Government of Karnataka
Department of Technical Education
Bengaluru

	Course Title: Database Management Systems		
	Scheme (L:T:P) : **4:0:0**	Total Contact Hours: **52**	Course Code: **15CS33T**
	Type of Course: **Lectures, Self Study & Student Activity**	Credit :**04**	Core/ Elective: **Core**
CIE- 25 Marks			SEE- 100 Marks

Prerequisites

Knowledge of programming language.

Course Objectives

1. Understand database concepts, applications, data models, schemas and instances.
2. Implement the relational database design and data modelling using entity-relationship (ER) model.
3. Demonstrate the use of constraints and relational algebra operations.
4. Use of SQL in querying the database
5. Demonstrate Normalization process.
6. Learn the new emerging Technologies and Applications in database.

Course Outcome

On successful completion of the course, the students will be able to attain below Course Outcome (CO):

	Course outcome	CL	Linked PO	Teaching Hours
CO1	Identify the characteristics of database and describe the architecture and languages of Database system.	R, U	1,2,5,6,7,8,9,10	08
CO2	Identify the elements used in Entity-Relationship diagram and sketch a simple diagram.	U, A	1,2,3,4,5,6,7,8,9,10	08
CO3	Summarize relational model concept and illustrate the relational constraints.	U, A	1,2,3,4,5,6,7,8,9,10	08
CO4	Describe Structured Query Language (SQL) and apply to query a database.	A	1,2,3,4,5,6,7,8,9,10	10
CO5	Recognize and interpret normalization for relational databases.	U, A	1,2,3,4,5,6,7,8,9,10	08
CO6	Visualize the features of NOSql and identify the database applications.	A	1,2,3,4,5,6,7,8,9,10	10
		Total sessions		52

Legends: R = Remember U= Understand; A= Apply and above levels (Bloom's revised taxonomy)

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Course-PO Attainment Matrix

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Computer Organisation	3	3	3	3	3	3	3	3	3	3

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.
Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.
If ≥40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3
If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2
If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1
If < 5% of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Hour	Questions to be set for SEE			Marks Weightage	Marks Weightage (%)
			R	U	A	A	
I	Identify the characteristics of database and describe the architecture and languages of Database system.	08	10	12	-	22	15.38
II	Identify the elements used in Entity-Relationship diagram and sketch a simple diagram.	08	6	10	6	22	15.38
III	Summarize relational model concept and illustrate the relational constraints.	08	5	10	7	22	15.38
IV	Describe Structured Query Language (SQL) and apply to query a database.	10	-	5	25	30	19.24
V	Recognize and interpret normalization for relational databases.	08	-	24	-	24	15.38
VI	Visualize the features of NOSql and identify the database applications.	10	-	15	10	25	19.24
	Total	**52**	**21**	**76**	**48**	**145**	**100**

UNIT I : Databases and Data Base Users   08 Hrs

Introduction, An Example, Characteristics of the database approach, Actors on the scene, Workers behind the scene, Advantages of using the DBMS Approach, A Brief History of Database Applications, When Not to use a DBMS
Database System Concepts and Architecture - Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client /Server Architectures for DBMSs, Classification of database Management System.

UNIT II: Data Modelling Using the Entity-Relationship(ER) Model   08 Hrs

Using High-Level Conceptual Data Models for Database Design, An example Database Application, Entity Types, Entity Sets, attributes and keys, Relation Types, Relationship Sets, roles and structural constraints, Weak Entity Types, Refining the ER Design for the Company Database, ER Diagrams, naming, conventions and design issues, Relationship Types of Degree Higher Than Two.

UNIT III: Relational Data Model and Relational Data Base Constraints	08 Hrs

Relational Model concepts, Relational Model Constraints and relational database schemas, Update Operation, Transaction and Dealing with constraints violations.

UNIT IV: SQL: Schema Definition, constraints, queries and views	10 Hrs

SQL Data Definition and data types, Specifying constraints in SQL, Schema Change statement in SQL, Basic queries in SQL, More Complex SQL queries, INSERT, DELETE and UPDATE statements in SQL, Specifying constraints and Assertions and Triggers, Views(Virtual Tables) in SQL

UNIT V: Functional Dependencies and normalization for relational databases	08 Hrs

Informal Design guidelines for relation schemas, Functional dependencies, Normal forms based on primary keys, General Definition of second and third normal forms, Boyce-codd Normal form.

