BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2CP01: DATABASE MANAGEMENT SYSTEMS
CREDITS - 4 (LTP:3,0,1)

Course Objective:
To impart knowledge of database design concepts and formulation of queries to access a database

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				
				Theory		Practical		Total Marks
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	4	60	40	20	30	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction:** Database system applications; Purpose of Database Systems, View of Data, Data models, Approaches to building a database, Database management system(DBMS), Three levels of the architecture, Challenges in building a DBMS, Various components of a DBMS architecture, systems development life cycle (SDLC)	05
2	**Database Models:** ER-Model: Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features – generalization, specialization, aggregation, reduction to E-R database schema. Relational Data Model: Concept of relations, Schema-instance distinction. Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax; All set Operators.	08
3	**Dependencies and Normal Forms:** Importance of a good schema design, Problems encountered with bad schema designs, Motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, Closure of a set of FD's, Minimal covers, Definitions of 1NF, 2NF, 3NF and BCNF, Decompositions and desirable properties of them, Algorithms for 3NF and BCNF normalization, Multi-valued dependencies and 4NF, Join dependencies and definition of 5NF.	08
4	**Relational algebra & SQL query:** Selection, Projection, Cross product, Various types of joins, Division, Example queries, Tuple relation calculus, Domain relational calculus,	10

Unit No.	Topics	Teaching Hours
	Converting the database specification in E/R notation to the relational schema, Appropriate tool for DBMS, Basics of SQL, DDL, DML, DCL, structure creation, alteration, defining constraints, Primary key, foreign key, unique, not null, check, IN operator, Functions - aggregate functions, Built-in functions numeric, date, string functions, set operations, sub-queries, correlated sub-queries, Use of group by, having, order by, join and its types, Exist, Any, All , view and its types. Transaction control commands, Commit, Rollback, Save point. Embedded SQL, PL SQL Concepts, Cursors, Stored Procedures, Stored Function, Database Triggers.	
5	**Transaction Processing and Error Recovery:** Concepts of transaction processing, ACID properties, Concurrency control, Locking based protocols for CC, Error recovery and logging, Undo, Redo, Undo-redo logging and recovery methods; Backup Methods, Serializability	08
6	**Query Processing & Query Optimization:** Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans, and materialized views.	04
7	**Security:** Discretionary and Mandatory Access Control; Audit Trails; Multi-Level Security; Statistical Databases; Data Encryption.	02
	Total	**45**

List of References:

1. A Silberschatz, H F Korth and S Sudarshan, "*Database System Concepts*", McGRAW Hill. (E-book available on the BVM intranet).
2. C. J. Date, A. Kennan, and S. Swamynathan, "*An Introduction to Database Systems*", Person Education
3. Ramez Elmasri and Shamkant B Navathe, "*Fundamentals of Database Systems*", Pearson Education
4. Ivan Bayross, "*SQL, PL/SQL the Programming Language of Oracle*", BPB Publication.
5. Ramkrishnan, Raghu, "*Database Management Systems*", Mc-Graw Hill
6. J. D. Ullman, "*Principles of Database and Knowledge – Base Systems*", Vol 1, Computer Science Press.
7. Serge Abiteboul, Richard Hull, Victor Vianu, "*Foundations of Databases*", Reprint by, Addison-Wesley

Course Outcomes (COs):

After successful completion of the course, the student will be able to…

1. Understand concepts of database and database management systems
2. Construct an Entity-Relationship (E-R) model from specifications and transform in to relational data model

3. Design normalized database
4. Install and configure a relational database management system and formulate queries to access the database
5. Understand principles of database transaction management, database recovery, and security
6. Develop a database management system application