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**SECOND SEMESTER 2022-2023**

# Course Handout Part II

Date: 1-01-2023

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CS F212

## Course Title : Database Systems

Instructor-in-Charge : R. Gururaj ([gururaj@hyderabad.bits-pilani.ac.in](mailto:gururaj@hyderabad.bits-pilani.ac.in))

Instructors : Dr.Abhijit Das, Dr.Prajna Devi Upadhyay, Dr.Manik Gupta.

**Scope:**

The scope of this course includes- Data modeling, database design theory, data definition and manipulation languages, relational data model, relational algebra and relational calculus, SQL, functional dependencies and normalization, storage and indexing techniques, query processing and optimization, transaction management - concurrency control and crash recovery.

**Course Objectives:**

* To enrich the skill and competency of students in Modeling and Design of relational Database Systems using ER modeling technique.
* To learn Formal and Commercial query languages like- Relational Algebra and SQL for Relational data.
* To learn the concepts related to indexing, hashing and Query processing for relational databases.
* To understand transaction processing, concurrency control schemes and database recovery models for relational databases.
* To impart practical knowledge in SQL and PL-SQL with hands on experience.

**Textbooks:**

**T1.** Elmarsi R, & Navathe S B, ***Fundamental of Database System*,** Sixth Edition, Pearson Education.

**Reference books:**

**R1.** Silberschatz, Abraham, Henry F. Korth & S.Sudarshan, Database System Concepts McGRAW-HILLS, 6th ed., 2010.

**R2.** Ramakrishna R. & Gehrke J, ***Database Management Systems***, 3e, Mc-Graw Hill, 2003.

**Course Plan:**

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| **Lecture No.** | Learning Objectives | Topics to be covered | **Chapter in the Text Book** |
| 1-2 | To get the context for this course and introduction to basic concepts of Database Systems | Introduction to Database System Concepts – data models ; architecture; components of DBMS. | T1-Ch.1&2; Class Notes |
| 3-5 | To understand the essence of Relational data model. | Relational Data Model concepts; Constraints. | T1-Ch.3 |
| 6-10 | To learn and practice SQL query operations | SQL – DDL and DML Commands | T1-Ch.4 &5 |
| 11-14 | To understand the Formal query language operations for relational model. | Formal QLs for Relational Model; Relational Algebra; Operations; introduction to Tuple Relational Calculus(TRC). | T1-Ch.6 |
| 15-17 | To learn modeling Databases at Conceptual level | Database Design by ER-and EER;  Mapping from ER/EER to-Relational Schema | T1-Ch. 7, 8 |
| 18-22 | To understand the basics of database design concepts | Relational Database Design: Functional Dependencies and Normalization , Decomposition rules | T1-Ch. 15 |
| 23-25 | To understand Data storage mediums and File organization for databases | Disk Storage, File/Record organization | T1-Ch.16 |
| 26-30 | To learn Hashing and Indexing schemes for Database Systems | Indexing- Primary; Secondary; multilevel; B+ Trees .  Hashing – Static and Dynamic hashing Schemes | T1-Ch. 16 & 17 |
| 31-32 | To understand the Transaction Model | Transaction Processing – States; Schedules | T1- Ch.20 |
| 33-35 | To understand concurrency control mechanisms | Concurrency Control Techniques – Lock-based and Timestamp based schemes | T1-Ch.21 |
| 36-37 | To learn the fundamentals of Database recovery Techniques | Database Recovery Techniques- Log-based and Shadow paging schemes | T1- Ch.22 |
| 38-41 | To understand the basics of SQL Query Processing and Optimization and Database tuning | Query Processing & Optimization- Query trees and Optimization Heuristics; Database tuning strategies | T1- Ch.18, 19 |
| 42 |  | Conclusion |  |

**Evaluation Scheme:**

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| **S No** | **Evaluation Component** | **Weightage** | **Date & Time** | **Nature of Component** |
| 1 | Mid-semester Test | 35% | 17/3 2.00 - 3.30 PM | Close Book |
| 2 | End-sem Lab- Exam | 10% | 29-Apr-2023(Sat) AN | Open Book |
| 3 | Mini-project  ( 5% evaluation before mid-semester grading) | 10% |  | Open Book(take-home) |
| 4 | Comprehensive  Exam | 45% | 18/05 FN | Close Book |

**Make-up Policy:**

Make-up will be given for genuine cases (on medical grounds only) with prior permission by the IC.

**Course Notices**

All notices pertaining to this course will be made available on the CMS.

**Chamber Consultation:** To be announced.

**Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-In-charge**

Prof. R Gururaj