UNIT VI: Fundamentals of Data Base Transaction Processing	10 Hrs

Introduction to transaction processing, transaction and system concepts, desirable properties of transactions.
NoSQL – Introduction, Distributed Systems, Advantages & Disadvantages of Distributed Computing, Scalability, What is NoSQL? Why NoSQL? RDBMS vs. NoSQL, Brief history of NoSQL, CAP theorem (Brewer's Theorem), NoSQL pros/cons, NoSQL Categories, Production deployment.

📚Text books

1. Fundamentals of Database Systems, **Sixth** edition, 2014, Ramez Elmasri, Shamkan B. Navathe, Pearson Education, ISBN- 9788131792476
2. http://www.w3resource.com/mongodb/nosql.php *--for NoSQL - **UNIT VI***

References

1. Fundamentals of Database Management Systems, Mark L. Gillenson, 2009, Wiley India
2. Database Management Systems – Raghu Ramakrishnan and Johannes Gehrke – 3rd Edition, McGraw-Hill, 2003
3. DBMS a practical approach , by E R Rajiv Chopra, S Chand publications.
4. http://elearning.vtu.ac.in/10CS54.html
5. http://www.tutorialspoint.com/dbms/
6. http://www.indiabix.com/technical/dbms-basics/
7. http://beginner-sql-tutorial.com/sql.htm

Suggested list of student activities

Note: The following activities or similar activities for assessing CIE (IA) for 5 marks (Any one)
Student activity like mini-project, surveys, quizzes, etc. should be done in group of 3-5 students.

1. Each group should do any one of the following type activity or any other similar activity related to the course and before conduction, get it approved from concerned course co-ordinator and programme co-ordinator

2. Each group should conduct different activity and no repeating should occur.

1	Identify and do a case study on relationship types of degree higher than two in ER data modelling
2	Design E-R diagrams for the following databases with all constraints specifications. a) Hospital Management b) Hotel Management c) Student Database
3	Conduct a survey on various applications of database and submit a report of 3 to 4 pages.
4	Conduct a case study on any one Online Transaction Processing System (OLTP) and submit a report of 3 to 4 pages. Ex: Online Banking , Online Reservation (Bus, Train, Airlines)

Course Delivery

The course will be delivered through Lectures and Power point presentations/ Video

Course Assessment and Evaluation Scheme

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
Direct Assessment	CIE	IA	Students	Three IA tests (Average of three tests will be computed)	20	Blue books	1 to 6
				Student activities	05	Report	1 to 6
				Total	**25**		
	SEE	End Exam		End of the course	100	Answer scripts at BTE	1 to 6
Indirect Assessment	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2,3 Delivery of course
	End of Course Survey			End of the course		Questionnaires	1 to 6 Effectiveness of Delivery of instructions & Assessment Methods

Note: I.A. test shall be conducted for 20 marks. Average marks of three tests shall be rounded off

to the next higher digit.

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's taxonomy) such as:

Sl. No	Bloom's Category	%
1	Remembrance	15
2	Understanding	50
3	Application	35

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Note to IA verifier: *The following documents to be verified by CIE verifier at the end of semester*

1. Blue books (20 marks)
2. Student suggested activities report for 5 marks
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Methods.

FORMAT OF I A TEST QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th weak of sem 10-11 Am	I/II SEM		20
	Year:		
Name of Course coordinator : CO's:____			Units:__

Question no	Question	MARKS	CL	CO	PO
1					
2					
3					
4					

Note: Internal choice may be given in each CO at the same cognitive level (CL).

