



BHARATI VIDYAPEETH'S
INSTITUTE OF COMPUTER APPLICATIONS & MANAGEMENT (BVICAM)
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Lesson Plan Version 1.0

Course: MCA-107 - Database Management Systems		
MCA - 1st Semester	No. of Theory Hours per Week: 04	No. of Practical Hours per Week: 2 (1 Lab of 2 hours / week)

Course Outcome (CO):

COs for Theory (MCA-107):	
CO1	Explain the various database components, models, DBMS architecture and Database Security (BTL2)
CO2	Apply relational database theory to construct relational algebra expression, tuple and domain relation expression for SQL queries (BTL3)
CO3	Construct advanced SQL queries on data and apply Procedural abilities through PL/SQL. (BTL4)
CO4	Examine the use of normalization and functional dependency for database design. (BTL4)
CO5	Appraise the concepts of transaction, concurrency control and recovery in databases. (BTL5)

Recommended Books:

Books	S. N.	Details of the Books
Text Books	1.	Elmsari and Navathe, "Fundamentals of Database Systems", Pearson Education, 7th Edition, 2016. [EN]
	2.	Korth, Silberschatz, "Fundamentals of Database System Concepts", TMH, 6th Ed., 2010. [KS]
	3.	Ivan Bayross, "SQL, PL/SQL the Programming language of Oracle", BPB Publications, 2010. [IB]
Reference Books	1.	Ullman J. D., "Principals of Database Systems", Galgotia Publications, 2nd Edition, 1999. [JD]
	2.	C.J.Date, A. Kannan, S. Swamynathan "An Introduction to Database Systems", Pearson Education, 8th Edition, 2006. [CJ]
	3.	Desai B., "An Introduction to Database Concepts", Galgotia Publications, New Delhi. [BD]
	4.	Shio Kumar Singh, "Databases Systems Concepts, Design and Applications", Pearson Publication, 2nd Edition, 2011. [SK]
	5.	Rajiv Chopra, "Database Management System (DBMS) - A Practical Approach", S. Chand & Company Pvt. Ltd., 4th Edition, 2014 [RC]

Lesson Plan for Theory:

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
UNIT I		
1.	Basic concepts: Database and types of users	Chapter - 1 [KS] Chapter - 1 [BD]
2.	Characteristics of the Database - Advantages and comparison with Flat files	Chapter - 1 [KS] Chapter - 1 [BD]
3.	Overview of hierarchical, Network Data Base Management Systems	Chapter - 2 [BD]
4.	Data Abstraction and 3-tier architecture	Chapter - 1 [BD]
5.	DBMS architecture & data independence and Mapping between views	Chapter - 1 [BD]
6.	Data modeling using the Entity-Relationship Diagrams (ERDs) and concepts of keys	Chapter - 7 [KS] Chapter - 2 [BD]
7.	Types of relationships 1:1, 1:M & M:N and Roles in a relationship	Chapter - 7 [KS] Chapter - 2 [BD]
8.	Strong and Weak Entities	Chapter - 2 [BD]
9.	Generalization and Specialization	Chapter - 2 [BD]
10.	Aggregation Form1 and Form 2	Chapter - 2 [BD]
11.	Extended ERDs and Redundant relationships	Chapter - 7 [KS]
12.	EF Codd's Rules	Chapter - 2 [BD]
13.	Buffer Reserved for Revision	
UNIT II		
14.	Introduction to Relational Algebra with relational model concepts and constraints	Chapter - 6 [KS] Chapter - 4 [BD]
15.	Integrity rules - Referential Integrity and Entity integrity	Chapter - 6 [KS] Chapter - 4 [BD]
16.	Set Oriented Operations - Union, Intersection, Difference and Cartesian product	Chapter - 6 [KS] Chapter - 4 [BD]
17.	Selection, Projection, Join and Division Operation	Chapter - 6 [KS] Chapter - 4 [BD]
18.	Types of Joins	Chapter - 10 [IB]
19.	View and Queries in SQL	Chapter - 7,8 [IB]
20.	Various built-in functions in SQL - Numeric, String and Date functions	Chapter - 8,9 [IB]

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
21.	Constraints - Primary Key, Foreign Key, NULL value, UNIQUE, Check and Default values	Chapter - 8 [IB]
22.	Introduction to indexes and types of indexes in SQL and Sequences	Chapter - 11 [IB]
23.	Buffer Reserved for Revision	
UNIT III		
24.	Introduction to Normalization, Function dependencies & its types	Chapter - 8 [KS] Chapter - 6 [BD]
25.	Closure of a set, finding keys, minimal set and canonical cover	Chapter - 8 [KS] Chapter - 6 [BD]
26.	Armstrong's Aximos	Chapter - 8 [KS] Chapter - 6 [BD]
27.	Normal forms - 1 NF and 2 NF with partial dependencies	Chapter - 8 [KS] Chapter - 6 [BD]
28.	Normal form - 3 NF and BCNF	Chapter - 8 [KS] Chapter - 6 [BD]
29.	Lossless join and dependency preserving decomposition.	Chapter - 8 [KS]
30.	Normal form - 4 NF and 5 NF (Join Dependencies and Multi-valued dependencies)	Chapter - 8 [KS]
31.	Basics of PL/SQL and introduction to Stored Procedures	Chapter - 18 [IB]
32.	Procedures vs. User Defined Functions	Chapter - 18 [IB]
33.	Implicit and Explicit Cursors	Chapter - 16 [IB]
34.	Exception Handling in Pl/SQL code	Chapter - 17 [IB]
35.	Triggers and types - Before and after triggers	Chapter - 18 [IB]
36.	Buffer Reserved for Revision	
UNIT IV		
37.	Introduction to transaction management and ACID properties of a transaction	Chapter - 14 [KS]
38.	Database backup and recovery techniques - Log based recovery, Deferred modification scheme, Checkpoints and Shadow paging	Chapter - 16 [KS]
39.	Buffer Reserved for Revision	

