SIDDAGANGA INSTITUTE OF TECHNOLOGY, TUMAKURU
LECTURE PLAN FOR THE ACADEMIC YEAR 2025 – 26

Teacher	Mrs. Sowmya R B	**Dept.**	Information Science and Engineering
Class	5th	**Course**	Database Management System (S5ISI02)

Course Objectives

The objectives of this course are:

1. Learn basic concepts of database and database management systems.
2. Understand the fundamentals of relational system which includes data models, database architectures, database manipulations and ER diagram.
3. Get a comprehensive overview of Structured Query Language (SQL), construction of queries in SQL.
4. Learn the need of Normalization and the use of different types of Normalization.
5. Discuss concepts of Transaction management.

Course Code	Course Title	Teaching & Learning Scheme							
		Classroom Instruction (CI) (in hrs/sem)		Lab Instruction (LI) (in hrs/sem)	Study Hours (in hrs/ sem)	Term Work (TW) (in hrs /sem)	Assessment (hrs /sem)	Total no. of Hours per Sem.	Total Credits (C)* (Total Hours/30)
		L	**T**	**P**	**SH**	**TW**	**A**		
IPCC (S5ISI02)	DATABASE MANAGEMENT SYSTEM	**42**	**-**	**28**	**17**	**41**	**9**	**137**	**4**

Sl. No	Date	Topic	Remarks
		UNIT – I	
1	01/09/25	**Databases and Database Users** Introduction, an example, characteristics of database approach.	
2	03/09/25	Actors on the screen, workers behind the scene. Advantages of using DBMS approach.	
3	04/09/25	A brief history of database applications, When not to use a DBMS.	
4	08/09/25	Database System – Concepts and Architecture Data models, schemas and instances,	
5	10/09/25	Three-schema architecture and data independence.	
6	11/09/25	Database languages and interfaces. The database system environment.	
7	15/09/25	Centralized and Client-Server architectures.	
8	17/09/25	Classification of database management systems.	
9	18/09/25	Classification of database management systems-Examples	
		UNIT – II	
10	22/09/25	**Entity-Relationship Model** Using high-level conceptual data models for database design.	
11	24/09/25	Examples of database applications.	

12	25/09/25	Entity types, entity sets	
13	06/10/25	Attributes and keys	
14	08/10/25	Relationship types, relationship sets, roles and structural constraints.	
15	09/10/25	Weak entity types and refining the ER design for the company database.	
16	13/10/25	ER diagrams, naming conventions and design issues	
17	15/10/25	Design of ER diagrams- for real-time database examples	Test 1
UNIT – III			
18	16/10/25	**SQL-The Relational Database Standard** SQL data definition and data types, schema and catalog concepts in SQL	
19	20/10/25	The create table command in SQL, attribute data types and domains in SQL. Specifying attribute constraints and attribute defaults, specifying key and referential integrity constraints.	
20	21/10/25	Specifying basic constraints in SQL: giving names to constraints, specifying constraints on tuples using check. Schema change statements in SQL: the drop command, the alter command.	
21	22/10/25	Basic queries in SQL: the select-from-where structure of basic SQL queries, ambiguous attribute names, aliasing, and tuple variables, unspecified where clause and use of the asterisk, tables as sets in SQL, substring pattern matching and arithmetic operators, ordering of query results.	
22	23/10/25	More complex SQL queries: comparisons involving null and three-valued logic. Nested queries, tuples, and set/multi-set comparisons, correlated nested queries, the exists and unique functions in SQL.	
23	27/10/25	Explicit sets and renaming of attributes in SQL. Joined tables in SQL, aggregate functions in SQL.	
24	29/10/25	Grouping: the group by and having clauses, discussion and summary of SQL queries.	
25	30/10/25	Insert, delete statements in SQL, delete and update statements in SQL, additional features of SQL. Specifying general constraints as assertion and views (virtual tables) in SQL.	
UNIT – IV			
26	03/11/25	**Database Design** Informal design guidelines for relation schemas semantics of the attributes, reducing the redundant information in tuples.	
27	05/11/25	Informal design guidelines for relation schemas reducing the null values in tuples.	
28	06/11/25	Disallowing the possibility of generating spurious tuples.	
29	10/11/25	Definition of functional dependencies, inference rules for functional dependencies.	
30	12/11/25	Functional dependencies equivalence of sets of functional dependencies, minimal sets of functional dependencies.	
31	13/11/25	Functional dependencies equivalence of sets of functional dependencies, minimal sets of functional dependencies.	
32	17/11/25	Normal forms based on primary keys, normalization of relations, practical use of normal forms.	
33	19/11/25	General definitions of first and second normal forms, with examples.	
34	20/11/25	General definitions of third normal form with examples. Boyce-Codd normal form with examples.	Test 2
UNIT – V			
35	24/11/25	**Transaction Processing Concepts** Introduction to transaction processing single-user versus multi-user transactions - read and write operations and DBMS buffers.	

