course Learning Outcome (CLO): (at the end of the course, students will be able to do:)**

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| **CLO1** | Explain analytical skills to map out the conceptual design for a real-life problem and how to draw the model of Database using Entity Relationship (ER) model and explain the relational schema. |
| **CLO2** | Illustrate the logical design to translate into a specific data model and be able to gather knowledge regarding MSSQL/MySQL programming. |
| **CLO3** | Construct the transactions, trigger, view, stored procedure etc. |
| **CLO4** | Determine functional dependency, normalization technique in the database for reducing data redundancy. |

**Content of the course:**

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| **SL** | **Course Content (as summary)** | **Hrs** | **CLO’s** |
| 1 | Introduction to DBMS, Purpose of DBMS, Relational Model, Data Abstraction, Database Architecture, Keys, ER Model, ER Model Scenario and ER Model, Relational Schema, ER Model to Schema Practice Example | 14 | CLO-1 |
| 2 | Relational Algebra, Basic SQL Queries, Join Operation, More Sql Queries, Sub-queries in DBMS | 16 | CLO-2 |
| 3 | Stored Procedure and Views, Transaction, More about Transaction, Triggers | 10 | CLO-3 |
| 4 | Functional Dependency, Normalization | 8 | CLO-4 |

**Mapping of Course Learning Outcomes to Program Learning Outcomes**

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| PLO’s  CLO’s | PLO1 | PLO2 | PLO3 | PLO4 | PLO5 | PLO6 | PLO7 | PLO8 | PLO9 | PLO10 | PLO11 | POL12 |
| CLO1 |  | √ |  |  |  |  |  |  |  |  |  |  |
| CLO2 | √ |  |  |  |  |  |  |  |  |  |  |  |
| CLO3 |  |  | √ |  | √ |  |  |  |  |  |  |  |
| CLO4 |  |  |  | √ |  |  |  |  |  |  |  |  |

**Mapping Course Learning Outcome (CLOs) with the Teaching-Learning and Assessment Strategy:**

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| **CLO’s** | **Teaching Learning Strategy**  [course teacher will decide based on the type of the contents] | **Assessment Strategy** | **Corresponding**  **PLO number** | **Domain**  **Level/ Learning**  **Taxonomy** |
| **CLO-1** | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | Class Test/Assignment/ Midterm examination | PLO-2 | L1,L2 |
| **CLO-2** | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | Class Test/Assignment/ Midterm examination | PLO-1 | L3 |
| **CLO-3** | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | Class Test/Assignment/ Final examination | PLO-3, PLO-5 | L3 |
| **CLO-4** | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion | Class Test/Assignment/ Final examination | PLO-4 | L4 |