Lecture No.	Topics / Concepts to be Covered	Reference of the Book and its Chapter
40.	Introduction to Concurrency, Schedule and its types	Chapter - 14 [KS] Chapter - 12 [BD]
41.	Problems due to concurrent execution of transactions - lost update problem, dirty reads and unrepeatable read problems	Chapter - 14 [KS] Chapter - 12 [BD]
42.	Conflict vs. view serializability	Chapter - 14 [KS] Chapter - 12 [BD]
43.	Testing for serializability, cascading schedules and recoverability	Chapter - 14 [KS] Chapter - 12 [BD]
44.	Concurrency Control Protocols - 2PL and variants	Chapter - 15 [KS] Chapter - 12 [BD]
45.	Lock conversions and Timestamp based protocols	Chapter - 15 [KS] Chapter - 12 [BD]
46.	Graph based protocols and Deadlock handling in transactions	Chapter - 15 [KS] Chapter - 12 [BD]
47.	Introduction to object-oriented database management systems, Object definition and object structures	Chapter - 18 [KS]
48.	Object oriented concepts, Object Query Language (OQL) and its comparison with SQL	Chapter - 18 [KS]
49.	Introduction to distributed databases	Chapter - 19 [KS]
50.	Forms of data distribution	Chapter - 19 [KS]
51.	Overview of Database Security Concepts, security issues and control mechanism.	Chapter - 21 [KS]
52.	Buffer Reserved for Revision	

Course Outcome (CO):

Course: MCA-167 - Database Management System Lab	
MCA - 2 nd Semester	No. of Practical Hours per Week: 2 (1 Lab of 2 hours / week)

COs for Practical (MCA-165):	
CO1	Implement relational data models using SQL commands. (BTL3)
CO2	Manage database using advanced features of SQL like views, indexes, synonyms, etc.(BTL4)
CO3	Use procedures, cursors and triggers for application development. (BTL3)
CO4	Implement the normalized tables and transaction management using SQL commands for effective database design. (BTL3)
CO5	Work in teams to design and implement database for real life problems. (BTL6)

Lesson Plan for Practical:

Week No.	Lab No.	Topics / Concepts to be Covered	Reference of Lab Manual
1.	1.	Basic DDL/DML queries, views and sub-queries	Assignment A (Problem AP1)
2.	2.	Advanced SQL queries based on Constraints, Sequences, Indexes and Union, Intersect and Minus clauses	Assignment A (Problem AP2)
3.	3.	Joining tables in SQL for fetching desired records	Assignment B (Problem BP1)
4.	4.	Using Built-in functions	Assignment C (Problem CP1)
5.	5.	Buffer Reserved for Revision	Assignment A - C
6.	6.	Basic PL/SQL programs	Assignment D (Problem DP1 - DP3)
7.	7.	Transaction management - using savepoint, rollback and commit	Assignment D (Problem DP4 - DP5)
8.	8.	Implicit and Explicit cursors	Assignment E (Problem EP1-EP2)
9.	9.	Implicit and Explicit cursors with Exception handling	Assignment E (Problem EP3-EP4)
10.	10.	Buffer Reserved for Revision	Assignment D - E
11.	11.	Procedures and Functions	Assignment F (Problem FP1-FP4)
12.	12.	Before and After Triggers	Assignment G (Problem GP1-GP2)
13.	13.	Buffer Reserved for Revision	Assignment F - G

Testing Schedule:

Nature of Test	January	February	March	April
Surprise Test (ST)			ST in any of the Weeks	
Mid Term Test (MT)		MT in 2 nd / 3 rd Week		

Nature of Test	January	February	March	April
Class Test (CT)	CT-1 in any of the Weeks			CT-2 in any of the Weeks
Supplementary Test (Sp.T)				Sp. T in 1 st week
Assignment Submission Schedule	<p>Assignment-1 is to be submitted One Week after completion of Unit-1 and Unit-2.</p> <p>Assignment-2 is to be submitted One Week after completion of Unit-3.</p> <p>Assignment-3 is to be submitted One Week after completion of Unit-4.</p>			

Suggested Topics for Presentation:

S. No.	Suggested Topics for Presentation
1.	3-tier Architecture of DBMS and Data Independence
2.	Extended ERDs
3.	Superclass and Subclass relationships
4.	Types of Indexes in SQL
5.	Types of Joins
6.	Unnormalized relations and need for normalization
7.	Finding keys and types of keys
8.	Oracle Logical and Physical architecture
9.	ACID properties of a transaction
10.	Recovery techniques
11.	Locking protocols
12.	Deadlocks in transactions and recovery from deadlocks
13.	Timestamp based protocols
14.	Types of serializability
15.	Transparency in distributed databases

Suggested Topics for Projects:

S. No.	Suggested Topics for Projects:
1.	ERD for National Hockey League
2.	ERD for Cricket Cup Tournament
3.	ERD for Online Book-Sellers
4.	ERD for a Library

S. No.	Suggested Topics for Projects:
5.	ERD for a Movie Ticketing Systems
6.	ERD for Airline Reservation
7.	ERD for a Post Office
8.	ERD for Car Insurance Company
9.	ERD for Railway Reservation System
10.	ERD for University Examination System
11.	ERD for College Departments
12.	ERD for a Manufacturing Firm
13.	ERD for Movie Production House
14.	ERD for Hotel Management System
15.	ERD for a hospital Management System