Reg No.:_____ Name:_____

0720MCA102112402

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Second Semester MCA(Two Year) Degree (S,FE) Examination December 2024

Course Code: 20MCA102

Course Name: ADVANCED DATABASE MANAGEMENT SYSTEMS

Max. Marks: 60 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1	Differentiate Database schema and instance.	(3)
2	List down any three functions of database administrator (DBA).	(3)
3	Explain the issues that may occur if the relation is not normalized.	(3)
4	Give R(X, Y, Z, W) and Set of Functional Dependency FD = {X → Y, Y → Z, Z → X}. Find the candidate keys of above relation.	(3)
5	Does Two Phase locking protocol avoid deadlocks? Justify your answer with example.	(3)
6	How can the wait/die and wound/wait schemes be utilized to manage transaction concurrency effectively in a multi-user database environment?	(3)
7	Explain query processing with figure.	(3)
8	Explain any two types of indices used in databases.	(3)
9	Explain structured types in SQL with example.	(3)
10	List down any three non-relational databases.	(3)

PART B

Answer any one question from each module. Each question carries 6 marks.

Module I

11 Consider the following schema. (6)

Suppliers (SID, sname, address)

Parts(PID, pname, colour)

Catalog(SID, PID, price)

$\texttt{Catalog[SID]} \subset \texttt{Suppliers[SID]}$

$\texttt{Catalog[PID]} \subset \texttt{Parts[PID]}$

Write relational algebra queries for the following:

(i) Find all prices for parts that are red or green. (A part may have different prices from different manufacturers)

(ii) Find the SIDs of all suppliers who supply a part that is red or green.

(iii) Find the names of all suppliers who supply a part that is red or green.

(iv) Find the name and address of all suppliers who supply a part that price greater than 100.

OR

12 Explain Entity Relationship model and different symbols used in ER diagram. (6)

Module II

13 a) Consider a relation R(A,B,C,D,E,F) with A as the only key. Assume that the dependencies E→F and C→DE hold on R. Is R in 2NF? If not, decompose to 2NF. (3)

b) Let E= {B→A, D→A, AB→D} is a set of Functional Dependencies. Find a minimal cover for E. (3)

OR

14		Define 2NF. Consider relational schema Student(StudentID, CourseID, StudentName, CourseName, Grade) with functional dependencies {StudentID, CourseID} → Grade, StudentID → StudentName, CourseID → CourseName. Check whether this relation is in 2NF? If not convert into 2NF. Justify your answer.	(6)

Module III

15		What are the possible issues that may arise if concurrent execution of transactions is not controlled? With the help of example, explain any three such issues.	(6)

OR

16	a)	Explain ACID properties of transaction.	(4)
	b)	How would you apply the ACID properties in transactions to ensure data integrity in banking application?	(2)

Module IV

17		Explain various file organization methods with figures.	(6)

OR

18		What is the purpose of RAID? Explain various levels of RAID.	(6)

Module V

19		Explain MongoDB sharding and replication with figure.	(6)

OR

20		Explain ‘shared disk’ and ‘shared nothing’ architecture with figures.	(6)

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