

MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL
(Formerly West Bengal University of Technology)
Syllabus of BCA
(Effective from 2023-24 Academic Sessions)

SEMESTER: IV

DEFINITION OF CREDIT

1 HR LECTURE PER WEEK	1 CREDIT
1 HR TUTORIAL PER WEEK	1CREDIT
2 HR PRACTICAL PER WEEK	1 CREDIT

SUBJECT NUMBERING SCHEME:

CODE FOR THE DEPT. OFFERING SUBJECT	SUBJECT TYPE	SEM	SUBJECT CODE
--	--------------	-----	--------------

C	CORE MAJOR
---	------------

SUBJECT NAME: Data Base Management System
SUBJECT CODE: BCAC401

Credit: 5 (3L + 2P)

COURSE OBJECTIVE:

The course on Database Management Systems (DBMS) aims to equip students with a comprehensive understanding of the core principles and practical applications of managing data effectively within organizational contexts. Throughout the course, students will delve into the fundamental concepts of database design, data manipulation, and database administration. They will learn to design efficient and robust databases using entity-relationship modeling and normalization techniques, ensuring data integrity and optimal performance. By the end of the course, students will be proficient in designing, implementing, and managing databases to support decision-making processes and organizational objectives effectively.

COURSE OUTCOME	
CO1	Understand the fundamental concepts and principles of database management systems (DBMS), including data modeling, database design, and normalization.
CO2	Demonstrate proficiency in using SQL (Structured Query Language) to perform data definition, manipulation, and query tasks in a relational database environment.

CO3	Apply indexing and query optimization techniques to enhance the performance of database systems
CO4	Evaluate different types of database architectures, such as centralized, distributed, and client-server architectures, and comprehend their advantages and limitations.

DETAILED SYLLABUS:

Module No:	NAME OF THE TOPIC	HOURS	L	T	MAR KS
M1	Introduction: Concept & Overview of DBMS, Data Models, Database Languages, Database Administrator, Database Users, Data Abstraction, Three Schema architecture of DBMS.	2	2		2
M2	Entity Relationship Model: Entity Set, Simple and composite Attribute, Single valued and multivalued attribute, Relationship sets, Mapping cardinality, keys, Binary vs n-ary relationship, Entity Relationship Diagram : Need for E-R Model, Various steps of database design, Mapping Constraints, E-R diagram, Subclass, Generalization, Specialization, Aggregation, Strong Entity-Weak Entity, Tabular representation of Strong entity set, tabular representation of weak entity set, ER diagram and corresponding UML diagram	5	4	1	10
M3	Relational Algebra: Select operation, Project Operation, Set operations (union, intersection, difference), Join operations, Division operation, outer join and outer union, Examples queries in Relational Algebra	4	3	1	8
M4	SQL : Concept of DDL, DML. Basic Structure Relational databases and tables, Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, assertions, views, Nested Subqueries, Stored procedures, cursors and triggers.	4	3	1	10
M5	Relational Model and Relational Database Design: Concept of Relational Model, Design Issues, Keys, Closure set, Functional Dependency, Different anomalies in designing a Database., Normalization using functional dependencies, Decomposition, Boyce-Codd	10	7	3	14

	Normal Form, 3NF, Normalization using multivalued dependencies, 4NF,5NF.				
M6	Indexing and Hashing: Ordered indices (Primary Index, Dense and Sparse Indices), Secondary Index, B tree and B+ tree indexing, Hashing Concepts and its implementation Basic query optimization techniques, Cost estimation in query optimization	10	7	3	14
M7	Transaction Management: Transaction definition, properties, transaction state diagram, commit and rollback, Serializability (Conflict and View), Concurrency control, lock based protocols, Two phase locking, Timestamp ordering protocol, Recovery management, Deadlock handling and prevention	10	8	2	12
	INTERNAL EXAMINATION	3			30
	TOTAL	48	34	11	100

Practical:

SUBJECT NAME: DBMS Lab
SUBJECT CODE: BCAC491

Credit: 2

Use any database for the SQL implementation

List of sample Questions for Practical:

1. Write a SQL query to retrieve all columns from a table named "Employees."
2. How do you select distinct values from a column in SQL?
3. Write a SQL query to retrieve all records from the "Orders" table where the order amount is greater than 1000.
4. Explain the difference between INNER JOIN and LEFT JOIN in SQL with an example.
5. How do you use the WHERE clause to filter rows in SQL?
6. Write a SQL query to calculate the total number of orders for each customer from the "Orders" table.
7. What is the purpose of the GROUP BY clause in SQL? Provide an example query.
8. How do you use the HAVING clause in SQL? Provide an example.
9. Write a SQL query to update the salary of an employee with ID 101 to 50000.
10. How do you delete records from a table in SQL? Provide an example.
11. Explain the concept of foreign keys in SQL with an example.
12. Write a SQL query to retrieve the top 5 highest-paid employees from the "Employees" table.
13. How do you use the ORDER BY clause in SQL? Provide an example query.
14. Explain the difference between the UNION and UNION ALL operators in SQL.