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ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.Tech (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2025

INFORAMTION TECHNOLOGY

THIRD SEMESTER

IT5351 - Database Management Systems

(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	Model an application's data requirements using conceptual modeling and design database schemas based on the conceptual model.
CO2	Formulate solutions to a broad range of query problems using relational algebra/SQL.
CO3	Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
CO4	Run transactions and estimate the procedures for controlling the consequences of concurrent data access.
CO5	Explain basic database storage structures, access techniques and query processing
CO6	Describe distributed, semi-structured and unstructured database systems.

BL – Bloom's Taxonomy Levels

(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)

(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	List any five applications of DBMS	2	1	2
2	What is the difference between a database schema and a database state?	2	1	2
3	Discuss about the informal measure of goodness for a relation schema?	2	2	1
4	What is functional dependency? Give example?	2	3	2
5	Describe the ACID Properties of a transaction?	2	4	1
6	Define deadlock	2	4	1
7	What is the function of a buffer manager?	2	5	1
8	List the techniques applied for allocating file blocks on disk?	2	5	2
9	Write the differences between key-value and document data models.	2	6	2
10	Describe about various types of XML parsers?	2	6	2

PART- B(5x 13=65Marks)

(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	i) With the help of the block diagram, describe the basic architecture of a database management system? ii) Discuss the main characteristics of the database approach and how it differs from traditional file systems?	8 5	1	2
	OR			
11 (b)	i) List and explain various DML, DDL commands in SQL ii) Answer the following queries using SQL for EMPLOYEE relations Emp (empno, ename, job, mgrno, hire_ date, sal, deptno) Dept (deptno, dname, location) Project (pno, pname, pmgr, persons, budget, pstart, pend) 1. Create a view containing the name, job title and the annualsalary of employee working in department 10. 2. Retrieve all employees who are working in department 10 and who earn at least as much as any (i.e., at least one) employee working in department 20. 3. For each employee, retrieve the name, department number and the name of the department where he is working. 4. Write a procedure which is used to increase the salary of all employees who work in the department given by the procedures parameter	5 8	2	2
12 (a)	i) Construct an ER diagram for hospital management system with a set of patients and a set of doctors. Associate with each patient a log of the various tests and examinations conducted. ii)Discuss the two main types of constraints on specializations and generalizations with suitable example?	8 5	3	2,3

	OR			
12 (b)	i) Consider the relation scheme R (A, B, C, D, E, F, G, H, I, J) and the set of functional dependencies as given below. {A, B}→{C}, {B}→{ E, F}, {A, D}-→{G, H }, {G }-{ I }, and{H}→{J} Determine the key for the relation R and the total number of candidate keys? ii) Differentiate 3NF and BCNF with an example?	8 5	3	2,3
13 (a)	What is Concurrency? Explain it in terms of locking mechanism and two-phase Commit Protocol with neat diagram?	13	4	2
	OR			
13 (b)	Illustrate the conflict serializability and view serializability with an example?	13	4	2
14 (a)	i) Describe the purpose of indexing? How this can be done by B+ tree? Explain. ii) Explain the cost estimation for executing a selection query which uses a binary search based on a primary key?	8 5	5	2
	OR			
14 (b)	i) What are the main goals and characteristics of various levels of RAID technology? ii) Discuss the techniques for allowing a hash file to expand and shrink dynamically? What are the advantages and disadvantages of each?	8 5	5	2
15 (a)	i) Explain distributed database architecture with a neat sketch? ii)Discuss the different types of NoSQL databases and their uses in appropriate scenario?	8 5	6	2
	OR			
15 (b)	i)Explain XML DTD and Schema with example? ii) Explain the importance of CAP theorem?	8 5	6	2

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	i) Describe the three phases of the ARIES recovery method? ii) Write the log corresponding to a particular schedule at the point of a system crash for four transactions T1, T2, T3, and T4. Suppose that the systems use the immediate update protocol with check pointing. Describe the recovery process from the system crash. Specify which transactions are rolled back, which operations in the log are redone and which (if any) are undone, and whether any cascading rollback takes place.	5 10	4	3,4

[start_transaction, T_1]
[read_item, T_1, A]
[read_item, T_1, D]
[write_item, T_1, D, 20, 25]
[commit, T_1]
[checkpoint]
[start_transaction, T_2]
[read_item, T_2, B]
[write_item, T_2, B, 12, 18]
[start_transaction, T_4]
[read_item, T_4, D]
[write_item, T_4, D, 25, 15]
[start_transaction, T_3]
[write_item, T_3, C, 30, 40]
[read_item, T_4, A]
[write_item, T_4, A, 30, 20]
[commit, T_4]
[read_item, T_2, D]
[write_item, T_2, D, 15, 25] ← System crash