36	26/11/25	Introduction to transaction processing single-user versus multi-user transactions - read and write operations and DBMS buffers.	
37	27/11/25	Need of concurrency control and recovery.	
38	01/12/25	Transaction and system concepts transaction states and additional operations	
39	03/12/25	Discussions on system log, commit point.	
40	04/12/25	Desirable properties of transactions – ACID properties	
41	08/12/25	Desirable properties of transactions –characterizing schedules based on recoverability.	
42	10/12/25	Desirable properties of transactions –characterizing schedules based on recoverability.	

Study Hours

2	02/09/25	Study Hour	Revision of characteristics of database approach.
3	09/09/25	Study Hour	Revision of when not to use DBMS
4	16/09/25	Study Hour	Revision of Two tier architecture
5	23/09/25	Study Hour	Revision of Three tier architecture
6	30/09/25	Study Hour	Revision of ER diagrams
7	07/10/25	Study Hour	Revision of ER diagrams
8	14/10/25	Study Hour	Revision of constructing Scema
9	21/10/25	Study Hour	Revision of DML commands
10	28/10/25	Study Hour	Revision of DDL commands
11	04/11/25	Study Hour	Revision of DCL Commands
12	11/11/25	Study Hour	Revision of Views
13	18/11/25	Study Hour	Discussing queries on Student Database
14	25/11/25	Study Hour	Discussing queries on Salesman
15	02/12/25	Study Hour	Discussing queries on Salesman databse
16	09/12/25	Study Hour	Discussing queries on Movie Database
17	16/12/25	Study Hour	Discussing queries on Company Database

List of Problems for Laboratory		**Hours:28**
1	Consider the following schema for a Library Database: BOOK (Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS (Book_id, Author_Name) PUBLISHER (Publisher_Name, Address, Phone) BOOK_COPIES (Book_id, Branch_id, No-of-Copies) BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date) LIBRARY_BRANCH (Branch_id, Branch_Name, Address) BORROWER (Card_no, Name, Address, Phone) Write SQL queries to a) Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc. b) Get the particulars of borrowers who have borrowed more than 3 books from Jan 2018 to Jan 2019. c) Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. d) Partition the BOOK table based on year of publication. Demonstrate its working with a simple query. e) Create a view of all books and its number of copies that are currently available in the Library.	4 Hours
2	Consider the following schema for Order Database: SALESMAN (Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS (Ord_No, Purchase_Amt, Ord_Date, Customer_id,Salesman_id) Write SQL queries to a) Count the customers with grades above Bangalore's average.	4 Hours

	b) Find the name and numbers of all salesmen who had more than one customer. c) List all salesmen and indicate those who have and don't have customers in their cities (Use UNION operation). d) Create a view that finds the salesman who has the customer with the highest order of a day. e) Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.	
3	Consider the schema for Movie Database: ACTOR (Act_id, Act_Name, Act_Gender) DIRECTOR (Dir_id, Dir_Name, Dir_Phone) MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST (Act_id, Mov_id, Role) RATING (Mov_id, Rev_Stars) Write SQL queries to a) List the titles of all movies directed by 'XYZ'. b) Find the movie names where one or more actors acted in two or more movies. c) List all actors who acted in a movie before 2020 and also in a movie after 2022 (use JOIN operation). d) Find the title of movies and number of stars for each movie that has at least one rating. Sort the result by movie title. e) Update rating of all movies directed by 'ABC' to 4.	4 Hours
4	Consider the schema for College Database: STUDENT (USN, SName, Address, Phone, Gender) SEMSEC (SSID, Sem, Sec) CLASS (USN, SSID) SUBJECT (Subcode, Title, Sem, Credits) IAMARKS (USN, Subcode, SSID, Test1, Test2, Test3, FinalIA) Write SQL queries to a) List all the student details studying in fourth semester 'C' section. b) Compute the total number of male and female students in each semester and in each section. c) Create a view of Test1 marks of student USN '1SI24IS001' in all subjects. d) Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students. e) Categorize students based on the following criterion: If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA< 12 then CAT = 'Weak' Give these details only for 8th semester A, B, and C section students.	4 Hours
5	Consider the schema for Company Database: EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo) DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate) DLOCATION (DNo,DLoc) PROJECT (PNo, PName, PLocation, DNo) WORKS_ON (SSN, PNo, Hours) Write SQL queries to a) Make a list of all project numbers for projects that involve an employee whose last name is 'raj', either as a worker or as a manager of the department that controls the project. b) Show the resulting salaries if every employee working on the 'AI' project is given a 10 percent raise. c) Find the sum of the salaries of all employees of the 'IS' department, as well as the maximum salary, the minimum salary, and the average salary in this department	4 Hours

	d) Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator). e) For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 60,00,000.	

