

Name of the college: Government College of Arts, Science and Commerce, Sanquelim - Goa		
Name of Faculty: Nilesh Natekar	Subject: Computer Science	
Paper code: CSC308 – Database Management System	Program/Course: T.Y.B.Sc.	Division: A
Academic year: 2025 - 2026	Semester: V	Total Lectures: 45 + 30
Course Objectives: 1. To provide a comprehensive understanding of database systems. 2. To encompass relational, NoSQL, and cloud-native databases, data warehousing, data lakes, and modern data lake house architectures. 3. To gain practical exposure to industry-relevant tools and services, and to prepare them for roles in data engineering, analytics, and cloud infrastructure..		
Course Learning Outcome: Upon completion of the course students should be able to:: CO1. Remember the basic concepts and terminologies of DBMS, ERD, Normalization, and Transaction Management, Recovery and Security. CO2. Understand ER diagrams, Normalization, Relational Operations, modern data lakehouse architectures. CO3. Apply concepts of relational, NoSQL, and serverless cloud databases. Apply data security and optimization strategies in cloud environments CO4. Implement and query cloud data lakes and warehouses.		

Month	Lectures From: To:	No. of lecture s allotted	Topic, Subtopic to be covered	Learning outcome	ICT Tools	Reference books
June	23/06/2025 to 28/06/2025	03	Database concepts: Data, DBMS, RDBMS Data models: Hierarchical, Network, Relational, Object- oriented. Keys, constraints, ER diagrams.	1. Introduce database concepts 2. Draw ER Diagrams	Microsoft Powerpoint Presentation, LCD Projector	1. Elmasri, R., & Navathe, S. B. (2015). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson Education. 2. Silberschatz, A., Korth, H., & Sudarshan, S. (2013). <i>Database System Concepts</i> (6th ed.). McGraw Hill.
June/July	30/06/2025 to 05/07/2025	03	Normalization (1NF to 5NF): Understanding and achieving 1NF, 2NF, 3NF, and Boyce-Codd Normal Form (BCNF), with an introduction to 4NF and 5NF.	1. Normalize tables	Microsoft Powerpoint Presentation, LCD Projector	1. Elmasri, R., & Navathe, S. B. (2015). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson Education. 2. Silberschatz, A., Korth, H., & Sudarshan, S. (2013). <i>Database System Concepts</i> (6th ed.). McGraw Hill.
July	07/07/2025 to 12/07/2025	03	Data governance, security principles. Introduction to NoSQL categories: Document (eg. MongoDB), Key- Value, Column-Family, Graph databases. Relational model concepts: keys, constraints.	1. Introduce NOSQL databases 2. Explain relational model concepts	Microsoft Powerpoint Presentation, LCD Projector	1. Kristina Chodorow(2013), <i>MongoDB – The Definitive Guide</i> , O’Reilly Media 2 nd Edition

July	14/07/2025 to 19/07/2025	03	Relational algebra: operations - selection, projection, union, intersection, set difference, join, division	1. Perform relational algebra queries	Microsoft Powerpoint Presentation, LCD Projector	1. Elmasri, R., & Navathe, S. B. (2015). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson Education. 2. Silberschatz, A., Korth, H., & Sudarshan, S. (2013). <i>Database System Concepts</i> (6th ed.). McGraw Hill.
July	21/07/2025 to 26/07/2025	03	SQL basics: DDL, DML, DCL, TCL. Advanced SQL: • Joins (inner, outer, cross). • Subqueries (correlated and non-correlated). • Views. • Indexes. • Triggers. • Stored procedures.	1. Perform SQL queries 2. Perform advanced SQL operations	Microsoft Powerpoint Presentation, LCD Projector	1. Elmasri, R., & Navathe, S. B. (2015). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson Education. 2. Silberschatz, A., Korth, H., & Sudarshan, S. (2013). <i>Database System Concepts</i> (6th ed.). McGraw Hill.
July/August	28/07/2025 to 02/08/2025	03	NoSQL databases: Document (MongoDB), Key-Value, Column- family, Graph. Cloud database models: IaaS, PaaS, SaaS. AWS RDS (eg. MySQL/PostgreSQL), Google Cloud SQL.	1. Explain NoSQL databases and cloud databases	Microsoft Powerpoint Presentation, LCD Projector	1. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 2. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 3. AWS Free Tier Labs / Google Cloud Skill Boosts (https://www.cloudskillsboost.google/)

