Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (R,S) / S4 (PT) (R,S) / S4 (WP) (R) Examination May 2024 (2019 Scheme)

Course Code: CST204

Course Name: Database Management Systems

Max. Marks: 100   **Duration: 3 Hours**

PART A

(Answer all questions; each question carries 3 marks)   **Marks**

1	List out any three database users and their functionalities.	3
2	Distinguish between schema and instance.	3
3	Explain the intersection operation in relational algebra with an example.	3
4	Differentiate between Super key, Candidate key and Primary key.	3
5	Outline concept of assertion in SQL with an example.	3
6	Explain any three differences between Hash indexes and B+ tree indexes.	3
7	State the Armstrong's axioms of FD.	3
8	State insertion anomaly with suitable example.	3
9	Explain the different properties of a transaction.	3
10	Summarize the purpose of using a lock compatibility matrix.	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Explain the seven drawbacks of file processing system, compared to database approach.	7
	b)	Represent a "Library Management Software" using an ER diagram.	7
12	a)	Explain the concept of three schema architecture with the help of a neat labelled diagram.	7
	b)	Represent an "Online Shopping Portal" using an ER diagram.	7

Module -2

13	a)	Explain the left outer join, right outer join and full outer join operations with	6

suitable examples.

b) Consider the following schema.

Suppliers(sid, sname, address)

Parts(pid, pname, color)

Catalog(sid, pid, cost)

The primary key fields are underlined; Foreign keys have the same name as primary keys. Assume integer domain for the attributes sid, pid, cost and string domain for the attributes sname, address, pname, color. Write **relational algebra** expressions for the given questions. (Use * symbol for natural join and ⋈ symbol for join)   **8**

     (i) Find the names of suppliers who supply some red part.

     (ii) Find the sids of suppliers who supply some red or green part.

     (iii) Find the sids of suppliers who supply every red part or supply every green part.

     (iv) Find the pids of parts supplied by at least two different suppliers.

14   **a)** What is constraint? Discuss about domain constraint, entity integrity and referential integrity constraint with suitable example.   **7**

     b) Illustrate with an example the different steps involved in synthesizing an ER diagram into a relational schema.   **7**

Module -3

15   **a)** With the help of an example explain Single-level indexing and multi-level indexing. Explain the difference (any four) between single-level indexing and multi-level indexing.   **8**

     b) Describe any three aggregate functions in SQL with example.   **6**

16   **a)** Explain a situation where a multi-level index would be significantly less effective than a single-level index, and vice versa.   **6**

     b) Consider the following relations: **8**

Employee (Employee-Id, Employee-Name, Salary, Department-No)

Department (Department-No, Department-Name)

The primary key fields are underlined. Foreign keys have the same name as primary keys. Write **SQL** queries for the following:

     (i) Retrieve the employee names and their department names.

     (ii) Retrieve department names and the average salary given by them.

(iii) Retrieve the ids of employees getting salary greater than the average salary of their department.

(iv) For each department that has more than 4 employees, retrieve the department-No and the number of employees getting salary more than Rs. 50000.

Module -4

17 a) Write an algorithm to find the closure of an attribute.   6

   b) Let R = (A,B,C,D,E), R1 = (A,D), R2 = (A,B), R3 = (B,E), R4 = (C,D,E), and   8
       R5 = (A,E). Let the FDs be: A→C, B→C, C→D, A→D, DE→C, CE→A.
       Check whether the decomposition of R into {R1, R2, R3, R4, R5} is a lossless
       decomposition or not.

18 a) P and Q are two set of FDs for a relational schema R(A, B, C, D).   6
       P = {A→B, B→C, C→D} and Q = {A→BC, C→D}. Check whether P covers
       Q and Q covers P? Also check whether P and Q are equivalent?

   b) Define 1NF, 2NF, 3NF and BCNF with suitable examples.   8

Module -5

19 a) Describe the different states of a transaction with the help of a neat sketch.   7

   b) What is deferred database modification? How it is different from immediate   7
       database modification? Explain the recovery steps in deferred database
       modification with an example.

20 a) Determine if the following schedule is recoverable. Is the schedule cascadeless? 4
       Justify your answer.

       r1(X), r2(Z), r1(Z), r3(X), r3(Y), w1(X), c1, w3(Y), c3, r2(Y), w2(Z), w2(Y), c2

       (Note: ri(X)/wi(X) means transaction Ti issues read/write on item X;
       ci means transaction Ti commits.)

   b) What is REDIS? What are the Features (any four) of REDIS?   6

   c) Check whether the following schedule is conflict serializable or not and find an   4
       equivalent serial schedule if possible.

       r1(X), r2(Z),r1(Z),r3(X),r3(Y),w1(X),w3(Y),r2(Y),w2(Z),w2(Y)

       (Note: ri(X)/wi(X) means transaction Ti issues read/write on item X)

***