Study Hours

Important Dates to be remembered:

Sl No	Important Events	Date
1.	I – Test	28th-30th Nov 2025
2.	Last date for dropping of course	7th Dec 2025
3.	II – Test	13th -16th Jan 2025
4.	Last date for withdrawal of course	18th Jan 2025
5.	Last working day	25th Jan 2025
6.	Preparation Holidays	26th -31st Jan 2025
7.	Semester end examination	01st -22nd Feb 2025
8.	Announcement of results	28th Feb 2025

Activities to meet Teaching Learning Scheme

Sl.. No .	**Activity Planned**	**Number of Hours**
1.	**Class Room Teaching**	42
2.	**Laboratory**	28
3.	**Formative Assessment** [Test (2 No.)+Quiz (2 No.) + Semester End Exam] **Laboratory Internal Examination**	07 02
4.	**Activity Based Learning.** I. Case Study (24 hours): Real-time database problems will be given to group of students 1. Identifying the requirement: 4 hours 2: Design ER diagram and Schema to represent the relationships, constraints and entities: 4 hours 3. Implementation of SQL queries for creating the database schema, inserting records, and querying: 10 hours 4. Identifying the challenges in designing the database: 4 Hours 5. Report Preparation and Submission: 2 hours II. Poster Presentation (12 hours): Database Normalization: Organizing Data Efficiently for the designed open ended database projects The detail content will include: 1.Identifying the current normalization: 2 hours 2.Identify the next normal form: 3 hours 3.Converting the current normal form to higher normal form:5 hours 3.Report Preparation and Submission: 2 hours	36
5.	**Open-Ended Project Report Preparation** Submit a report that covers the project scope, design process, database schema, queries, testing, and conclusions.	5

Text Books:

1. Elmasri and Navathe, Fundamentals of Database Systems, 7th Edition, Mc- GrawHill, 2017.

Reference Books:

1. Silberschatz, Korth and Sudharshan, Data base System Concepts, 7th Edition, Mc- GrawHill, 2019.
2. Raghu Ramakrishnan and Johannes Gehrk, Database Management Systems, 3rd Edition, McGraw-Hill, 2022.

Course Outcomes:

Upon completion of this course the student will be able to:

CO1: Describe database concepts, architecture, applications.

CO2: Analyze and Design of ER diagram based on application's data requirements.

CO3: Create SQL queries for given schema.

CO4: Apply normalization techniques to a given database.

CO5: Discuss transaction processing for a given database.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) & Program Specific Outcomes (PSOs)

		Pos												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
COs	CO1	3												3		
	CO2	3	3	3										3		
	CO3	2	2	2		2								2		
	CO4	2	2	2		2								2		
	CO5	2	2	2		2								2		

Assessment Tools	Cos				
Direct AT	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
CIE (Individual)	✓	✓	✓	✓	✓
SEE (Individual)	✓	✓	✓	✓	✓
Assignments (Individual/Group)	✓	✓	✓	✓	✓
Micro Projects (Group)	--	--	--	✓	--
Topic seminar (Individual)	--	--	--	--	--
Case studies (Individual/Group)	✓	✓	✓	--	--
Online courses (Individual)	--	--	--	--	--
Indirect AT					
Course end survey (Students)	✓	✓	✓	✓	✓
Student profile (Faculty)	--	--	--	--	--

Course delivery methods, assessment tools and sample questions:

CO1	Describe database, architecture and applications.
Delivery Methods	17/12/25
Assessment Tools	CIE-Test 1 and 2, Activity, laboratory, SEE
Sample Questions	1. Define database. Explain the 3 tier architecture of database with a neat diagram. 2. Explain the importance of front end and back end users with examples.

CO2	Analyze and Design of ER diagram based on application's data.
Delivery Methods	18/12/25

Assessment Tools	CIE-Test 1, Activity Based Learning, laboratory, SEE
Sample Questions	Consider the following schema for a Library Database and design the ER diagram with relations, entities and constraints: BOOK (Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS (Book_id, Author_Name) PUBLISHER (Publisher_Name, Address, Phone) BOOK_COPIES (Book_id, Branch_id, No-of-Copies) BOOK_LENDING (Book_id, Branch_id, Card_No, Date_Out, Due_Date) LIBRARY_BRANCH (Branch_id, Branch_Name, Address)

CO3	Create SQL queries for given schema.
Delivery Methods	22/12/25
Assessment Tools	CIE-Test 2, Activity Based Learning, laboratory, SEE
Sample Questions	Consider the schema for Movie Database: ACTOR (Act_id, Act_Name, Act_Gender) DIRECTOR (Dir_id, Dir_Name, Dir_Phone) MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST (Act_id, Mov_id, Role) RATING (Mov_id, Rev_Stars) Write SQL query to create the table for ACTOR and DIRECTOR entities. Write SQL query to update rating of all movies directed by 'Karan Johar' to 4.

CO4	Apply normalization techniques to a given database.
Delivery Methods	Chalk and talk, Power Point Presentation
Assessment Tools	CIE-Test 2, Activity Based Learning, SEE
Sample Questions	1. Explain BCNF with an example 2. Compare and contrast 2NF and 3NF with an example.

CO5	Discuss transaction processing for the given database.
Delivery Methods	Chalk and talk, Power Point Presentation
Assessment Tools	CIE- Test 2, SEE
Sample Questions	1. Define ACID properties with an example. 2. How the absence of concurrency control and recovery hampers shaping of database?

Signature of Faculty **Signature of HOD** 04/9/25 **Signature of Principal** 4/9/2025