National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	**Master of Computer Applications**	Year of Regulation	**2024-25**
Department	**Computer Science and Engineering**	Semester	**III**

Course Code	Course Name	Pre-Requisite	Credit Structure				Marks Distribution			
			L	T	P	C	INT	MID	END	Total
CA503	**Database Management Systems**		**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives

- **To understand the fundamentals concepts of database, operation of relational data model and its requirement in an organization.**
- **To understand the various relational data models, application of relational data models to design logical database including E- R diagrams and database normalization. And also write the simple and optimized advanced database queries using Structured Query Language (SQL).**
- **To develop and ability to design and implement a small database project using Structured Query Language (SQL).**
- **To understand the requirement of database tuning, concept of a database transaction, including concurrency control, backup & recovery, data object locking protocols and role of database administrator.**

Course Outcomes

CO's	Statement	Bloom's Taxonomy
CA503.1	**Able to understand the fundamental components of database systems, Relational Database Management System and its need towards an organization.**	**understand**
CA503.2	**Able to demonstrate the data models, analyse the real world problems and requirements, to give the appropriate solution using the principles of Entity Relationship Diagram.**	**Analyse**
CA503.3	**Able to attain the practical understanding of SQL, convert the Entity relationship model to relational tables, operations to store the data using queries.**	**Analyse**
CA503.4	**Able to apply the principles of normalization to remove the redundancy and inconsistency to improve the performance using database tuning and query optimization.**	**Apply**
CA503.5	**Able to understand the concurrent transactions, Problems such as failures, solutions to solve the concurrency problems & recovery from failure using protocols**	**Understand**

COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CA503.1	3	3							2				3		3
CA503.2	3	3	3	1	2				1				2	3	2
CA503.3	1	2	3	3	2	2							2	3	3
CA503.4	1	2	3	3	3	2	3		2			1	2	3	2
CA503.5	2	3	3	2	2	3	2		2			1	3	3	3
CA503	**2**	**2.6**	**2.4**	**1.8**	**1.8**	**1.4**	**1**		**1.4**			**0.4**	**2.4**	**2.4**	**2.6**

SYLLABUS

No.	Content	Hours	COs
I	**Introduction to Database: Purpose of database systems, data abstraction and modeling, instances and schemes, database manager, database users and their interactions, data definition and manipulation language, data dictionary, overall system structure.**	**03**	**CA503.1 CA503.2**
II	**Entity-relationship model: Entities and entity sets, relationships and relationship sets, mapping constraints, E-R diagram, primary keys, strong and weak entities, reducing E-R diagrams to tables, trees or graphs, generalization and specialization, aggregation.**	**05**	**CA503.1 CA503.2**
III	**Brief Introduction to hierarchical and network model: Data description and tree structure diagram for hierarchical model, retrieval and update facilities, limitations; Database task group (DBTG) model, record and set constructs retrieval and update facilities, limitations.**	**05**	**CA503.2 CA503.3**
IV	**Relational model and Query optimization: Structure of a relational database, operation on relations, relational algebra, tuple and domain relational calculus, salient feature of a query language, Structured query language: Description an actual RDBMS and SQL. Importance of query processing, equivalence of queries, cost Estimation for processing a query, general strategies, bi-relational and multi-relational join algorithms, algebraic manipulation.**	**08**	**CA503.2 CA503.3 CA503.4**
V	**Normalization: Pitfalls in RDBMS, importance of normalization, functional, multi-valued and join dependencies, 1NF to 5NF, limitations of RDBMS.**	**07**	**CA503.4 CA503.5**
VI	**Database tuning: Index selection and clustering, tuning of conceptual schema, denormalization, tuning queries and views.**	**04**	**CA503.2 CA503.4**
VII	**Crash recovery: Failure classification, transactions, log maintenance, check point implementation, shadow paging, example of an actual implementation**	**04**	**CA503.5**
VIII	**Concurrency Control in RDBMS: Testing for serializability, lock based and time-stamp based protocols; Deadlock detection and Recovery**	**06**	**CA503.4 CA503.5**
	Total	**42**	

Essential Readings

1. Silberschatz, Korth and Sudarshan, Database system concepts, McGraw Hill, 7th Edition, 2019.
2. C.J. Date, An Introduction to Database Systems (8th Edition), Pearson, 8th Edition, 2004.

3. Steven Feuerstein, Bill Pribyl, “Oracle PL/SQL Programming,”, O'Reilly Media, 6th Edition, 2014.

Supplementary Readings

1. Elmasri and Navathe, Fundamentals of database systems; Pearson, 7th Edition, 2016.
2. Raghu Ramakrishnan and Gehrke, Database Management System, McGraw-Hill, 3rd Edition, 2014.
3. C. J. Date, SQL and Relational Theory: How to Write Accurate SQL Code , O'Reilly Media, 3rd Edition, 2015.