Birla Institute of Technology & Science, Pilani
Hyderabad Campus

**SECOND SEMESTER 2024-2025**

Course Handout Part II

Date: 31-12-2024

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 : Prof. R. Gururaj (gururaj@hyderabad.bits-pilani.ac.in)
Instructors : Prof. Abhijit Das, Prof. Akanksha Rathore, Prof. 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, transaction management, concurrency control, database recovery, and introduction to query processing and optimization

**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 and Navathe S B, ***Fundamental of Database System,*** Seventh Edition, Pearson Education, 2017.

**Reference books:**

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

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

**Course Plan:**

| 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 |

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|---|---|---|---|
| 3-5 | To understand the essence of Relational data model. | Relational Data Model concepts; Constraints. | T1-Ch.5 |
| 6-10 | To learn and practice SQL query operations | SQL – DDL and DML Commands | T1-Ch.6 & 7 |
| 11-14 | To understand the Formal query language operations for relational model. | Formal Query Languages for Relational Model; Relational Algebra; Operations; introduction to Tuple Relational Calculus (TRC). | T1-Ch.8 |
| 15-17 | To learn modeling Databases at Conceptual level | Database Design by ER-and EER; Mapping from ER/EER to-Relational Schema | T1-Ch.3, 4 & 9 |
| 18-22 | To understand the basics of database design concepts | Relational Database Design: Functional Dependencies and Normalization , Decomposition rules | T1-Ch.14 & 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 | Hashing – Static and Dynamic hashing Schemes<br>Indexing- Primary; Secondary; multilevel; B+ Trees. | 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 get introduction to the basics of SQL Query Processing and Optimization | Query Processing & Optimization- Query trees and Optimization Heuristics | T1- Ch.18, 19 |
| 42 | | Conclusion | |

**Evaluation Scheme:**

| S No | Evaluation Component | Weightage | Date & Time | Nature of Component |
|---|---|---|---|---|
| 1 | Mid-semester Test | 35% | | Close Book |
| 2 | End-semester<br>Lab- Exam | 10 % | 26-Apr FN (Sat) | Open Book |
| 3 | Mini-project<br>( 5% evaluation before mid-semester grading) | 10% | | Open Book (take-home) |
| 4 | Comprehensive Exam | 45 % | | Close Book |

**Make-up Policy:**
Make-up may be given for genuine cases with prior permission by the IC.

**Course Notices**
All notices pertaining to this course will be made available on the CMS/LMS.

**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

**Mini-project:**

Weightage : 10%
Timelines : Problem statement will be announced in the First or Second week of Feb-2025.

Eval-1 : Before Mid-semester grading (5%)
Eval-2 : Before Comprehensive exam, 3rd week of April. (5%)

Groups: Each can have up to 4 students.

**End-semester Lab Exam:**

Weightage : 10%
Date : In the FN of 26-Apr-2025 (Sat)
Duration : 60 Mins.
Time slot :8-00AM to 2-00PM
(actual slot will be announced 1 or 2 days ahead)
Mode : Open book

What is allowed: Text book (printed form) and only one handwritten note book. Xerox material or other printouts of PPTs etc are NOT allowed.

Hence for Lab-work, you are advised to maintain a notebook with sufficient number of pages.