## Relational Databases Management System

| Semester – III | Subject Code: BS31602 | Lectures: 60 |
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**Objectives:**

The syllabus aims in equipping students ,
- To learn advanced concepts of RDBMS
- To learn database management operations
- To learn data security and its importance
- To learn client server architecture

| Unit 1: Relational Database | 10 |
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**1. Procedural SQL**
- PL/PgSQL: Language structure
- Controlling the program flow, conditional statements, loops
- Views
- Functions
- Handling errors and exceptions
- Cursors
- Triggers

[Ref. book 2-Chaper 5]
[Ref. book 3-Chapter 7,11]

| Unit 2: Transaction concepts | 28 |
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**2. Transaction concepts and concurrency control**

- Transaction
  - ➢ Properties of transaction
  - ➢ States of transactions
  - ➢ Concurrency concept
- Conflicts in concurrent execution of transactions
- Schedules
  - ➢ Types of schedules
  - ➢ Concept of Serializability
  - ➢ Precedence graph for Serializability

- Locks
  - Concepts of locks
  - Different lock modes
  - Ensuring serializability with locks
  - 2PL and its variations
- Timestamp for concurrency
  - Concept of Timestamp
  - Definition
  - Methods of timestamp
  - Timestamp to transaction, Timestamp to database object, Timestamp with Thomas Write Rule
- Multiple granularity
  - Concepts
  - Locks with multiple granularity
  - Dynamic database concurrency algorithm (Phantom Phenomenon)
- Timestamps versus locking
- Deadlock handling
  - Definition
  - Deadlock handling methods
    - Prevention algorithms (Wound-wait, Wait-die)
    - Detection and Recovery (Wait for graph),

**[Ref. book 1**-Chaper 17,18]
**[Ref. book 2**-Chapter 14,15]

## 3.Crash recovery

- Transaction failure classification
- Recovery concepts
- Checkpoints
- Recovery with concurrent transactions (rollback, checkpoints, commit)
- Log base recovery techniques (Deferred and Immediate update)
- Buffer Manager
- Relationship between Recovery manager and Buffer manager(steal / force algorithm)
- Database backup and recovery from catastrophic failure

[Ref. book 1-Chaper 19]

| Unit 3: Database security and Client-server technology | 10 |
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### 4. Database security techniques
- Introduction to database security concepts
- Methods for database security
  - Discretionary access control method
  - Mandatory access control and role base access control for multilevel security
- Use of views in security enforcement
- Overview of encryption technique for security
- Statistical database security

[Ref. book 1-Chaper 23]

### 5. Client-Server Technology

- Client-server computing
- Evolution of Client - Server information systems
- Client – Server Architecture benefits
- Client Server Architecture(2 tier and 3 tier)
  - Components, principles, client components
  - Communication middleware components
  - Database middleware components
  - Client-Server Databases
- Practical demonstration on installation process-Postgresql (Client-Server)

[Ref. book 2-Chaper 17]

*Contact hours – 12 hours

### Recommended Reference Books:

1. Elmasri, Navathe, *Fundamentals of Database Systems* -5th edition –Pearson.
2. A. Silberschatz, Henry F. Korth, S. Sudarshan, *Database System Concepts*-6th edition-McGraw-Hill
3. Joshua D. Drake, John C Worsley, *Practical Postgresql* , (O'Reilly publications)

### Reference Links:

- http://www.postgresql.org/docs/9.3/static/tutorial.html