MODEL QUESTION PAPER (CIE)

Test/Date and Time	Semester/year	Course/Course Code	Max Marks
Ex: I test/6 th week	III SEM	**Data Base Management Systems**	20

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Name of Course coordinator :
Units:1,2 Co: 1,2

Note: Answer all questions

Question no	Question	CL	CO	PO
1	Define the following. (5) 1. Data Model 2. Database Schema/Intension 3. Database State/Extension 4. Data Sublanguage 5. DML.	R	1	1,2
2	Define data independence and explain different types of it. (5)	R	1	1,2
3	Explain the different cardinality ratios for binary relationship types. (5)	U	2	1,2
4	Explain with suitable examples 1:1 and M:N relationship types. (5) OR Develop an E-R diagram for a company database.	A	2	1,2

Format for Student Activity Assessment

DIMENSION	Unsatisfactory 1	Developing 2	Satisfactory 3	Good 4	Exemplary 5	Score

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Collection of data	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collects some basic information; refer to the topic	Collects relevant information; concerned to the topic	Collects a great deal of information; all refer to the topic	3
Fulfill team's roles & duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs all duties	Performs all duties of assigned team roles with presentation	4
Shares work equally	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Does the assigned job without having to be reminded.	Always does the assigned work without having to be reminded and on given time frame	3
Listen to other Team mates	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Listens, but sometimes talk too much	Listens and contributes to the relevant topic	Listens and contributes precisely to the relevant topic and exhibit leadership qualities	3
					TOTAL	**13/4=3.25=4**

All student activities should be done in a group of 4-5 students with a team leader.

Diploma in Computer science & Engineering
III- Semester
Course Title: Data Base Management Systems

Time: **3 Hours**   Max Marks**: 100**

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PART-A

Answer any <u>SIX</u> questions. Each carries 5 marks.   **5X6=30 Marks**

1. What is database? List the important characteristics of database approach.
2. Explain with examples Entity Integrity Constraints and referential Integrity Constraint.
3. Explain the characteristics of Relations.
4. With examples write a note on CREATE and DROP command.
5. Differentiate Having and Where clause with example.
6. Explain the Boyce-Codd normal form with example.
7. Explain the generation of spurious tuples and how to overcome the same.
8. Discuss the advantages of NoSql versus RDBMS.
9. What is scaling. Explain the types of scaling.

PART-B

Answer any <u>SEVEN</u> full questions each carries 10 marks.   **10X7=70 Marks**

1. Discuss the advantages of DBMS Approach.
2. Define the following.
   a) Data Model b) Database Schema/Intension c) Database State/Extension
   d) Data Sublanguage. e) DML.
3. With a neat diagram explain the different phases of database design.
4. Identify the entities, relationships and develop an E-R diagram for a company database.
5. Explain with example the different Constraints that are violated during UPDATE and
   DELETE operations
6. Consider the following schema & write the SQL queries.
   SAILORS (sid, sname, rating, age)
   BOATS (bid, bname, color)
   RESERVES (sid, bid, day)
      a. Retrieve names of sailors who reserved green boat.
      b. Retrieve the colors of boats reserved by 'ramesh'.
      c. Retrieve the names of sailors who have reserved a red or a green boat.
      d. Retrieve the sid of sailors with age over 20 who have not reserved a red boat.
      e. Retrieve the names of sailors who have reserved all boats called 'Interlake'.
7. List and explain the different data types used in SQL.
8. Discuss the informal design guidelines for relational schema.
9. Draw a state diagram and discuss the typical states during transaction execution.
10. Explain the need for concurrency control.

	MODEL QUESTION BANK		
	<u>**Diploma in Computer Science & Engineering**</u>		
	III Semester		
	Course Title: Data Base Management Systems		

