



**Government of Karnataka**  
**DEPARTMENT OF COLLEGIATE AND TECHNICAL EDUCATION**

<b>Programme</b>	Computer Science and Engineering	<b>Semester</b>	III
<b>Course Code</b>	20CS34P	<b>Type of Course</b>	Programme Core
<b>Course Name</b>	Database System Concepts and PL/SQL	<b>Contact Hours</b>	8 hours/week 104 hours/semester
<b>Teaching Scheme</b>	L:T:P :: 3:1:4	<b>Credits</b>	6
<b>CIE Marks</b>	60	<b>SEE Marks</b>	40

### 1. Rationale

Data, factual information, is the main driving force that is changing the face of our world. Database is an organized collection of related data which is stored and accessed electronically using a computer. Database management has evolved from a specialized computer application to a central component of virtually all enterprises, and, as a result, knowledge about database systems has become an essential part of an education in computer science. SQL is a powerful language for both querying and updating data in relational databases. Study of SQL empowers students to implement and work with relational data model.

### 2. Course Outcomes: At the end of the course, the student will be able to:

CO-01	Identify the elements of ER model for a given requirement, draw ER diagram and validate with the given requirement.
CO-02	Translate the given ER diagram to a relational model and verify against integrity constraints. Also refine and normalize the relational database design against first three normal forms.
CO-03	Use appropriate SQL statements to create a database and other DB objects using a DBMS software.
CO-04	Perform insert, delete and/or update operations on the database and query the database to retrieve the required information using appropriate SQL statements and clauses.

### 3. Course Content

Week	CO	PO	Lecture (Knowledge Criteria)	Tutorial (Activity Criteria)	Practice (Performance Criteria)
			3 hours/week	1 hour/week	4 hours/week (2 hours/batch twice in a week)
1	1	1,4	<b>Introduction</b> Overview of DB: why a database? Purpose of database; Classification; Application; DBMS: features, providers; Functional components of DBMS; Types of DBMS architecture; View of data in DBMS; Database users; Role and responsibilities of DBA; Case study: Example of any database application, recruitment database	Refer Table 1	1. Install and setup DBMS software such as MySQL, PostgreSQL 2. Learn the interface and explore the features of installed DBMS
2	1	1,3,4	<b>Database design</b> Data model; types; importance of data modeling; Overview of database design; phases		1. Identify and ER-model elements and draw ER

			of database design; database development life cycle; Conceptual design: ER-Model: entity: types; attribute: types; relationships: types, constraints, Symbols and Notations; Case study: conceptual design for a set of specifications <ul style="list-style-type: none"> <li>i. Restaurant</li> <li>ii. Retail shop</li> <li>iii. Recruitment</li> <li>iv. College</li> <li>v. Library</li> </ul>		diagram for the given specifications using tools.
3	2	1,3	Relational model: Overview; characteristics; Constraints: types; Operations; Advantages and Disadvantages; applications; Design anomalies; Features of good DB design;		1. Map ER Model to relational model 2. Identify various constraints
4	2	1,3	Functional dependency: overview, rules, types; Normalization: normalization process; importance of normalization; 1NF, 2NF, 3NF Sufficient examples to understand the concept		1. Normalize the above design
5	3	1,4	database languages: types, commands/tasks in each type; Integrity constraints; MySQL/PostgreSQL: overview; features; datatypes; Standardization guidelines;		1. Validate the above design against integrity constraints
6	3	1,3,4	Defining Data: DDL CREATE, ALTER, DROP different DB objects; Temporary tables: types, create and use; external tables; Managing constraints		1. Use MySQL/PostgreSQL DDL statements to create database and other DB objects for above design
7	3,4	1,3,4	Insert, delete and update data Modifying data: UPDATE and DELETE Update anomalies; impact of constraints Querying of available data: SELECT; Aliases; sorting data: ORDER BY		1. Perform single table and multi table insertion 2. Perform delete and update operations 3. Querying single table 4. Sort the result set of a query
8	4	1,4	filtering data: WHERE, AND, OR, row limiting clause, IN, BETWEEN, LIKE; Joining table: INNER JOIN, LEFT JOIN,		1. Querying single table 2. Filtering data 3. query multiple tables with joins
9	4	1,4	Grouping data: Aggregate functions, GROUP BY, HAVING; Set operators: UNION, INTERSECT, MINUS;		1. Queries that use set operators 2. Report aggregated data using group functions
10	4	1,4	Subqueries: Comparator operators; subqueries: Single Row Subqueries; Multiple Row Subqueries; correlated subqueries; EXISTS, NOT EXISTS, ANY, ALL, SOME;		1. Write sub queries to retrieve information from the created database
11	4	1,4	Views: create, drop and update; realization of views based on single and multiple tables;		1. Create view and query



			DCL: Controlling user access: Differentiating system privileges from object privileges; Granting privileges on tables		2. Create users and assign privileges for DB operations
12	4	1,4	PL/SQL: variables, datatypes; control statements (decision making); Stored procedures and Functions Concept; syntax and structure of store procedure; syntax and structure of functions; calling a function; Examples;		1. Create and execute store procedures 2. Create and execute functions
13	4	1,4	<b>Managing and controlling transactions:</b> Introduction of transaction, ACID properties; states of transaction; Transaction control; Overview of transaction management, using transaction control commands: COMMIT, ROLLBACK, SAVE POINT, SET TRANSACTION; sufficient examples;		1. Create and execute transactions 2. Call previously created store procedure or function in transaction
<b>Total in hours</b>			<b>39</b>	<b>13</b>	<b>52</b>

