Q. Code: 570456

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Third Semester

IT22302 – DATABASE CONCEPTS

(Information Technology)

(Regulation 2022)

TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Demonstrate the knowledge on basic elements of different data models and normalize the given relation.	**5**
CO 2	Construct SQL queries for a given application.	**5**
CO 3	Illustrate transaction processing and concurrency control concepts and manage transactions.	**4**
CO 4	Examine the basic database storage structures and access techniques.	**4**
CO 5	Analyze the recent advancements in databases and design database for real world applications.	**4**

PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	List the various types of database management systems and mention the significance of RDBMS.	**1**	**2**
2.	Describe the difference between primary key and foreign key in database design with examples.	**1**	**3**
3.	Give two examples each for composite key and single attribute.	**1**	**3**
4.	List the limitations of First Normal Form.	**1**	**2**
5.	Say TRUE or FALSE a. DROP command deletes the table along with its schema b. TRUNCATE command deletes only the table contents and retains the schema	**2**	**2**
6.	If there are five tuples in table A and 10 tuples in table B, the table A × B will have ____ tuples.	**2**	**2**
7.	Compare base table and view with examples.	**2**	**2**
8.	Compare the select and project operators in Relational Algebra.	**2**	**2**
9.	Give an example of a cascading rollback scenario.	**3**	**3**
10.	What is a deadlock in a database system, and how does it occur?	**3**	**2**
11.	List any 2 drawbacks of executing transactions sequentially.	**3**	**2**
12.	Outline the sequence of states for a fund transfer transaction, will go through in its lifetime.	**3**	**2**

13.	Compare Primary and Secondary indexing in your words	**4**	**2**
14.	What is the advantage of using hashing in databases?	**4**	**2**
15.	Sketch the Query execution tree for the following query: select ename from employee;	**4**	**3**
16.	Compare B tree and B+ tree in the context of storing values in nodes.	**4**	**2**
17.	List the sources of data that a multimedia database model is capable of storing and retrieving	**5**	**2**
18.	How does temporal database management differ from traditional databases? Provide examples of situations where temporal databases are advantageous.	**5**	**2**
19.	Compare horizontal and vertical fragmentations with examples	**5**	**2**
20.	Discuss the advantages of distributed database systems over centralized databases.	**5**	**3**

PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Explain the components of a modern database management system (DBMS) and illustrate how each component of the architecture interacts in view of a university's student management system.	**(10)**	**1**	**3**
	(OR)			
(b)	Given a set of data representing a university's student enrollment system, apply the principles of normalization to transform it into third normal form (3NF). Provide a step-by-step explanation of the normalization process and justify the importance of normalization in ensuring data integrity and efficiency.	**(10)**	**1**	**3**
22. (a)	Consider the below schemas and write SQL queries for the following Student (roll_no, student_name, DOB, DEP_NO) Teacher(ID,Teacher_name,Dep_No,Salary) Department(Dep_No,Dep_Name,HOD_ID) 1. List the details of students in CSE department 2. List the details of teachers who earn more than 1,00,000 3. Count the number of students in each department 4. List the names of students who born after 2005	**(10)**	**2**	**4**
	(OR)			
(b)	Consider the below schemas and write Relational Algebra expressions for the	**(10)**	**2**	**4**

following

Student(S_ID,S_Name,Age,Dept) Course (C_ID,C_Name,Credit)

Enrollment(E_ID,S_ID,C_ID,Grade)

1. Retrieve all students enrolled in a specific course.
2. Find the average age of students
3. Find the course with the highest enrollment.
4. Find the students in the department numbered 5

23. (a)	Explain about the desired properties that a ticket booking transaction should possess in order to ensure database stability and persistence.	**(10)**	**3**	**3**
	(OR)			
(b)	Explain how transactions and locks are used to manage concurrency in a database system. Provide an example of a situation where proper locking mechanisms are essential.	**(10)**	**3**	**3**
24. (a)	Explain the concept of indexing and hashing in database systems. How do they improve data retrieval performance? Provide examples of scenarios where indexing and hashing are beneficial.	**(10)**	**4**	**3**
	(OR)			
(b)	Discuss the application of disk organizing techniques at various levels to improve reliability with suitable diagrams.	**(10)**	**4**	**3**
25. (a)	Discuss the benefits of distributing data across multiple locations and employing redundant data storage methods. Illustrate the difficulties encountered in coordinating transactions across the distributed locations for a banking application.	**(10)**	**5**	**3**
	(OR)			
(b)	Explain the concept of temporal databases and their significance in managing time-varying data. Provide an example scenario where a temporal database would be beneficial.	**(10)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Evaluate the design of an Entity-Relationship (ER) diagram for a school management system. Critically analyze the provided scenario, which includes entities such as students, teachers, courses, classes, and grades. Assess the effectiveness of the chosen entities, attributes, and relationships in accurately modeling the data requirements of a school management system. Consider factors such as student enrollment, teacher assignments, course offerings, class schedules, and grade recording. Additionally, examine the potential strengths and limitations of the ER diagram in handling complex scenarios, such as student transfers, teacher substitutions, and grading policies. Finally, propose any enhancements or alternative modeling strategies that could improve the representation of the school management system data in the ER diagram.	**(10)**	1	**5**

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