

Subject Code	Subject Name	Period per Week		Credit
28561	Database Management System	T	P	C
		2	3	3

<b>Rationale</b>	The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
<b>Learning Outcome (Theoretical)</b>	<b>After Completing the subject, students will be able to:</b> <ol style="list-style-type: none"> <li>1. Illustrate Entity-Relationship model from a realistic problem specification.</li> <li>2. Describe schema of a database.</li> <li>3. Interpret formal design techniques to produce a database schema.</li> <li>4. Explain relational data model, relational database design, relational algebra and SQL.</li> <li>5. Interpret Integrity &amp; security.</li> <li>6. State the procedure to improve the database design by normalization.</li> </ol>
<b>Learning Outcome (Practical)</b>	<b>After undergoing the subject, students will be able to:</b> <ol style="list-style-type: none"> <li>1. Create relational database systems with design.</li> <li>2. Execute various advanced database queries.</li> <li>3. Design and build ER Diagrams, Flow chart for related database systems using various software.</li> <li>4. Design and implement database applications.</li> </ol>

## Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1 Period)	Final Marks
<b>1</b>	<b>Basic concept of database system</b> 1.1 Define database and database management system. 1.2 Explain the purposes of database management system. 1.3 Differentiate between conventional file system and database management system. 1.4 Mention the advantages and disadvantages of database management system. 1.5 State Relational data base management system-RDBMS. 1.6 Define data abstraction, instances and schemas. 1.7 Describe schema.	<b>2</b>	<b>6</b>
<b>2</b>	<b>Database languages, users, manager and administrator</b> 2.1 Describe the database query languages. 2.2 Explain the basic operation of DDL, DML, DCL and TCL. 2.3 Describe the different types of database system users. 2.4 State various tasks performed by a database manager. 2.5 Describe the responsibilities of a database administrator. 2.6 Explain the functional components of a database system.	<b>2</b>	<b>6</b>
<b>3</b>	<b>Data models</b> 3.1 Define entity, entity set and data model. 3.2 Explain E-R diagram symbols. 3.3 Describe the E-R diagram for different mapping constrains. 3.4 List different types of attributes used in E-R diagrams. 3.5 Explain conversion technic of E-R diagram to table. 3.6 Describe the different types of data models with examples. 3.7 Illustrate mapping, cardinalities and existences constraints in entity-relationship with diagrams. 3.8 List different types of keys in RDBMS. 3.9 Define Primary key, Foreign key, Super key and Candidate key. 3.10 Distinguish between strong and weak entity sets.	<b>4</b>	<b>10</b>
<b>4</b>	<b>Relational Database Query Language</b> 4.1 Define query language. 4.2 Differentiate among SQL, QBE and datalog. 4.3 List fundamental operations of relational algebra. 4.4 Describe select, project, union, set difference, Cartesian product, rename, set intersection, natural joint, division and assignments.	<b>3</b>	<b>6</b>

<b>5</b>	<b>SQL and PL/SQL</b> 5.1 Define SQL and PL/SQL. 5.2 Mention several parts of SQL and PL/SQL. 5.3 List different clauses of SQL statement. 5.4 Explain SELECT, FROM, WHERE, ORDER BY, GROUP BY and HAVING statement. 5.5 Describe the usage of SQL set operators. 5.6 State the usage of SQL Scalar functions. 5.7 Describe the usage of SQL aggregate functions. 5.8 Explain the usage of joining. 5.9 Interpret the techniques to add, change and remove data from a table.	<b>4</b>	<b>8</b>
<b>6</b>	<b>Integrity and security</b> 6.1 Define integrity constraints. 6.2 Describe the referential integrity in SQL. 6.3 State the assertions in RDBMS. 6.4 Define the triggers in RDBMS. 6.5 State the necessity of triggers in RDBMS. 6.6 Define the security in RDBMS. 6.7 Define encryption and authentication in database. 6.8 Mention various encryption techniques.	<b>4</b>	<b>6</b>
<b>7</b>	<b>Relational database design</b> 7.1 Define normalization. 7.2 Explain the necessity for normalization. 7.3 Describe redundancy in RDBMS. 7.4 Explain the three stages/rules of normalization in a database management system. 7.5 State the overall database design.	<b>3</b>	<b>4</b>
<b>8</b>	<b>Data Storage Media</b> 8.1 List physical storage media. 8.2 Describe the storage device hierarchy used for database storage. 8.3 Define RAID. 8.4 Describe the various levels of RAID. 8.5 Explain the considerations for choosing RAID levels.	<b>3</b>	<b>4</b>
<b>9</b>	<b>Transactions and concurrency controls</b> 9.1 Define transaction and concurrent execution in DBMS. 9.2 List the properties of a transaction. 9.3 Explain the transaction state with diagram. 9.4 Define concurrency. 9.5 Discuss the reasons for allowing concurrency. 9.6 Define locking. 9.7 Explain various locking techniques.	<b>3</b>	<b>4</b>

<b>10</b>	<b>Database System Architecture.</b> 10.1 Define centralized, parallel and distributed database systems. 10.2 Interpret homogeneous and heterogeneous databases. 10.3 Explain the structure of centralized and client server, Parallel and distributed database architecture. 10.4 Describe the advantages and disadvantages of server, parallel and distributed database system architecture.	<b>4</b>	<b>6</b>
	<b>TOTAL</b>	<b>32</b>	<b>60</b>