**\*PO = Program outcome as listed and defined in year 1 curriculum**

**Table 1: Suggestive activities for tutorials (the list is only shared as an example and not inclusive of all possible activities for that course. Student and faculty are encouraged to choose activities that are relevant to the topic and the availability of such resources at their institution)**

1	1. Identify the drawbacks of file system and how DB enables us to overcome them. Identify distinguishable features of each of DBMS available in the market.
2	1. Transform given n-ary relationship to binary relationship 2. Document the steps to create ER diagram. 3. Identify the components of ER model in the given requirements.
3	1. Document the steps to create logical design 2. Discuss and document Codd's 12 rules
4	1. Explore and document other normal forms
5	1. study and present the working of SQL optimizer 2. Learn and report optimization techniques
6	1. Learn and demonstrate use of DISTINCT, ALL, IS NULL; 2. Learn and present RIGHT JOIN;
7	1. Identify the advantages of Cascading Referential Integrity Constraints
8	1. Identify need of subqueries
9	1. identify the advantages and disadvantages of store procedure and functions,
10	1. presentation on the latest developments in research and industry related to this course
11	1. Learn and present need of scalar subqueries
12	1. Learn iterative statements in PL/SQL
13	1. Does Relational model support storage of unstructured data, if no, what are the alternatives to store unstructured data.

#### 4. CIE and SEE Assessment Methodologies

Sl. No	Assessment	Test Week	Duration In minutes	Max marks	Conversion
1.	CIE-1 Written Test	5	80	30	Average of three tests 30
2.	CIE-2 Written Test	9	80	30	
3	CIE-3 Written Test	13	80	30	
4.	CIE-4 Skill Test-Practice	6	180	100	

5	CIE-5 Skill Test-Practice	12	180	100	Average of two skill tests reduced to 20
6	CIE-6 Portfolio continuous evaluation of Activity through Rubrics	1-13		10	10
Total CIE Marks					60
Semester End Examination (Practice)			180	100	40
Total Marks					100

### 5. Format for CIE written Test

Course Name	Database System Concepts and PL/SQL	Test	I/II/III	Sem	III/IV
Course Code	20CS34P	Duration	80 Min	Marks	30

**Note:** Answer any one full question from each section. Each full question carries 10 marks.

Section	Assessment Questions	Cognitive Levels	Course Outcome	Marks
I	1			
	2			
II	3			
	4			
III	5			
	6			

Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, Cognitive level and course outcomes.

### 6. Rubrics for Assessment of Activity (Qualitative Assessment)

Sl. No.	Dimension	Beginner	Intermediate	Good	Advanced	Expert	Students Score
		2	4	6	8	10	
1		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	8
2		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	6
3		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
4		Descriptor	Descriptor	Descriptor	Descriptor	Descriptor	2
Average Marks= (8+6+2+2)/4=4.5							5

**Note:** Dimension and Descriptor shall be defined by the respective course coordinator as per the activities

### 7. Reference:

Sl. No.	Description
1	Database System Concepts by Abraham Silberschatz, Henry F. Korth, S . Sudarshan
2	<a href="https://binaryterms.com/">https://binaryterms.com/</a>
3	<a href="https://beginnersbook.com/">https://beginnersbook.com/</a>
4	<a href="https://www.oracletutorial.com/">https://www.oracletutorial.com/</a>

### 8. CIE Skill Test Scheme of Evaluation

SL. No.	Particulars/Dimension	Marks
1	Draw ER diagram for the given specifications.	30

2	Translate ER diagram to relational model, verify against integrity constraints and refine and normalize DB design	40
3	Explain above DB design In the event of student failing to verify integrity constraints and apply normalization the examiner shall use viva voce to assess the student understanding of normal forms and integrity constraints	20
4	Portfolio evaluation of practice sessions	10
<b>Total Marks</b>		<b>100</b>

**Note: For CIE skill test 2, SEE scheme of evaluation shall be used.**

### 9. SEE Scheme of Evaluation

SL. No.	Particulars/Dimension	Marks
1	Draw ER diagram for the given specifications.	10
2	Translate ER diagram to relational model, verify against integrity constraints and refine and normalize DB design	20
3	Use appropriate SQL statements to create the database and other DB objects using a DBMS software for the above design	10
4	Perform insert, delete and/or update operations on the database and query the database to retrieve the required information using appropriate SQL statements and clauses.	30
5	Demonstrate the working of above queries. In the event of not working of above queries (with no syntactical errors), the examiner shall use viva voce to assess the student understanding of ER model, Relational model concepts and SQL.	20
6	Portfolio evaluation of practice sessions	10
<b>Total Marks</b>		<b>100</b>

### 10. Equipment/software list with Specification for a batch of 20 students

Sl. No.	Particulars	Specification	Quantity
1	Computers		20
2	MySQL workbench/ or equivalent software; Lucid chart, draw.io		