Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Examination July 2021 (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 any three categories of database users, highlighting any one important characteristic of each category.	3
2	What are the major difference between structured, unstructured and semi structured data.	3
3	What is entity integrity? Why is it important?	3
4	Distinguish between Super key, Candidate key, and Primary key using a real convincing example.	3
5	Illustrate the concept of trigger in SQL with an example	3
6	Compare DDL and DML with the help of an example	3
7	Illustrate different anomalies in designing a database	3
8	How can we conclude two FDs are equivalent?	3
9	Illustrate two phase locking	3
10	How conversions of locks are achieved in concurrency control?	3

PART B

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

Module -1

11	a)	A company has the following scenario: There are a set of salespersons. Some of them manage other salespersons. However, a salesperson cannot have more than one manager. A salesperson can be an agent for many customers. A customer is managed by exactly one salesperson. A customer can place any number of orders. An order can be placed by exactly one customer. Each order lists one or more items. An item may be listed in many orders. An item is assembled from different parts and parts can be common for many items. One or more employees assemble an item from parts. A supplier can supply	7

different parts in certain quantities. A part may be supplied by different suppliers.

(i) Identify and list entities, suitable attributes, primary keys, and relationships to represent the scenario.

(ii) Draw an ER diagram to model the scenario using min-max notation.

b) Explain three schema architecture with figure 7

12 a) Illustrate Database architecture with a neat diagram 7

b) Explain the characteristics of Database system 7

Module -2

13 a) Study the tables given below and write relational algebra expressions for the queries that follow. 8

STUDENT(ROLLNO, NAME, AGE, GENDER, ADDRESS, ADVISOR)

COURSE(COURSEID, CNAME, CREDITS)

PROFESSOR(PROFID,PNAME, PHONE)

ENROLLMENT(ROLLNO, COURSEID, GRADE)

Primary keys are underlined. ADVISOR is a foreign key referring to PROFESSOR table. ROLLNO and COURSEID in ENROLLMENT are also foreign keys referring to the primary keys with the same name.

(i) Names of female students

(ii) Names of male students along with adviser name

(iii) Roll Number and name of students who have not enrolled for any course.

b) Explain the left outer join, right outer join, full outer join operations with examples 6

14 a) Consider the following relations for a database that keeps track of business trips of salespersons in a sales office: 9

SALESPERSON(Ssn, Name, StartYear, DeptNo)

TRIP(Ssn, FromCity, ToCity, DepartureDate, ReturnDate, TripId)

EXPENSE(TripId, AccountNo, Amount)

i) A trip can be charged to one or more accounts. Specify the foreign keys for this schema, stating any assumptions you make.

ii) Write relation algebra expression to get the details of salespersons who have travelled between Mumbai and Delhi and the travel expense is greater that Rs. 50000.

iii) Write relation algebra expression to get the details of salesperson who had incurred the greatest travel expenses among all travels made.

b) List the basic data types available for defining attributes in SQL? 5

Module -3

15 a) Illustrate structure of B-Tree and B+ Tree and explain how they are different? 5

b) What are the different types of single-level ordered indices? Explain. 9

16 a) Differentiate between static hashing and dynamic hashing. 9

b) Write short notes on Nested queries 5

Module -4

17 a) i) What are Armstrong's axioms? 10

ii) Write an algorithm to compute the attribute closure of a set of attributes (X) under a set of functional dependencies (F).

iii) Explain three uses of attribute closure algorithm.

b) Explain the difference between BCNF and 3NF with an example 4

18 a) Consider the relation R = {A, B, C, D, E, F, G, H} and the set of functional dependencies F = {A→DE, B→F, AB→C, C→GH, G→H}. What is the key for R? Decompose R into 2NF and then 3NF relations. 9

b) What is the lossless join property of decomposition? Why is it important? 5

Module -5

19 a) Explain the concepts behind the following: - 10

i) Log-Based Recovery

ii) Deferred Database Modification.

b) Why recovery is needed in transaction processing? 4

20 a) Differentiate serial and concurrent schedules. Elaborate conflict serializability with suitable example. 10

b) What are the desirable properties of transactions? Explain 4

*****