						1. Kristina Chodorow(2013), <i>MongoDB – The Definitive Guide</i> , O'Reilly Media 2 nd Edition
August	04/08/2025 to 09/08/2025	03	Serverless databases: AWS Aurora Serverless. DynamoDB (AWS NoSQL). Cloud security (IAM, encryption, VPCs), performance monitoring. Data modelling for NoSQL	1. Explain serverless databases 2. Explain cloud security 3. Explain data modeling for NoSQL	Microsoft Powerpoint Presentation, LCD Projector	1. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 2. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 3. AWS Free Tier Labs / Google Cloud Skill Boosts (https://www.cloudskillsboost.google/)
August	11/08/2025 to 16/08/2025	03	Data Warehousing : • OLTP vs. OLAP. • Star and Snowflake schemas. • ETL/ELT concepts. • Cloud Data Warehouses: Google BigQuery, AWS Redshift, A brief introduction to Snowflake a popular cloud	1. Explain data warehousing concepts	Microsoft Powerpoint Presentation, LCD Projector	1. Upm Mailk, Matt Goldwasser, Benjamin Johnston(2019) <i>SQL for Data Analytics</i>, Packt Publishing

			data warehousing service.			
August	18/08/2025 to 23/08/2025	03	What are data lakes? Use cases for data lakes in modern data platforms (e.g., big data analytics, machine learning).	1. Explain Data lakes	Microsoft Powerpoint Presentation, LCD Projector	1. Upm Mailk, Matt Goldwasser, Benjamin Johnston(2019) <i>SQL for Data Analytics</i> , Packt Publishing
August/ September	25/08/2025 to 06/09/2025	03	Amazon S3 (Simple Storage Service) : - Object storage principles. - Data lake architecture and usage. Amazon Athena: - Serverless querying over data in S3, using the data catalog provided by AWS Glue. - Query optimization and partitioning	1. Explain Amazon S3 and Amazon Athena	Microsoft Powerpoint Presentation, LCD Projector	1. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 2. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 3. AWS Free Tier Labs / Google Cloud Skill Boosts (https://www.cloudskillsboost.google/)

September	08/09/2025 to 13/09/2025	03	Transaction management, concurrency control. Distributed transactions and modern concurrency methods.	1. Explain transaction management and concurrency control methods	Microsoft Powerpoint Presentation, LCD Projector	1. Elmasri, R., & Navathe, S. B. (2015). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson Education. 2. Silberschatz, A., Korth, H., & Sudarshan, S. (2013). <i>Database System Concepts</i> (6th ed.). McGraw Hill.
September	15/09/2025 to 20/09/2025	03	Database recovery strategies.	1. Explain database recovery techniques	Microsoft Powerpoint Presentation, LCD Projector	1. Elmasri, R., & Navathe, S. B. (2015). <i>Fundamentals of Database Systems</i> (7th ed.). Pearson Education. 2. Silberschatz, A., Korth, H., & Sudarshan, S. (2013). <i>Database System Concepts</i> (6th ed.). McGraw Hill.
September	22/09/2025 to 27/09/2025	03	Access control, encryption, auditing. Cloud database security best practices (AWS & GCP).	1. Explain Access control, encryption and auditing 2. Explain cloud database best practices	Microsoft Powerpoint Presentation, LCD Projector	1. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 2. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 3. AWS Free Tier Labs / Google Cloud Skill Boosts (https://www.cloudskillsboost.google/)
September/ October	29/09/2025 to 04/10/2025	03	Query optimization techniques. Indexing and performance tuning.	1. Explain query optimization techniques 2. Explain indexing and performance tuning	Microsoft Powerpoint Presentation, LCD Projector	1. Upm Mailk, Matt Goldwasser, Benjamin Johnston(2019) <i>SQL for Data Analytics</i>, Packt Publishing

