# Faculty of Computer Science & Applications
# Master of Computer Application (MCA)
# (W. E. F.: 2023-24)

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| **Name of Faculty** | : | **Faculty of Computer Science & Applications** |
| **Name of Program** | : | Master of Computer Application (MCA) |
| **Course Code** | : | 1MCA04 |
| **Course Title** | : | Database Management System |
| **Type of Course** | : | Professional core |
| **Year of Introduction** | : | 2023-24 |

| | | |
|---|---|---|
| **Prerequisite** | : | Maths, logic and most importantly zeal to learn |
| **Course Objective** | 1 | To learn the fundamentals of data models and to represent a database system using ER diagrams. |
| | 2 | To understand the internal storage structures using different file and indexing techniques which will help in physical DB design. |
| | 3 | To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures. |
| | 4 | To have an introductory knowledge about the Storage and Query processing Techniques. |
| | 5 | To study SQL and relational database design. |
| **Course Outcomes** | : | After learning the course the students will be able to: |
| | CO1 | Describe the fundamental elements of relational database management systems |
| | CO2 | Demonstrate the understanding of database design using normalization. |
| | CO3 | Analyze and Select storage and recovery techniques of database system. |

**Teaching and Examination Scheme**

| Teaching Scheme (Contact Hours) | | | Credits | Examination Marks | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | Practical Marks | | Total Marks |
| L | T | P | C | SEE | CIA | SEE | CIA | |
| 2 | 0 | 2 | 3 | 70 | 30 | 30 | 20 | 150 |

*Legends: **L**-Lecture; **T**–Tutorial/Teacher Guided Theory Practice; **P**– Practical,**C** – Credit, **SEE** – Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations /MCQ Tests, etc.))*

**Course Content**

| Unit No. | Topics | Teaching Hours | Weightage | Mapping with CO |
|---|---|---|---|---|
| 1 | **Introduction:** Database, Data models, Database management system, Schemas and instances, Three-schema architecture of DBMS, Components of DBMS. Data independence, Functions of DBA, ER model- E-R diagram, Weak Entity sets, Generalization, Specialization, Aggregation | 07 | 20% | CO1 |
| 2 | **Relational Model:** Structure of relation database-Domains, Relations, Keys, Key attributes, Referential integrity, Intension and Extension.<br>**SQL Query & Relational Algebra :** Basics of SQL, DDL, DML, DCL, structurecreation, alteration, defining constraints, Data extraction from tables, Joins, Complex queries, Relational Algebra and Relational Calculus | 08 | 20% | CO3 |
| 3 | **Relational Database Design:** Functional Dependency , Normalization- Introduction, 1NF, 2NF, 3NF, Decomposition, Dependency Preservation , BCNF, Mutivalued Dependency, 4NF, Join Dependency and 5NF<br>**Query Processing:** Query Evaluation, Operator Evaluation, Query Optimization, Optimization Methods- Heuristic Based, Cost Estimation based, Semantic Query Optimization | 07 | 20% | O2 |
| 4 | **Transaction Management**: Transaction concepts, ACID properties, Transaction systems, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Concurrency Control Technique-Concurrency Control, locking Techniques for concurrency control | 07 | 20% | CO3 |
| 5 | **Storage & Data Security:** Storage structure, file organization, Recovery and atomicity, Performance measures of discs, RAID levels, Indices, B+ Tree, Hashing, Bitmap indices, Query optimizations , Database Security, Data mining models and techniques, Distributed Databases, GIS. | 07 | 20% | CO3 |

| Suggested Distribution of Theory Marks Using Bloom's Taxonomy | | | | | | |
|---|---|---|---|---|---|---|
| **Level** | Remembrance | Understanding | Application | Analyse | Evaluate | Create |
| **Weightage** | **20** | **30** | **30** | **20** | **0** | **0** |

*NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.*

**Suggested List of Experiments/Tutorials**

| Sr. No. | Name of Experiment/Tutorial | Teaching Hours |
|---|---|---|
| 1 | Creation of a database and writing SQL queries to retrieve iformation from the database | 01 |
| 2 | Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions. | 01 |
| 3 | Creation of Views, Synonyms, Sequence, Indexes, Save point. | 02 |
| 4 | Creating an Employee database to set various constraints. | 01 |
| 5 | Creating relationship between the databases. | 02 |
| 6 | Study of PL/SQL block. | 01 |
| 7 | Write a PL/SQL block to satisfy some conditions by accepting input from the user. | 01 |
| 8 | Write a PL/SQL block that handles all types of exceptions. | 01 |
| 9 | Creation of Procedures. | 01 |
| 10 | Creation of database triggers and functions. | 01 |

**Major Equipment/ Instruments and Software Required**

| Sr. No. | Name of Major Equipment/ Instruments and Software |
|---|---|
| 1 | VB, ORACLE and/or DB2 |
| 2 | CB, MY SQL SERVER 2000 |

**Suggested Learning Websites**

| Sr. No. | Name of Website |
|---|---|
| 1 | https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/ |
| 2 | https://www.guru99.com/what-is-dbms.html |
| 3 | https://www.javatpoint.com/dbms-tutorial |

**Reference Books**

| Sr. No. | Name of Reference Books |
|---|---|
| 1 | Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, 4 th ed., US, Pearson/Addision Wesley, 2003. |
| 2 | Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, Database Systems: The Complete Book, 2nd ed., Pearson, 2008 |
| 3 | Raghu Ramakrishnan, Database Management Systems, 3rd ed. New Delhi, McGraw Hill, 2014. |