Computer Science Paper II
Relational Database Management System
[CORE COURSE]

Semester II	Credits: 2	Subject Code: BS22002	Lectures: 40

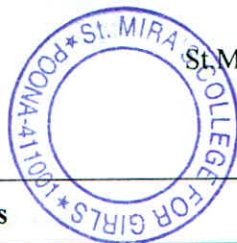| Course Outcomes: |
|---|
| **At the end of this course, the learner will be able to:**
• Perform database management operations
• Apply the fundamental concepts of RDBMS (PL/PgSQL)
• Analyze the basic issues of transaction processing and concurrency control
• Apply their mind to implement data security. |

Unit 1: Relational Database Design Using PLSQL	8
• Introduction to PLSQL • PL/PgSqL: Datatypes, Language structure • Controlling the program flow, conditional statements, loops • Stored Functions • Handling Errors and Exceptions • Cursors • Triggers	

Unit 2: Transaction Concepts and concurrency control	15
• Transaction, properties of transaction-ACID, state of the transaction. • Executing transactions concurrently associated problem in concurrent execution. • Schedules, types of schedules, concept of Serializability, Precedence graph for Serializability. • Ensuring Serializability by locks, different lock modes, 2PL and its variations. • Basic timestamp method for concurrency, Thomas Write Rule. • Locks with multiple granularity, dynamic database concurrency (Phantom Problem). • Timestamps versus locking. • Deadlock and deadlock handling - Deadlock Avoidance(wait-die, wound-wait), Deadlock Detection and Recovery (Wait for graph).	

Unit 3:Crash Recovery	7
• Failure classification • Recovery concepts • Log base recovery techniques (Deferred and Immediate update) • Checkpoints, Relationship between database manager and buffer cache. Aries recovery algorithm. • Recovery with concurrent transactions (Rollback, checkpoints, commit) • Database backup and recovery from catastrophic failure	

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Unit 4: Database Integrity and Security Concepts	5

• Domain constraints
• Referential Integrity
• Introduction to database security concepts
• Methods for database security
   o Discretionary access control method
   o Mandatory access control
   o Role base access control for multilevel security.
• Use of views in security enforcement.
• Overview of encryption technique for security.
• Statistical database security.	

*Contact hours – 5 hours

Reference Books:
• AviSilberschatz,Henry F. Korth,S. Sudarshan, *Database System Concepts-6th edition-* McGraw-Hill • RaghuRamakrishnan, *Database Management Systems*, Mcgraw-hill higher Education, ISBN:9780071254342 • Raghu Ramakrishnan and Johannes Gehrke, *Database Management Systems*, McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631 • Elmasri, Navathe, *Fundamentals of Database Systems* -5th edition –Pearson. • Joshua D. Drake, John C Worsley, *Practical Postgresql* ,(O'Reilly publications)

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