October	06/10/2025 to 11/10/2025	03	Denormalization and its practical applications. Cost management in cloud database platforms.	1. Explain denormalization 2. Assess cost management in cloud databases	Microsoft Powerpoint Presentation, LCD Projector	1. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 2. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 3. AWS Free Tier Labs / Google Cloud Skill Boosts (https://www.cloudskillsboost.google/)
October	13/10/2025 to 18/10/2025	03	Revision		Microsoft Powerpoint Presentation, LCD Projector	

Practical Component

Month	Lectures From: To:	No. of lectures allotted	Topic, Subtopic to be covered	Learning outcome	ICT Tools	Reference books
June	23/06/2025 to 28/06/2025	02	1. Introduction and installation of DBMS Software 2. Database creation, alteration and deletion 3. Table creation, alteration, and Deletion 4. Identify and add appropriate data types to the fields	1. Database software installation 2. Basic database operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
June/July	30/06/2025 to 05/07/2025	02	1. Add primary key and domain constraints to the table 2. Inserting data in the created tables 3. Data Manipulation language: Simple select query, Select with where clause	1. Basic database operations 2. Data Manipulation operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm

July	07/07/2025 to 12/07/2025	02	1. Data Manipulation language: Simple select query, Select with where clause	1. Data Manipulation operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
July	14/07/2025 to 19/07/2025	02	1. Data Manipulation language: Simple select query, Select with where clause	1. Data Manipulation operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
July	21/07/2025 to 26/07/2025	02	1. Data Manipulation language: Simple select query, Select with where clause	1. Data Manipulation operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
July/August	28/07/2025 to 02/08/2025	02	- Joins - Subqueries	1. Perform joins and subqueries	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
August	04/08/2025 to 09/08/2025	02	- Joins - Subqueries	1. Perform joins and subqueries	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
August	11/08/2025 to 16/08/2025	02	- Joins - Subqueries	1. Perform joins and subqueries	Microsoft Powerpoint Presentation,	https://www.tutorialspoint.com/dbms/relational_algebra.htm

					LCD Projector	
August	18/08/2025 to 23/08/2025	02	1. Group function and having clause	1. Perform grouping functions	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
August/ September	25/08/2025 to 06/09/2025	02	1. Operators 2. Aggregate Functions	1. Use various operators and perform aggregate functions	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
September	08/09/2025 to 13/09/2025	02	1. Set operations 2. Sorting data	1. perform set operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
September	15/09/2025 to 20/09/2025	02	Advanced SQL - Views - Triggers	1. Perform advanced SQL operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
September	22/09/2025 to 27/09/2025	02	- Procedures - Transactions	1. Perform advanced SQL operations	Microsoft Powerpoint Presentation, LCD Projector	https://www.tutorialspoint.com/dbms/relational_algebra.htm
September/ October	29/09/2025 to 04/10/2025	02	1. MongoDB CRUD operations and indexing. Data Modelling 2. Google BigQuery: Dataset creation,	1. Perform MongoDB CRUD operations 2. Perform operations on Google BigQuery	Microsoft Powerpoint Presentation, LCD Projector	1. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 2. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 3. AWS Free Tier Labs / Google Cloud Skill Boosts

			querying, partitioning, clustering.			(https://www.cloudskillsboost.google/)
October	06/10/2025 to 11/10/2025	02	1. Amazon S3: Bucket management, uploading structured/semi- structured data. 2. Amazon Athena: Querying S3 data, partitioning, integrating with Glue Data Catalog.	1. Perform operations on Amazon S3 and Amazon Athena	Microsoft Powerpoint Presentation, LCD Projector	4. AWS Documentation: RDS, DynamoDB, Athena, S3 (https://docs.aws.amazon.com/athena/latest/ug/connectors-dynamodb.html) 5. Google BigQuery Documentation (https://cloud.google.com/bigquery/docs) 6. AWS Free Tier Labs / Google Cloud Skill Boosts (https://www.cloudskillsboost.google/)
October	13/10/2025 to 18/10/2025	02	REVISION		Microsoft Powerpoint Presentation, LCD Projector	

