

## CP201: Database Management Systems

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
4	0	2	6	70	30	30	20	150

### Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p><b><u>Introduction:</u></b></p> <p>Database system applications; Purpose of Database Systems, View of Data, Data models, Approaches to building a database, Database management system(DBMS), Three levels of the architecture, Challenges in building a DBMS, Various components of a DBMS architecture.</p>	08
2	<p><b><u>Database Models:</u></b></p> <p>ER-Model: Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema.</p> <p>Relational Data Model: Concept of relations, Schema-instance distinction. Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax; All set Operators.</p>	10
3	<p><b><u>Relational algebra query &amp; operators:</u></b></p> <p>Selection, Projection, Cross product, Various types of joins, Division, Example queries, Tuple relation calculus, Domain relational calculus, Converting the database specification in E/R notation to the relational schema.</p>	06
4	<p><b><u>SQL:</u></b></p> <p>Appropriate tool for DBMS, Basics of SQL, DDL, DML, DCL, structure creation, alteration, defining constraints, Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. Transaction control commands, Commit, Rollback, Save point. Embedded SQL, PL SQL Concepts, Cursors, Stored Procedures, Stored Function, Database Triggers.</p>	10

5	<b><u>Dependencies and Normal Forms:</u></b>	10
	Importance of a good schema design, Problems encountered with bad schema designs, Motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, Closure of a set of FD's, Minimal covers, Definitions of 1NF, 2NF, 3NF and BCNF, Decompositions and desirable properties of them, Algorithms for 3NF and BCNF normalization, Multi-valued dependencies and 4NF, Join dependencies and definition of 5NF.	
6	<b><u>Transaction Processing and Error Recovery:</u></b>	06
	Concepts of transaction processing, ACID properties, Concurrency control, Locking based protocols for CC, Error recovery and logging, Undo, Redo, Undo-redo logging and recovery methods; Backup Methods.	
7	<b><u>Query Processing &amp; Query Optimization:</u></b>	06
	Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, and materialized views.	
8	<b><u>Security:</u></b>	04
	Discretionary and Mandatory Access Control; Audit Trails; Multi-Level Security; Statistical Databases; Data Encryption.	

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<b>Total Hrs.</b>	<b>60</b>
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**Reference Books:**

1. A Silberschatz, H F Korth and S Sudarshan, “*Database System Concepts*”, McGRAW Hill.
2. C. J. Date, A. Kennan, and S. Swamynathan, “*An Introduction to Database Systems*”, Person.
3. Ramez Elmasri and Shamkant B Navathe, “*Fundamentals of Database Systems*”, Addison Wesley.
4. Ivan Bayross, “*SQL, PL/SQL the Programming Language of Oracle*”, BPB Publication.
5. Ramkrishnan, Raghu, “*Database Management Systems*”, Mc-Graw Hill (E-book available on the BVM intranet).