**Course Delivery Plan/Lesson Delivery Plan:**

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| Week | Lesson | Topic | Textbook& Video Reference | Student Activities during Online and Onsite  [course teacher will decide based on the type of the contents] | Mapping with CLO and PLO | Assessment Plan |
| 1 | Les. 1  [1.5 Hours] | Introduction, Structure of DBMS, DBMS Approach,  Objective & Advantages of DBMS | Silberschatz, Ch.1 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2 | Class Test,  Assignment,  Midterm |
| Les. 2  [1.5 Hours] | Three Level Architecture of DBMS, The External Level or Subschema, The Conceptual Level or Conceptual Schema, The Internal Level or Physical Schema, | Silberschatz, Ch.1 and Online Resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2 | Class Test,  Assignment,  Midterm |
| 2 | Les. 3  [1.5 Hours] | Data Models, Schemes & Instances, DBMS Vs RDBMS, ACID Properties. | SilberschatzCh.1 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2 | Class Test,  Assignment,  Midterm |
| Les. 4  [1.5 Hours] | Overview of Database Design, Entities, attributes, and Entity sets, Relationships and Types of Attributes | Silbertz, Ch.7 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2 | Class Test,  Assignment,  Midterm |
| 3 | Les. 5  [1.5 Hours] | More about ER diagram, Relationship | Silbertz, Ch.7 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2 | Class Test,  Assignment,  Midterm |
| Les. 6  [1.5 Hours] | MySQL Architecture; SQL Server Architecture,DDL, DML, Roles of Database Administrator, Client/Server Architecture | Silbertz, Ch.1 and Ch.17 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| 4 | Les. 7  [1.5 Hours] | Participation Constraints,  Specialization, Generalization and Aggregation | Silbertz, Ch. 7 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| Les. 8  [1.5 Hours] | The Basic Parts of Speech in SQL, DDL and DML Commands, Creating and Managing Tables,  Aggregate Functions | Silbertz, Ch.1, Ch. 3 and online resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| 5 | Les. 9  [1.5 Hours] | Grouping thing together (GROUP BY, Having)  Changing Data (Insert, Update, Merge & Delete ) | Silbertz, Ch.3 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| Les. 10  [1.5 Hours] | Basic Operations, Union (U), Difference ( - ), Intersection, Cartesian Product (x); Projection, Selection , Division | Silbertz, Ch. 3 and Ch.6 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| 6 | Les. 11  [1.5 Hours] | Tuple Relational Calculus, Relational ALGEBRA, Semantics of TRC Queries, Examples of TRC Queries | Silbertz, Ch.6 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| Les. 12  [1.5 Hours] | Domain Relational Calculus; Relational ALGEBRA vs Relational CALCULUS | Silbertz, Ch.6 and online resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| 7 | Les. 13  [1.5 Hours] | Join Operation,  Numeric Functions,  Date & Time Functions,  Views | Silbertz, Ch.4 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| Les. 14  [1.5 Hours] | Join Operation: inner, outer, left, right | Silbertz, Ch.4 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| 8 | Les. 15  [1.5 Hours] | Join Operation: inner, outer, left, right | Silbertz, Ch.14 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| Les. 16  [1.5 Hours] | Introduction to nested queries | Silbertz, Ch.3 and online resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| 9 | Les. 17  [1.5 Hours] | More about nested queries | Silbertz, Ch.3 and online resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Midterm, Final |
| Les. 18  [1.5 Hours] | More about SQL | Silbertz, Ch.3 and Online Resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-2,  PLO-1 | Class Test,  Assignment,  Final |
| 10 | Les. 19  [1.5 Hours] | Transaction  Concept and State Implementation of ,  Atomicity and Durability, | Silbertz, Ch.14 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| Les. 20  [1.5 Hours] | More about Transaction | Silbertz, Ch.14 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| 11 | Les. 21  [1.5 Hours] | QueriesConcurrent Executions, Serializability, Recoverability, Implementation of Isolation | Silbertz, Ch.14 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| Les. 22  [1.5 Hours] | Functional Dependency; Anomalies in a Database; Properties of Normalized Relations; | Silbertz, Ch.8 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-4,  PLO-4 | Class Test,  Assignment,  Final |
| 12 | Les. 23 [1.5 Hours] | First Normalization; Second Normal Form Relation; Third Normal Form; | Silbertz, Ch.8 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-4,  PLO-4 | Class Test,  Assignment,  Final |
| Les. 24  [1.5 Hours] | Boyce-Codd Normal Form (BNCF); Fourth and Fifth Normal Form | Silbertz, Ch.8 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-4,  PLO-4 | Class Test,  Assignment,  Final |
| 13 | Les. 25  [1.5 Hours] | Triggers | Silbertz, Ch.5 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| Les. 26  [1.5 Hours] | Triggers | Silbertz, Ch.5 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| 14 | Les. 27  [1.5 Hours] | Triggers | Silbertz, Ch.5 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| Les. 28  [1.5 Hours] | View | Silbertz, Ch.5 | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| 15 | Les. 29  [1.5 Hours] | Stored procedures | Silbertz, Ch.13 and Online Resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| Les. 30  [1.5 Hours] | Stored procedures | Silbertz, Ch.13 and Online Resources | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-3,  PLO-3,  PLO-5 | Class Test,  Assignment,  Final |
| 16 | Les. 2 31  [1.5 Hours] | Overview 1 | All Class Lectures | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2,  CLO-2,  PLO-1,  CLO-3,  PLO-3,  PLO-5  CLO-4,  PLO-4 | Class Test,  Assignment,  Final |
| Les. 2 32  [1.5 Hours] | Overview 2 | All Class Lectures | Brainstorming sessions, Classroom discussion, Voice over PPT, Lecture video, Lecture note, Open discussion. | CLO-1,  PLO-2  CLO-2,  PLO-1  CLO-3,  PLO-3,  PLO-5  CLO-4,  PLO-4 | Class Test,  Assignment,  Final |

**Assessment Pattern:**

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| **Assessment Task** | **CO’s** | | | | | **Mark (Total=100)** |
| **CO1** | **CO2** | **CO3** | **CO4** |  |
| Attendance | -- | -- | -- | -- |  | 7 |
| Class Test (CT1, CT2,  CT3) | -- | -- | -- | -- |  | 15 |
| Assignment | -- | -- | -- | -- |  | 5 |
| Presentation | -- | -- | -- | -- |  | 8 |
| Midterm  Examination | 14 | 11 | -- | -- |  | 25 |
| Semester Final  Examination | -- | 17 | 13 | 10 |  | 40 |
| Total Mark | 14 | 28 | 13 | 10 |  | 100 |

**CIE – Breakup (Theory) [60 marks]**

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| **Bloom’s Criteria** | **Attendance (07)** | **Class Test (15)** | **Assignment (05)** | **Presentation (08)** | **Mid Exam (25)** |
| Remember | -- | -- | -- | -- | 02 |
| Understand | -- | 05 | 01 | 02 | 12 |
| Apply | -- | 10 | 04 | 06 | 11 |
| Analyze | -- | -- | -- | -- | -- |
| Evaluate | -- | -- | -- | -- | -- |
| Create | -- | -- | -- | -- | -- |

**SEE – Semester End Examination [40 marks] {Theory}**

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| --- | --- |
| **Bloom Criteria** | **Score for the Test** |
| Remember | -- |
| Understand | 04 |
| Apply | 26 |
| Analyze | 10 |
| Evaluate | -- |
| Create | -- |

**Textbook**

1. Fundamentals of Relational Database Management Systems, Author: S. Sumathi and S. Esakkirajan.
2. Database System Concept, Silbertz, Korth and Sudarshan (6th Ed. Or higher)

**Reference Books**

1. Oracle Database 10g: The Complete Reference, Author: KavinLoney