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December 2023 (REEXAM)

SY B.TECH (SEMESTER - I)

COURSE NAME: Database Management System BRANCH: Artificial Intelligence and Data Science
COURSE CODE: ADUA21204

(PATTERN 2020)

Time: [2 Hrs] **[Max. Marks: 60]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks.**
2) **Use of scientific calculator is allowed**
3) **Use suitable data wherever required**
4) **All questions are compulsory. Solve any two sub questions each from each Question 1 ,2, 3,4,5,and 6 respectively**

Q. No.	Question Description	Max. Marks	CO mapped	BT Level
Q.1	a) Examine the difference between a regular entity and a weak entity in an Entity-Relationship model. Provide a practical example for each.	[5]	CO[1]	Analyzing
	b) Assess the importance of constraints in a relational database. Discuss how domain constraints contribute to data correctness.	[5]	CO[1]	Evaluating
	c) Examine the differences between total and partial participation in a relationship. How does each type impact the database structure?	[5]	CO[1]	Analyzing
Q2	a) Evaluate the characteristics and advantages of SQL as a database language. How does SQL address the need for data manipulation and control?	[5]	CO[2]	Analyzing
	b) Evaluate the significance of indexes in a relational database. How do they enhance query performance? Provide an example illustrating the use of an index.	[5]	CO[2]	Evaluating
	c) Create a SQL query that involves both DDL and DML operations. Illustrate the creation of a new table and the insertion of data into that table.	[5]	CO[2]	Creating
Q3.	a) Analyze the importance of functional dependencies in the relational model. Provide examples to illustrate trivial and non-trivial functional dependencies.	[5]	CO[3]	Analyzing

	b) Assess the benefits of normalization in a relational database. Provide examples to illustrate the reduction of redundancy and prevention of anomalies. c) Analyze the role of Boyce-Codd Normal Form (BCNF) in relational databases. How does BCNF address the limitations of Third Normal Form (3NF)? Provide an example to illustrate the application of BCNF.	[5] [5]	CO[3] CO[3]	Evaluating Analyzing
Q.4	a) Analyze the importance of Atomicity in transaction properties within a database. Provide examples to illustrate the significance of both commit and abort operations in ensuring the atomicity of transactions. b) Analyze the concept of Conflict Serializability in database transactions. Explain the conditions for conflicting operations and the construction of a precedence graph to determine conflict serializability. c) Design a scenario illustrating a deadlock in a database system. Explain the conditions that lead to a deadlock, and propose a solution to break the deadlock, ensuring transaction progress.	[5] [5] [5]	CO[4] CO[4] CO[4]	Analyzing Analyzing Creating
Q.5	a) Analyze the role of Fragmentation in a Distributed Database System. Discuss the types of fragmentation (horizontal, vertical, hybrid) and their impact on system performance and data distribution. b) Analyze the benefits and challenges of Replication in a Distributed Data Storage system. Discuss how replication contributes to reliability, reduction in network load, and quicker response, while addressing potential drawbacks. c) Analyze the fundamental principles and advantages of a distributed database system. Discuss how the distribution of databases across various computers impacts performance, reliability, and scalability.	[5] [5] [5]	CO[5] CO[5] CO[5]	Analyzing Analyzing Analyzing
Q.6)	a) Analyze the challenges associated with Big Data, focusing on the aspects of capturing, curation, storage, and analysis. b) Evaluate the advantages of using NoSQL databases over traditional relational databases. c) Create a comparative analysis between RDBMS and MongoDB in the context of database management. Discuss scenarios where MongoDB is preferable over traditional relational databases.	[5] [5] [5]	CO[6] CO[6] CO[6]	Analyzing Analyzing Analyzing