CO	Question	CL	Marks

	What is database? List the important characteristics of database approach.	R	
	What do you mean by data model? List and explain the different types of data model.	R	
	What is Data Independence? Differentiate between logical & physical Data Independence.	U	
	Define the following. 1. Data Model 2. Database Schema/Intension 3. Database State/Extension 4. Data Sublanguage 5. DML.	R	05
	Explain the functions of database administrators and database designers.	U	
	Briefly explain the different types of End Users.	U	
	Define data independence and explain different types of it.	U	
I	List the various DBMS languages and explain each.	R	
	List the various DBMS interfaces and explain each.	R	
	Explain the functions of different Database utilities.	U	
	Explain the important characteristics of database approach.	U	
	Explain the actors on the scene and workers behind the scene.	U	
	Discuss the advantages of DBMS Approach.	U	
	Explain the two-tier client/server architecture for DBMS with neat diagram.	U	10
	Explain the DBMS components modules with neat diagram.	U	
	Write a note on classification of DBMS.	U	
	What is E-R diagram? List out the notations used for E-R diagram.	R	
	Explain the different cardinality ratios for binary relationship types.	U	
	Differentiate between a) an attribute and value set b) stored and derived attributes.	U	5
	Explain the structural constraints of relationship type.	U	
	Explain with suitable examples 1:1 and M:N relationship types.	A	
	With a neat diagram explain the different phases of database design.	U	
	What is a Weak entity type, explain with an example how the entities are identified in a Weak entity.	U	
II	Define the following term with examples:- a) Entity b) Entity set c) Multi-valued attribute d) Composite attribute e)Derived attribute	R	
	Identify the entities, relationships and develop an E-R diagram for a company database.	A	10
	Identify the entities, relationships and develop an E-R diagram for a Hospital database.	A	
	Compare entity integrity and referential integrity constraints.	U	
	Classify the constraints on databases and give examples for each of them.	U	
	Explain the characteristics of Relations.	U	5
	Explain with examples Entity Integrity Constraints and referential Integrity Constraint	A	
III	Differentiate i) Key and super Key ii) degree and cardinality	U	
	Define the following term with examples:-	R	

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	a) Domain b) Attribute c) Tuple d) Relation schema (R) e) Relation (r)		10
	Explain the insert, delete and update operation with examples.	A	
	Explain with example the different constraints that are violated during UPDATE and DELETE operations	U	
IV	Write a note on different data types supported by SQL.	R	5
	Write the general syntax of specifying Check constraint and default constraint while creating a table.	R	
	Differentiate Having and Where clause with example.	A	
	Write a note on aggregate functions in SQL.	U	
	Discuss the strategies for View Implementation.	U	
	With examples write a note on CREATE and DROP command.	A	
	Define view. How to create it? Give example.	U,A	
	Explain UPDATE and ALTER command with example.	U,A	
	Write a note on basic queries in SQL.	U	
	Explain the different schema change statements in SQL with example.	A	
	List and explain the different data types used in SQL.	U	10
	Explain different constraints available in SQL with example.	U	
	List and explain the different aggregate functions available in SQL with example.	A	
	Explain the following with examples: a) Insert b) Delete c) Distinct d) Order by e) Where	A	
	Explain the following Operators with examples: a) ANY b) ALL c) IN d) LIKE e) BETWEEN	A	
	Consider the following schema & write the SQL queries. SAILORS (sid, sname, rating, age) BOATS (bid, bname, color) RESERVES (sid, bid, day) a) Retrieve names of sailors who reserved green boat. b) Retrieve the colors of boats reserved by 'ramesh'. c) Retrieve the names of sailors who have reserved a red or a green boat. d) Retrieve the sid of sailors with age over 20 who have not reserved a red boat. e) Retrieve the names of sailors who have reserved all boats called 'Interlake'.

And Similar databases to be considered with different set of queries. | A | |
V	Explain the generation of spurious tuples and how to overcome the same.	U	5
	Differentiate between i) prime attribute and non prime attribute ii) Full functional dependencies and partial dependencies with examples.	U	
	Explain the functional dependencies with examples.	U	
	Explain second normal form with an example.	U	
	Explain third normal form with an example.	U	

	Explain the Boyce-Codd normal form with example.	U	
	Explain the different UPDATE anomalies of tables.	U	
	Discuss the informal design guidelines for relational schema.	U	10
	What is normalization? Explain the different types of normal forms with examples.	U	
VI	Explain the following terms: transaction, concurrency control.	U	
	Explain the desirable properties of a transaction.	U	
	Write a note on System Log.	U	
	Write a note on commit point of a transaction.	U	
	Discuss the advantages of NoSql versus RDBMS.	U	5
	Explain CAP theorem.	U	
	Explain the advantages of distributed computing.	U	
	What is scaling. Explain the types of scaling.	U	
	Differentiate between ACID and BASE.	U	
	Bring out the advantages and disadvantages of Nosql.	U	
	Draw a state diagram and discuss the typical states during transaction execution.	A	
	Discuss the different types of failures that occur during transaction execution.	A	10
	Explain the need for concurrency control.	A	
	Explain the categories of NoSql.	U	
	Explain Column store and Row store with suitable examples.	A	