

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), AUGUST 2023**COMPUTER SCIENCE AND ENGINEERING****(2020 SCHEME)****Course Code : 20CST204****Course Name: Database Management Systems****Max. Marks : 100****Duration: 3 Hours****PART A*****(Answer all questions. Each question carries 3 marks)***

1. Illustrate a relationship of degree three with a suitable diagram.
2. Give a brief overview of structured, unstructured, and semi-structured data with example.
3. Differentiate between Left outer join and equi-join with an example.
4. σ (subject = "database" or price = "450") (Books) rewrite the query using union operator
5. Write SQL query to create the three tables given below with constraints.
Employee(ssn,salary,phone)
Department(dno,dname,budget)
Manager(ssn,dno,salary,phone,dname,budget)
6. List any two uses of triggers. Write a trigger which raises an error if more than three students are deleted simultaneously from the STUDENT table.
7. Given a relation R(A,B,C,D,E,F) with functional dependencies $A \rightarrow B$, $B \rightarrow D$, $D \rightarrow EF$, $F \rightarrow A$, compute $\{D\}^+$ and $\{EF\}^+$.
8. Explain 2NF with an example.
9. Give an overview on check point and rollback of a transaction.
10. Differentiate between Log-based recovery and Deferred database modification.

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

11. Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):
the NHL has many teams,
each team has a name, a city, a coach, a captain, and a set of players,
each player belongs to only one team, (14)
each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
a team captain is also a player,

a game is played between two teams (referred to as host_team and guest_team) and has a date (such as May 11th, 2017) and a score (such as 4 to 2). Construct a clean and concise ER diagram for the NHL database using min max notation.

OR

12. a) In the relational schema for a library given below, foreign keys have the same name as primary keys. Draw an ER diagram for the schema, clearly marking keys and cardinality constraints. (6)
 BOOKS(ACC-NO, TITLE, EDITION, YEAR)
 MEMBERS(MEMBERID, MEMBERNAME, MEMBERTYPE)
 ISSUEDTO(ACC-NO, MEMBERID, DATEOFISSUE)
- b) Elaborate the Three Schema architecture of Database Management System. (8)

MODULE II

13. ALBUMS(ALBUM-ID, ALBUM-NAME, PRODUCED-BY, YEAR)
 SONGS(SONG-ID, SONG-START, DURATION, ALBUM-ID)

For the relations listed below, write SQL statements for the following

- i) Create both the tables with appropriate datatypes (14)
 ii) Add a column named Genre to the table ALBUMS.
 iii) Delete the column named PRODUCED BY from the table ALBUMS
 iv) Update the year of the album with name 'SUHANA RATH' to 2018.
 v) Delete the album 'YADON KI BAARISH' along with all the songs in it.

OR

14. a) Consider the following tables
 Employee (ssn, name, address, sex, salary, Dno)
 Department (Dname, Dno, Mgr_ssn, Mgr_start_date)
 Dept_locations((Dno, Dlocation)
 Project(Pname, Pno, Plocation, Dno)
 Works_on (ssn, Pno, Hours)
 Dependent(Essn, Dependent_name, Sex, Bdate, Relationship) (9)

Write the relational algebra queries to

- i) Retrieve the name and address of all employees who work for the 'Research' department.
 ii) For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date.
 iii) Find the names of employees who work on all the projects

controlled by department number 5

- b) Write a note on any five steps for converting ER diagram to relational schema. (5)

MODULE III

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

EMPLOYEE(EMPLOYEE-NAME, STREET, CITY)

WORKS(EMPLOYEE-NAME, COMPANY-NAME, SALARY)

COMPANY(COMPANY-NAME, CITY)

MANAGES(EMPLOYEE-NAME, MANAGER-NAME)

- (i) Find the names, street address, and cities of residence for all employees who work for the Company 'RIL Inc.' and earn more than \$10,000. (10)

(ii) Find the names of all employees who live in the same cities as the companies for which they work.

(iii) Find the names of all employees who do not work for 'KYS Inc.'. Assume that all people work for exactly one company.

(iv) Find the names of all employees who earn more than every employee of 'SB Corporation'. Assume that all people work for at most one company.

- b) Differentiate between B-Tree and B+-Tree. (4)

OR

16. a) Consider a disk with block size $B = 512$ bytes. Block pointer is of size 6 bytes. A file has 30,000 EMPLOYEE records of fixed length. Each record has the following fields: Name (30 bytes), Ssn (9 bytes, Primary key), Department code (9 bytes), Address (40 bytes), Phone (10 bytes), Birth_date (8 bytes), Sex (1 byte), Job_code (4 bytes), and Salary (4 bytes). An additional byte is used as a deletion marker. Calculate the number of block access if multilevel primary indexing is used. (9)

- b) Compare indexing and hashing with example. (5)

MODULE IV

17. a) Differentiate BCNF and 3NF with suitable example. (6)
- b) Given a relation $R(A,B,C,D,E,F,G, H)$ with keys $B D$ and C and functional dependencies $D \rightarrow G$, $E \rightarrow F$ and $H \rightarrow C$, decompose the R into the highest normal form possible. (8)

OR

18. a) $R = (A, B, C, D, E)$. R is decomposed into $R_1 = (A, B, C)$, $R_2 = (C, D, E)$. The set of functional dependencies is: $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$. Check whether the relation is lossless. (7)
- b) Illustrate dependency preserving algorithm with example. (7)

MODULE V

19. a) Differentiate serial and concurrent schedules. Elaborate conflict serializability with suitable example. (6)
- b) Illustrate two-phase locking with a schedule containing three transactions. Argue that 2PL ensures serializability. Also argue that 2PL can lead to deadlock. (8)

OR

20. a) Explain main characteristics of Key value DB and Document DB. (6)
- b) Discuss the four ACID properties and their importance. (8)
