

Name:	
Enrolment No:	

UPES

End Semester Examination, December 2024

Course: Database Management Systems

Semester: III

Program: B. Tech CSE

Time : 03 hrs.

Course Code: CSEG2046

Max. Marks: 100

Instructions: Answer only what is asked. Irrelevant content will not earn extra marks.

**SECTION A
(5Qx4M=20Marks)**

S. No.	Questions	Marks	CO
Q. 1	Give Justification for the Statement: “The selection operation is commutative while the Projection operation is not commutative.”	4	CO 1
Q. 2	Explain briefly about aggregate functions with example query.	4	CO 1
Q. 3	Explain total and partial participation of entities in a relationship with suitable examples.	4	CO 2
Q. 4	Differentiate between primary, secondary and clustered indexes.	4	CO 3
Q. 5	Discuss the ACID properties of transaction.	4	CO 4

**SECTION B
(4Qx10M= 40 Marks)**

Q. 6	<p>Discuss the different types of keys in relational database management system.</p> <p style="text-align: center;">OR</p> <p>Consider a relation R with attributes ABCDEFGH and functional dependencies S as follows: S = {A → CD, ACF → G, AD → BEF, BCG → D, CF → AH, CH → G, D → B, H → DEG}.</p> <p>Find all the candidate keys for R.</p>	10	CO 2
Q. 7	Discuss the stages involved in query processing. How does query optimizer improve the efficiency of query execution. Taking an example, explain how a query is processed, and best query execution plan is selected? Use suitable illustrations.	10	CO 2
Q. 8	Discuss the different types of problems that can arise with concurrent transactions with suitable examples.	10	CO 3
Q. 9	<p>Given the structure of restaurants collection</p> <pre>{ "address": { "building": "1007", "city": "Mumbai", "name": "Dominos Pizza" } }</pre>		

	<pre> "coord": [-73.856077, 40.848447], "street": "Morris Park Ave", "zipcode": "10462" }, "borough": "Bronx", "cuisine": "Bakery", "grades": [{"date": {"\$date": 1393804800000}, "grade": "A", "score": 2}, {"date": {"\$date": 1378857600000}, "grade": "A", "score": 6}, {"date": {"\$date": 1358985600000}, "grade": "A", "score": 10}, {"date": {"\$date": 1322006400000}, "grade": "A", "score": 9}, {"date": {"\$date": 1299715200000}, "grade": "B", "score": 14}], "name": "Morris Park Bake Shop", "restaurant_id": "30075445" } </pre> <p>Write MongoDB queries for the following:</p> <p>A) Display the next 5 restaurants after skipping the first 5 which are in the borough Bronx.</p> <p>B) Find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.</p> <p>C) Find the restaurant Id, name, borough and cuisine for those restaurants which do not belong to the borough Staten Island or Queens or Bronx or Brooklyn.</p> <p>D) Find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'</p> <p>E) Find the restaurants that have a grade with a score of 2 and a grade with a score of 6 and are in the borough of Manhattan or Brooklyn, and their cuisine is not American.</p>	(2+2+2 +2+2)	CO 4
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SECTION-C (2Qx20M=40 Marks)

Q. 10	<p>A) List the differences between NoSQL and relational databases.</p> <p>B) Consider the relation $R = \{A, B, C, D, E, F, G, H, I, J\}$ and the set of functional dependencies $F = \{AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ\}$. What are the candidate keys for R? Decompose R into 2NF and then 3NF relations.</p> <p style="text-align: center;">OR</p> <p>A) Explain the various steps to convert an ER diagram to Relational Schema.</p> <p>B) Identify the various relationships and its cardinality ratio and participation constraint of each relationship type in the given ER diagram.</p>	(10+10)	CO 2
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	<p>The ER diagram illustrates a database schema with the following entities and their attributes:</p> <ul style="list-style-type: none"> EMPLOYEE: Attributes include Fname, Minit, Lname, Bdate, Address, Salary, Sex, and Ssn. DEPARTMENT: Attributes include Name and Number. It has a relationship LOCATIONS with attribute Number_of_employees. PROJECT: Attributes include Hours, Name, and Location. DEPENDENT: Attributes include Name, Sex, Birth_date, and Relationship. <p>The relationships are:</p> <ul style="list-style-type: none"> WORKS_FOR: Employee works for a department. Multiplicity N at Employee side, 1 at Department side. MANAGES: Employee manages a project. Multiplicity 1 at Employee side, 1 at Project side. CONTROLS: Department controls a project. Multiplicity 1 at Department side, N at Project side. WORKS_ON: Employee works on a project. Multiplicity M at Employee side, N at Project side. SUPERVISION: Employee supervises another employee. Multiplicity 1 at Supervisor side, N at Supervisee side. DEPENDENTS_OF: Employee has dependents. Multiplicity 1 at Employee side, N at Dependent side. 		
Q. 11 A) B)	<p>Explain Two phase locking protocol.</p> <p>Check whether the given schedule S is conflict serializable or not. If yes, then determine all the possible serialized schedules</p> <p>S: R₄(A), R₂(A), R₃(A), W₁(B), W₂(A), R₃(B), W₂(B).</p>	(5+15)	CO 4