Name of the Course: Fundamentals of Database Systems

Sr. No.	Heading	Particulars
1	**Description the course:**	**Introduction:** The Fundamentals of Database Systems course is a foundation in the study of information management and technology. It provides students with a comprehensive understanding of the principles, design, and implementation of databases, which are critical components in virtually every domain where data is utilized. **Relevance:** In today's data-driven world, the management and retrieval of information are paramount. This course is highly relevant as it addresses the core concepts essential for organizing, storing, and manipulating data efficiently. **Usefulness:** This course is immensely useful for individuals aspiring to work with data in various capacities. Whether designing databases, developing applications that interact with databases, or analyzing data trends, a solid understanding of database fundamentals is crucial. **Application:** The principles learned in this course find application across diverse sectors, including business, healthcare, finance, and technology. Students will gain the skills to model real-world scenarios, design efficient databases, and implement systems that store and retrieve information seamlessly. **Interest:** This course often attracts students due to its practical and tangible applications. The ability to structure and manage data effectively, ensuring its integrity and accessibility, can be intellectually stimulating and applicable to numerous real-world scenarios. **Connection with Other Courses:** This course forms a vital connection with various other courses in computer science and information technology. It is foundational to courses like database management, data warehousing, and data mining. Additionally, it complements courses related to software development, ensuring a holistic understanding of system architecture.

		Demand in the Industry: As businesses and organizations amass ever-growing volumes of data, there is an increasing demand for professionals versed in database systems. Industries such as finance, healthcare, e-commerce, and technology actively seek individuals who can design, implement, and manage robust databases. **Job Prospects:** Graduates proficient in the fundamentals of database systems enjoy promising job prospects. Potential roles include database administrator, data analyst, database developer, and business intelligence analyst. These professionals play a pivotal role in ensuring the efficient and secure management of an organization's data assets.
2	**Vertical:**	Major
3	**Type:**	Theory
4	**Credits:**	2 credits (1 credit = 15 Hours for Theory)
5	**Hours Allotted:**	30 Hours
6	**Marks Allotted:**	50 Marks
7	**Course Objectives(CO):** **CO 1.** To make students aware fundamentals of database system. **CO 2.** To give idea how ERD components helpful in database design and implementation. **CO 3.** To experience the students working with database using MySQL. **CO 4.** To familiarize the student with normalization, database protection and different DCL Statements. **CO 5.** To make students aware about importance of protecting data from unauthorized users. **CO 6.** To make students aware of granting and revoking rights of data manipulation.	
8	**Course Outcomes (OC):** After successful completion of this course, students would be able to - **OC 1.** To appreciate the importance of database design. **OC 2.** Analyze database requirements and determine the entities involved in the system and their relationship to one another. **OC 3.** Write simple queries to MySQL related to String, Maths and Date Functions. **OC 4.** Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands. **OC 5.** Understand the normalization and its role in the database design process. **OC 6.** Handle data permissions. **OC 7.** Create indexes and understands the role of Indexes in optimization search.	

9	**Modules** **Module 1 (15 hours):**
	Introduction to DBMS: Database, DBMS – Definition, Overview of DBMS, Advantages of DBMS, Levels of abstraction, Data independence, DBMS Architecture **Data models**: Client/Server Architecture, Object Based Logical Model, Record Based Logical Model (relational, hierarchical, network **Entity Relationship Model and ER to Table:** Entities, attributes, entity sets, relations, relationship sets, Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization, Conceptual Design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER) Entity to Table, Relationship to tables with and without key constraints. **DDL Statements:** Creating Databases, Using Databases, datatypes, Creating Tables (with integrity constraints – primary key, default, check, not null), Altering Tables, Renaming Tables, Dropping Tables, Truncating Tables **DML statements:** Viewing the structure of a table insert, update, delete, Select all columns, specific columns, unique records, conditional select, in clause, between clause, limit, aggregate functions (count, min, max, avg, sum), group by clause, having clause
	Module 2 (15 hours):
	Relational data model: Domains, attributes, Tuples and Relations, Relational Model Notation, Characteristics of Relations, Relational Constraints - primary key, referential integrity, unique constraint, Null constraint, Check constraint **Functions:** String Functions (concat, instr, left, right, mid, length, lcase/lower, ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod, pow, sqrt, round, truncate) Date Functions(adddate, datediff, day, month, year, hour, min, sec, now, reverse) **Joining Tables and Subqueries**: inner join, outer join (left outer, right outer, full outer) subqueries with IN, EXISTS, subqueries restrictions, Nested subqueries, ANY/ALL clause, correlated subqueries **Normal forms:** Functional dependencies, first, second, third, and BCNF normal forms based on primary keys, lossless join decomposition. **Database Protection:** Security Issues, Threats to Databases, Security Mechanisms, Role of DBA, Discretionary Access Control, Backing Up and Restoring databases **Views**: Creating, altering dropping, renaming and manipulating views **DCL Statements:** Creating/dropping users, privileges introduction, granting/revoking privileges, viewing privileges), Transaction control commands – Commit, Rollback

<table>
<tr><td>10</td><td colspan="2">Text Books
1. Fundamentals of Database System, ElmasriRamez, NavatheShamkant, Pearson Education, Seventh edition, 2017
2. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition,2014
3. Murach's MySQL, Joel Murach, 3rd Edition, 3rd Edition, 2019</td></tr>
<tr><td>11</td><td colspan="2">Reference Books
1. Database System Concepts, Abraham Silberschatz, HenryF.Korth, S.Sudarshan, McGraw Hill,2017
2. MySQL: The Complete Reference, VikramVaswani , McGraw Hill, 2017
3. Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease, Ashwin Pajankar, BPB Publications, 2020</td></tr>
<tr><td>12</td><td>Internal Continuous Assessment: 40%</td><td>Semester End Examination: 60%</td></tr>
<tr><td>13</td><td>Continuous Evaluation through:
Class Test on Module 1: 10 marks
Class Test on Module 2: 10 marks
Average of 2 Class Tests: 10 marks
Assignment on Module 1: 5 marks
Assignment on Module 2: 5 marks
Total of 2 Assignments: 10 marks
Total: 20 marks</td><td>Evaluation through:
A Semester End Theory Examination of 1 hour duration for 30 marks as per the paper pattern given below.
Total: 30 marks</td></tr>
<tr><td>14</td><td colspan="2">Format of Question Paper:

Total Marks: 30 Duration: 1 Hour
<table>
<tr><th>Question</th><th>Based On</th><th>Options</th><th>Marks</th></tr>
<tr><td>Q. 1</td><td>Module 1</td><td>Any 2 out of 4</td><td>10</td></tr>
<tr><td>Q. 2</td><td>Module 2</td><td>Any 2 out of 4</td><td>10</td></tr>
<tr><td>Q. 3</td><td>Module 1 & 2</td><td>Any 2 out of 4</td><td>10</td></tr>
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