Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Examination June 2022 (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 characteristics of database system	3
2	Draw neat labelled diagram of three schema architecture and briefly describe each level	3
3	Write briefly about any three relational database integrity constraints.	3
4	Differentiate between theta join and natural join operations.	3
5	Give any three uses of a trigger	3
6	A file has r =20000 STUDENT records of fixed length. Each record has the following fields: NAME (30 bytes), SSN (9 bytes), ADDRESS (40 bytes), PHONE(9 bytes), BIRTHDATE (8 bytes), GENDER (1 byte), DEPTID (4 bytes), CLASSCODE (4 bytes), and PROGID (3 bytes). An additional byte is used as a deletion marker. The file is stored on the disk with block size B=512 bytes,	3

     a) Calculate the record size R in bytes.

     b) Calculate the blocking factor bfr and the number of file blocks b assuming an unspanned organization.

     c) Calculate the average time it takes to find a record by doing a linear search

7	Define Boyce-Codd normal form. How does it differ from 3NF?	3
8	Suppose, a relational schema R (P,Q, R, S) and set of functional dependencies F and G are as follow: F : { $P \rightarrow Q$, $Q \rightarrow R$, $R \rightarrow S$ } G : { $P \rightarrow QR$, $R \rightarrow S$ }. Check the equivalency of functional dependencies F and G.	3
9	Write briefly on log based recovery	3
10	Explain briefly the characteristics of Column family database.	3

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

Module -1

|		
11	a) Differentiate between two-tier and three-tier client-server database architecture with the help of neat labelled diagrams.	7

b) Draw an ER diagram based on the following information,   7

- Manufacturers have a name, which we may assume is unique, an address, and a phone number

- Products have a model number and a type. Each product is made by one manufacturer, and different manufacturers may have different products with the same model number. However, you may assume that no manufacturer would have two products with the same model number

- Customers are identified by their unique social security number. They have email addresses, and physical addresses. Several customers may live at the same (physical) address, but we assume that no two customers have the same email address

- An order has a unique order number, and a date. An order is placed by one customer. For each order, there are one or more products ordered, and there is a quantity for each product on the order.

12 a) Write briefly about any three types of database end users   6

b) Interpret the following ER diagram   8
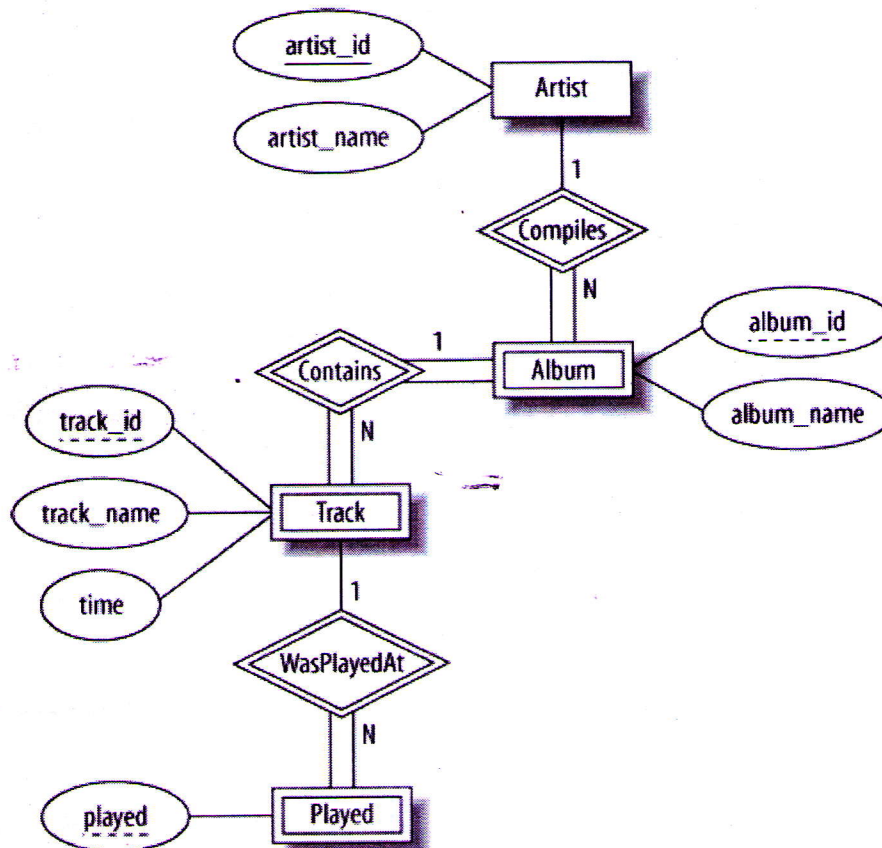
Module -2

