National Institute of Technology Meghalaya
An Institute of National Importance

CURRICULUM

Programme	**Bachelor of Technology in Computer Science and Engineering**	Year of Regulation	**2019-2020**
Department	**Computer Science and Engineering**	Semester	**V**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
CS 303	**Database Management Systems**	3	1	0	4	50	50	100	200

Course Objectives		Course Outcomes	
	To understand the fundamentals concepts of database, operation of relational data model and its requirement in an organization.	CO1	Able to describe the fundamental components of database systems, Relational Database Management System and its need towards 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).	CO2	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.
	To develop and ability to design and implement a small database project using Structured Query Language (SQL).	CO3	Able to attain the practical understanding of SQL, convert the Entity relationship model to relational tables, operations to store the data using queries.
	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.	CO4	Able to apply the principles of normalization to remove the redundancy and inconsistency to improve the performance using database tuning and query optimization.
		CO5	Able to understand the concurrent transactions, Problems such as failures, solutions to solve the concurrency problems & recovery from failure using protocols

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	3	3	0	0	0	0	0	0	2	0	0	0	3	0	3
2	CO2	3	3	3	1	2	0	0	0	1	0	0	0	2	3	2
3	CO3	1	2	3	3	2	2	0	0	0	0	0	0	2	3	3
4	CO4	1	2	3	3	3	2	3	0	2	0	0	1	2	3	2
5	CO5	2	3	3	2	2	3	2	0	2	0	0	1	3	3	3

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	CO1 CO2
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.	06	CO1 CO2
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	CO2 CO3
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.	09	CO2 CO3 CO4
V	**Normalization:** Pitfalls in RDBMS, importance of normalization, functional, multi-valued and join dependencies, 1NF to 5NF, limitations of RDBMS.	08	CO4 CO5
VI	**Database tuning:** Index selection and clustering, tuning of conceptual schema, denormalization, tuning queries and views.	05	CO2 CO4
VII	**Crash recovery:** Failure classification, transactions, log maintenance, check point implementation, shadow paging, example of an actual implementation	06	CO5
VIII	**Concurrency Control in RDBMS:** Testing for serializability, lock based and time-stamp based protocols; Deadlock detection and Recovery	08	CO4 CO5
	Total	50	

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.