SES's L.S. RAHEJA COLLEGE OF ARTS AND COMMERCE (AUTONOMOUS)

BOARD OF STUDIES: Information Technology and Data Science

PROGRAMME: Bachelor of Science (Information Technology)

SEMESTER: III

NOMENCLATURE OF THE COURSE: Database Management Systems

NEP Vertical: MAJOR

Credit: 04

(As Per Choice Based Credit System (under NEP 2020) with effect from the academic year 2025-26)

Programme:	**Bachelor of Science (Information Technology)**
Nomenclature of the Course	**Database Management Systems**
Total Marks	**100**
Semester:	**III**
Academic year	**2025-26**

LEARNING OBJECTIVES:

1. Introduce database concepts, architecture, and data models.
2. Develop an understanding of database design and normalization.
3. Equip students with SQL skills for data manipulation and query processing.

COURSE OUTCOMES:

1. Explain fundamental database concepts and relational models.
2. Design normalized databases using ER modeling techniques.
3. Write and execute SQL queries for efficient data management.

Unit	Course Content	Andragogy	No of Lectures
I	**Introduction to Database concepts:** Introduction to Data Processing, Overview of files systems, drawback of file systems, purpose of database system, concept of a database, database system vs file system, data models, database languages, Data base users, Role of DBA, database system structure, Challenges in building a DBMS. **E/R Model:** Conceptual data modelling - motivation, Entities, Entity types, Various types of attributes, Relationships, Relationship types, E/R diagram notation, extended ER features, Examples. **Relational database model:** Logical view of data, keys, integrity rules, Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).	• Give students problems: Provide problems for students to solve independently or in groups. • Focus on practical applications: Present knowledge and abilities in terms of their practical uses. • Use real-life examples: Incorporate real life examples into lessons.	**15**
II	**Transaction management and Concurrency** Control Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management. **XML Databases:** Structured Semi structure and unstructured data, XML hierarchical tree data model, Documents DTD and XML schema, XML Documents & Database, XML query and transformation, Storage of XML data, Xpath. XQuery, Join and Nesting Queries, XML database	• Focus on practical applications: Present knowledge and abilities in terms of their practical uses. • Consider self-concept: Give adults autonomy	**15**

	applications. Exemplar / Case Study: Based on XML Data	• over their learning so they can thrive on self-direction	
III	**Structured Query Language (SQL):** Background, basic structure, data definition, set operations, aggregate functions, NULL values, nested queries, views, Joined relations. Triggers. **Relational Algebra and Calculus** Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. **Constraints and Views** Constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views	• Give students problems: Provide problems for students to solve independently or in groups. • Focus on practical applications: Present knowledge and abilities in terms of their practical uses. • Use real-life examples: Incorporate real life examples into lessons.	**15**
IV	**NoSQL Basics:** Characteristics of NoSQL, ACID vs BASE properties, CAP theorem, NoSQL Storage types, Storing Data in and accessing Data from MongoDB/ Cassandra, Redis, HBase, Language Bindings for NoSQL Data Stores. **JSON data:** Advantages of using JSON, JSON syntax and data types, JSON data structures, objects and arrays, nested JSON objects and Arrays. Exemplar / Case Study: Based on NoSQL and JSON Data	• Focus on practical applications: Present knowledge and abilities in terms of their practical uses. • Consider self-concept: Give adults autonomy • over their learning so they can thrive on self-direction	**15**

SUGGESTED READINGS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", McGrow Hill 7th Edition. 2021.
2. Elmarsi and Navathe, "Fundamentals of Database Design", Addison Wesley 7th Edition, 2017

QUESTION PAPER PATTERN

(A) FOR CONTINUOUS EVALUATION

Particulars	Marks
Class Test	20
Presentation/Viva Voce/Quiz	10
Assignment/Project	10
Total	**40**

(B) FOR SEMESTER END EXAMINATION

Maximum Marks: 60
Duration: 2 Hours

Question No.	Description	Total Marks
Q. 1	**Attempt the following Unit I**	**15**
A	Remembering	
B	Analysing	
C	Applying	
	OR	
P	Remembering	
Q	Analysing	
R	Applying	
Q. 2	**Attempt the following Unit II**	**15**
A	Understand	
B	Analysing	
C	Evaluating	
	OR	
P	Understand	
Q	Analysing	
R	Evaluating	
Q. 3	**Attempt the following Unit III**	**15**
A	Understand	
B	Apply	
C	Evaluating	
	OR	
P	Understand	
Q	Apply	
R	Evaluating	
Q. 4	**Attempt the following Unit IV**	**15**
A	Understand	
B	Evaluating	
C	Creating	
	OR	
P	Understand	
Q	Evaluating	
R	Creating	