13 a) Consider the following schema,   8

> Suppliers (sid , sname, address)
>
> Parts (pid, pname, color)
>
> Catalog (sid, pid, cost)

The primary key fields are underlined.

Write relational algebra expressions for the following queries:

> b) Find the name of parts supplied by supplier with sid=105

ii) Find the names of suppliers supplying some green part for less than Rs 1000

iii) Find the IDs of suppliers who supply some red or green part

iv) Find the names of suppliers who supply some red part

b) Differentiate between the following SQL statements   6

> b) DROP and DELETE

ii) ALTER and UPDATE

14 a) Write SQL DDL statements based on the following database schema (Assume   8
suitable domain types):

> Employee (eid, name, designation, salary, comp_id)
>
> Company (comp_id, cname, address, turnover)

> b) Create the above mentioned tables assuming each company has many
> employees. Mention the primary key, foreign key and not null
> constraints.

ii) Insert values into both the tables. Mention in which order insertions will be
carried out.

ii) Modify the table Employee to include a new column "years_of_exp"

iv) Increment the salary of employees whose salary is less than Rs25000 by 5%

b) Illustrate any three ways of using INSERT statement in SQL.   6

Module -3

15 a) For the relation schema below, give an expression in SQL for each of the queries 8
that follows:

> employee (ID, person_name, street, city)
>
> works (ID, company_name, salary)
>
> company (company_name, city)
>
> manages (ID, manager_id)

b) Find the employees whose name starts with 'C'

ii) Find the name of managers of each company

iii) Find the ID, name, and city of residence of employees who works for "First Bank Corporation" and earns more than Rs50000

iv) Find the name of companies' whose employees earn a higher salary, on average, than the average salary at "First Bank Corporation"

b) Differentiate correlated and non-correlated nested queries with suitable examples   6

16 a) What is multi-level indexing? How does it improve the efficiency of searching an index file?   8

b) Insert the following keys, in the order given, into a B -tree of order 3: {10, 50, 20, 5, 22, 25}   6

Module -4

17 a) Consider a relation R(A, B, C, D, E) with FDs   8

$AB \rightarrow C$, $AC \rightarrow B$, $BC \rightarrow A$, $D \rightarrow E$.

Determine all the keys of relation R. Also decompose the relation into collections of relations that are in BCNF.

b) Write briefly on the different types of anomalies in designing a database.   6

18 a) Consider a relation schema R (A,B,C,D) with the following functional dependencies $A \rightarrow B$, $B \rightarrow C$, $C \rightarrow D$, $D \rightarrow B$. Determine whether the decomposition of R into R1 (A , B), R2 (B , C) and R3 (B , D) is lossless or lossy. Write the complete steps.   6

b) What is dependency preservation property for decomposition? Why is it important?   8

Module -5

19 a) Explain briefly the ACID properties of a transaction.   8

b) Check whether the given schedules are conflict serializable or not   6

i)   S1 : $R_1(X)$, $R_2(X)$, $R_1(Y)$, $R_2(Y)$, $R_3(Y)$, $W_1(X)$, $W_2(Y)$

ii)   S2 : $R_1(X)$, $R_2(X)$, $R_2(Y)$, $W_2(Y)$, $R_1(Y)$, $W_1(X)$

20 a) What is two phase locking protocol? How does it guarantee serializability?   8

b) What are the main characteristics of NOSQL systems in the areas related to data models and query languages?   6

******