Code No. MCA 107 **L T C**
Paper: Database Management Systems **3 1 4**

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. There should be 10 questions of short answer type of 2.5 marks each, having at least 2 questions from each unit.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions to evaluate analytical/technical skills of candidate. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks, including its subparts, if any.
3. Examiners are requested to go through the Course Outcomes (CO) of this course and prepare the question paper, accordingly, using Bloom's Taxonomy (BT), in such a way that every question be mapped to some or other CO and all the questions, put together, must be able to achieve the mapping to all the CO(s), in balanced way.

LEARNING OBJECTIVES:

In this course, the learners will be able to develop expertise related to the following: -

1. Develop a broad understanding of database concepts and database management system software, data models, schemas and instances, data constraints, relational algebra, and calculus.
2. Acquire Knowledge to model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model.
3. Be able to write SQL and PL/SQL commands to create and manipulate database objects.
4. Be able to discuss importance of normalization and improve the database design by applying various normal forms.
5. Get in depth knowledge of concurrency control mechanisms, transaction management techniques and database security.

PRE-REQUISITE:

1. Elementary Maths (Sets, Relations)
2. Computer fundamentals related to memory organization such as primary memory, secondary memory etc.
3. Knowledge of basic data structures.
4. Basic knowledge of data storage and file management system.

COURSE OBJECTIVE:

CO1	Explain the various database components, models, DBMS architecture and Database Security (BTL2)
CO2	Apply relational database theory to construct relational algebra expression, tuple and domain relation expression for SQL queries (BTL3)

CO3	Construct advanced SQL queries on data and apply Procedural abilities through PL/SQL. (BTL4)
CO4	Examine the use of normalization and functional dependency for database design. (BTL4)
CO5	Appraise the concepts of transaction, concurrency control and recovery in databases. (BTL5)

UNIT – I
No. of Hours: 10
Chapter / Book Reference: TB1 [Chapters 1-4]; TB2 [Chapters 1-2]
Basic concepts: Database & database users, characteristics of the database, database systems, concepts and architecture, Data Models, Schemas & Instances, DBMS architecture & data independence, Overview of hierarchical, Network & Relational Data Base Management Systems. **Data Modelling using the Entity Relationship Model:** ER model concepts, notation for ER diagram, mapping constraints, Concepts of keys, Extended ER model – Generalization, Specialization, Aggregation, ER diagram to tables Mapping.

UNIT – II
No. of Hours: 10
Chapter / Book Reference: TB1 [Chapters 5, 6, 8, 9]; TB2 [Chapters 3-5]; TB3 [Chapters 7-11]
Relational Model: Relational data model, **Relational integrity constraints:** Entity Integrity, Referential integrity, Domain Constraints, Key constraints. **Relational Algebra, Relational calculus:** Tuple Relational Calculus and domain Relational calculus. **Introduction on SQL**: SQL commands and types: DML, DDL, DCL, TCL. SQL Datatypes and literals, Operators in SQL. **Database Objects**: Table, View, Sequence, Index, Synonym, Queries. **Advanced SQL:** Functions: Single Row Functions, Aggregate functions, Sub queries, Join Operations. **Set Operations**: Unions, Intersection, Minus.

UNIT – III
No. of Hours: 10
Chapter / Book Reference: TB1 [Chapters 10, 11]; TB2 [Chapters 7, 9]; TB3 [Chapters 15, 16, 18]
Normalization: Functional dependencies, Normal forms- 1NF, 2NF, 3NF, BCNF, join dependencies and multi-valued dependencies. **PL/SQL Programming**: Introduction to PL/SQL, Structure of PL/SQL Block, PL/SQL language: Operators, Control Structure, Cursors, Triggers, Procedures, and functions.

UNIT – IV
No. of Hours: 10
Chapter / Book Reference: TB1 [Chapters 17-20, 23]; TB2 [Chapters 6, 15-17]
Transaction processing concept: Transaction system, testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log-based recovery, checkpoints, deadlock handling.

TEXTBOOKS:

TB1. Elmsari and Navathe, "Fundamentals of Database Systems", Pearson Education, 7th Edition, 2016.

TB2. Korth, Silberschatz, "Fundamentals of Database System Concepts", TMH, 6th Edition, 2010.

TB3. Ivan Bayross, "SQL, PL/SQL the Programming language of Oracle", BPB Publications, 2010.

REFERENCE BOOKS:

RB1. Ullman J. D., "Principals of Database Systems", Galgotia Publications, 2nd Edition, 1999.

RB2. C.J.Date, A. Kannan, S. Swamynathan "An Introduction to Database Systems", Pearson Education, 8th Edition, 2006.

RB3. Desai B., "An Introduction to Database Concepts", Galgotia Publications, New Delhi.

RB4. Shio Kumar Singh, "Databases Systems Concepts, Design and Applications", Pearson Publication, 2nd Edition, 2011.

RB5. Rajiv Chopra, "Database Management System (DBMS) - A Practical Approach", S. Chand & Company Pvt. Ltd., 4th Edition, 2014.

PRACTICAL:

Course Code: MCA-165 **L T/P C**
Paper: Database Management System Lab **0 2 1**

LEARNING OBJECTIVE:

In this course, the learners will be able to develop the working expertise of the following:-

1. Working expertise of DDL and DML commands with their application on solving real time problems.
2. Ability to apply filters using where clause and nested queries, integrity constraints at table level and column level and to use built-in functions including numeric, character and date functions.
3. Adequate knowledge to fetch data from multiple tables using different types of JOIN operations.
4. Knowledge of the generic structure of PL/SQL programs based on different PL/SQL control structures – Triggers, Cursors, Functions & Procedures and to apply transaction management concepts using Save point, Rollback and Commit statements.

COURSE OUTCOME (CO):

After completion of the Practical Course, the learners will be able to:-

CO1	Translate an information model into a relational database schema and to implement the schema using RDBMS (BTL2)
CO2	Apply advanced SQL features like views, indexes, synonyms, etc. for database management (BTL3)
CO3	Analyze PL/SQL structures like functions, procedures, cursors and triggers for database applications. (BTL4)
CO4	Examine database administration concepts like GRANT, REVOKE etc. through SQL commands. (BTL4)
CO5	Work in teams to design solutions for real world problems/case studies by creating efficient database schema. (BTL6)