### **DETAILED SYLLABUS (PRACTICAL)**

<b>SL.</b>	<b>EXPERIMENT NAME WITH WORKING PROCEDURE</b>	<b>Class (3 Period)</b>	<b>Marks (Continuous)</b>
<b>1.</b>	<b>Install MS-Access</b> 1.1 Collect necessary hardware and operating system requirements for installing MS-Access. 1.2 Install MS-Access on the computer. 1.3 Observe and document the Installation process. 1.4 Maintain a record of performed task.	<b>1</b>	<b>2</b>
<b>2.</b>	<b>Create a new database</b> 2.1 Open MS-Access. 2.2 Create a new database. 2.3 Save the database. 2.3 Rename the database as needed. 2.4 Maintain a record of the tasks performed during creation.	<b>1</b>	<b>2</b>
<b>3.</b>	<b>Create Tables</b> 3.1 Create a new user/database and assign permissions. 3.2 Create a table space for organized data storage. 3.3 Create new tables with appropriate data types for Student, Department, Subject, Year, and Mark information. 3.4 Identify Primary key, foreign key, and candidate key with different constraints. 3.5 Perform dropping Primary key and foreign key. 3.6 Save the table structures. 3.7 Edit a table structure if needed. 3.8 Perform operations such as inserting a record, updating a record, and deleting a row. 3.9 Alter a field with Field Name, Data type, and Length. 3.10 Change or remove a key field. 3.11 Maintain a record of the tasks performed during table creation and modification.	<b>2</b>	<b>3</b>

<b>4.</b>	<b>Create Data Entry Forms</b> 4.1 Query linked tables using join clauses for relational data. 4.2 Create data entry forms for Student Information, Department Information, Subject Information, Year Information, and Mark Information tables. 4.3 Create a total query to find the GPA of each student for a specific year. 4.4 Maintain a record of the tasks performed during	<b>2</b>	<b>2</b>
<b>5.</b>	<b>Use Report Wizard to Visualize the Final Output</b> 5.1 Use Auto Report to generate reports for the result process. 5.2 Utilize the report wizard to create grade sheets, mark sheets, transcripts, merit lists, and tabulation sheets. 5.3 Customize reports with grouping and sorting for better presentation. 5.4 Maintain a record of the tasks performed during report creation.	<b>2</b>	<b>2</b>
<b>6.</b>	<b>Install Oracle and SQL Server</b> 6.1 Collect necessary hardware and operating system requirements for installing Oracle and SQL Server database. 6.2 Install Oracle database on the computer. 6.3 Install SQL Server database on the computer. 6.4 Observe and document the installation process. 6.5 Maintain a record of the tasks performed during installation.	<b>2</b>	<b>2</b>
<b>7.</b>	<b>Retrieve Data using SQL</b> 7.1 Retrieve data from the database using SELECT clause. 7.2 Use WHERE to restrict the amount of rows in the result set. 7.3 Use ORDER BY to sort retrieved data. 7.4 Use GROUP BY to aggregate data. 7.5 Maintain a record of the tasks performed during data retrieval.	<b>1</b>	<b>2</b>
<b>8.</b>	<b>Use Functions of SQL</b> 8.1 Utilize various scalar functions, including LOWER (), UPPER (), INITCAP (). 8.2 Apply various aggregate functions, including COUNT (), SUM (), AVG () etc. 8.3 Maintain a record of the tasks performed using SQL functions.	<b>1</b>	<b>2</b>
<b>9.</b>	<b>Manipulate Data</b> 9.1 Perform Data Manipulation Language (DML) operations on the Database. 9.2 Execute the ALTER operation to modify the structure of a table. 9.3 Maintain a record of the tasks performed during data manipulation.	<b>1</b>	<b>2</b>

<b>10.</b>	<b>JOIN Tables</b> 10.1 Perform Inner Join on tables. 10.2 Execute Outer Join on tables. 10.3 Perform Full Outer Join on tables. 10.4 Maintain a record of the tasks performed during table joins.	<b>1</b>	<b>2</b>
<b>11.</b>	<b>Work with Index and Constraints in SQL</b> 11.1 Create Index on tables. 11.2 Utilize 'DUAL' and SYSDATE for system-related information. 11.3 Implement different types of constraints in SQL.	<b>1</b>	<b>2</b>
<b>12.</b>	<b>Work with Roles and Privileges</b> 12.1 Grant privileges on database users. 12.2 Revoke privileges from database users. 12.3 Create roles for organized access control. 12.4 Assign privileges to roles for efficient management. 12.5 Assign roles to users for streamlined access control. 12.6 Maintain a record of the tasks performed in managing roles and privileges.	<b>1</b>	<b>2</b>
Total		<b>16</b>	<b>25</b>

#### **RECOMMENDED BOOKS:**

<b>SL</b>	<b>Book Name</b>	<b>Writer Name</b>	<b>Publisher Name &amp; Edition</b>
01.	Database System Concepts	Abraham Silberschatz, Henry F. Korth, and S. Sudarshan	McGraw-Hill
02.	Successful ICT Projects in Access	P.M Heathcote	Payne-Gallway Publishers
03.	Oracle PL/SQL Programming	Steven Feuerstein, Bill Pribyl, Chip Dawes	O'Reilly Media
04.	Oracle Database 12c The Complete Reference (Oracle Press)	Bob Bryla, Kevin Loney	McGraw-Hill

#### **WEBSITE REFERENCES:**

<b>SL</b>	<b>Web Link</b>
1	<a href="https://www.w3schools.com/sql/">https://www.w3schools.com/sql/</a>
2	<a href="http://www.java2s.com/Tutorial/Oracle/CatalogOracle.htm">www.java2s.com/Tutorial/Oracle/CatalogOracle.htm</a>
3	<a href="https://www.splunk.com/en_us/blog/learn/dbms-database-management-systems.html">https://www.splunk.com/en_us/blog/learn/dbms-database-management-systems.html</a>
4	<a href="http://www.docs.oracle.com">www.docs.oracle.com</a>

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