GOAPAL KRISHNA COLLEGE OF ENGINEERING AND TECHNOLOGY
GOURAHARI VIHAR, PO: RANIPUT, JEYPORE – 764 005

LESSON PLAN

Name of the Subject: CSPC2004 DATABASE ENGINEERING
Session : 2024-25
Name of the Faculty: Amod Kumar Bagh
Semester: 4th **Branch:** Computer Sc. & Engg.
Semester From: **No. of Hours:** 40

WEEK	DAY	THEORY TOPICS	CLASSES
Module-I: Introduction to Databases and overview of Database Languages and architecture:			**8**
1	1	Overview, Database System vs File System,	1
	2	Overall Database Structure, Characteristics of database approach, Advantages of using the DBMS approach,	1
	3	History of database applications, Database System Concept, Types of users,	1
	4	Database design lifecycle, Data Model Schema and Instances,	1
2	5	Types of data model, Three schema architecture, Data Independence and Database Language and Interfaces,	1
	6	Mapping Constraints, Keys, Concepts of Super Key, Candidate Key, Primary Key,	1
	7	Specialization, Generalization, Aggregation, Reduction of an ER Diagrams to Tables,	1
	8	Extended ER Model, Relationship of Higher Degree.	1
Module-II: Introduction to Relational Data Model:			**8**
3	9	Relational Model Concepts, Codd's rules, Integrity Constraints, Entity Integrity, Referential Integrity,	1
	10	Key Constraints, Domain Constraints and relational database schemas,	1
	11	Update operations, transactions, and dealing with constraint violations. **Relational Algebra and Calculus:** Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison.	2
	12		
4	13	Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities, Relational Database Design using ER-to- Relational mapping.	1
	14	**Structured Query Language:** Introduction to SQL- Characteristics, advantages of SQL, Types of SQL commands, SQL data definition and data types, specifying constraints in SQL, basic retrieval queries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	1
	15	More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views and Indexes, Queries and Sub Queries.	2
	16		

		Aggregate Functions. Insert, Update and Delete Operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.	
Module-III: (09 Hrs.) Normalization:			**9**
5	17	Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies:	2
	18		
	19	Informal design guidelines for relation schema, Functional Dependencies,	1
	20	Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form,	2
6	21		
	22	Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Examples on normal forms.	1
	23	**Normalization Algorithms:** Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls,	2
	24		
7	25	Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms.	1
	Module-IV: (08 Hrs.) Query Processing, optimization and Database tuning:		**8**
	26	File Structures, Hashing and Indexing: Introduction, placing file records on disk,	1
	27	hashing techniques, Parallelizing Disk Access Using RAID Technology,	1
	28	indexing structures for files- Types of Single-Level Ordered Indexes,	1
8	29	Dynamic Multilevel Indexes Using B-Trees and B+-Trees, Indexes on Multiple Keys	1
	30	**Query Processing, optimization and Database tuning:** Translating SQL Queries into Relational Algebra, Algorithms for External Sorting,	1
	31	Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and Set Operations, Implementing Aggregate Operations and OUTER JOINs, Combining Operations Using Pipelining, Using Heuristics in Query Optimization, Using Selectivity and Cost Estimates in Query Optimization, Physical Database Design in Relational Databases, an Overview of Database Tuning in Relational Systems	1
	32	Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and Set Operations, Implementing Aggregate Operations and OUTER JOINs, Combining Operations Using Pipelining,	1
9	33	Using Heuristics in Query Optimization, Using Selectivity and Cost Estimates in Query Optimization, Physical Database Design in Relational Databases, an Overview of Database Tuning in Relational Systems	1

		Module-V: (08 Hrs.) **Transaction Processing:**	
	34	**Transaction Processing:** Introduction to Transaction Processing, Transaction and System concepts,	1
	35	ACID properties, Testing of Serializability, Serializability of Schedules,	1
	36	Conflict & View Serializable Schedule, Recoverability, Recovery from Transaction Failures,	1
10	37	Log Based Recovery, Checkpoints, Deadlock Handling	1
	38	**Concurrency Control Techniques:** Locking Techniques for Concurrency Control, Time Stamping Protocols for Concurrency Control, Validation Based Protocol,	2
	39		
	40	Multiple Granularity, Multi Version Schemes, Recovery with Concurrent Transaction.	1