

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (S), SEPT 2022

COMPUTER SCIENCE AND ENGINEERING
(2020 SCHEME)

Course Code : 20CST204

Course Name: Database Management Systems

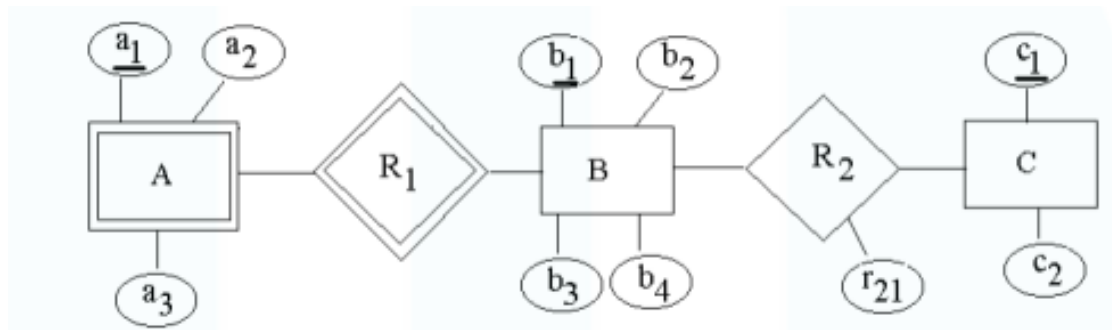
Max. Marks : 100

Duration: 3 Hours

PART A

(Answer all questions. Each question carries 3 marks)

1. Illustrate three schema architecture with a suitable diagram.
2. Highlight the major differences between structured, unstructured, and semi-structured data.
3. Using this ER diagram create a relational database (Primary Keys Underlined).



4. Create a table Student with columns StudentID, FacultyID, StudentName, ContactName, Phone Number, Address, City, Country. StudentID is set as not null and the primary key of the table. FacultyID of Faculty table should be set as the foreign key for this table.
5. 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.
6. What is the importance of views in SQL? Explain with suitable example.
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. Illustrate different anomalies in designing a database.
9. What is the significance of Shadow paging?
10. Demonstrate Two phase locking.

PART B

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

MODULE I

11. a) Explain the concepts of physical data independence and logical data with a typical real-world example for each. (4)
- b) Design an ER diagram for the given scenario;
Suppose that you are designing a schema to record information about reality shows on TV. Your database needs to record the following information:
- (i) For each reality show, its name, genre, basic info and participant's name. Any reality show has at least two or more participants.
 - (ii) For each producer, the company name, company country. A show is produced by exactly one producer. And one producer produces exactly one show. (10)
 - (iii) For each television, its name, start year, head office. A television may broadcast multiple shows. Each show is broadcasted by exactly one television.
 - (iv) For each user, his/her username, password, and age. A user may rate multiple shows, and a show may be rated by multiple users. Each rating has a score of 0 to 10.

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. (5)
- BOOKS(ACC-NO, TITLE, EDITION, YEAR)
MEMBERS(MEMBERID, MEMBERNAME, MEMBERTYPE)
ISSUEDTO(ACC-NO, MEMBERID, DATEOFISSUE)
- b) Give an overview of different type of Database Users. Elaborate the four different type of Database languages with the help of suitable example. (9)

MODULE II

13. a) With a suitable example differentiate between DML and DDL statements. (5)
- b) The relational database schema below represents certain information about albums, songs in the albums and singers of those songs. Foreign keys are given the same name as primary keys for easy identification.
ALBUMS(ALBUM#, ALBUM-NAME, PRODUCED-BY, YEAR)
SONGS(SONG#, SONG-START, DURATION, ALBUM#)
SUNGBY(ARTISTNAME, SONG#) (9)
- In the context of the schema, write relational algebra expressions for the following queries:
- (i) Names of albums produced by 'HMV' in the year 2018.
 - (ii) Names of albums in which an artist with name, 'AVANTHIKA' sung.
 - (iii) Names of albums in which all the artists have sung songs.

OR

14. a) Differentiate between Natural join, Equi-join and Left outer join with suitable example. (6)
- b) Write SQL DDL statements for the following (Assume suitable domain types):
- (i) Create the tables STUDENT(ROLLNO, NAME, CLASS, SEM, ADVISER), FACULTY(FID, NAME, SALARY, DEPT). Assume that ADVISER is a foreign key referring FACUTY table. (8)
 - (ii) Delete department with name 'CS' and all employees of the department.
 - (iii) Increment salary of every faculty by 10%.

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

OR

16. a) Consider the following relations:
- FACULTY(FNO, NAME, GENDER, AGE, SALARY, DNUM)
 DEPARTMENT(DNO, DNAME ,DPHONE)
 COURSE (CNO, CNAME, CREDITS, ODNO)
 TEACHING(FNO, CNO, SEMESTER) (9)
- DNUM is a foreign key that identifies the department to which a faculty belongs. ODNO is a foreign key identifying the department that offers a course. Write SQL expressions for the following queries:
- (i) Names and department names of faculty members.
 - (ii) Names of faculty members not offering any course.
 - (iii) Names of departments offering more than three courses, in alphabetic order.
- b) Write a detailed note on Indexing and Different type of Indexing Techniques. (5)

MODULE IV

17. a) Demonstrate 1 NF and 2 NF 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) Define 3NF and BCNF. Let $R(A, B, C, D, E)$ be a relational schema in which the following functional dependencies are known to hold: $AB \rightarrow C$, $C \rightarrow E$ and $E \rightarrow D$. Identify the highest normal form (8)
- b) Illustrate Lossless Join Decomposition and Dependency Preserving Decomposition with typical examples. (6)

MODULE V

19. a) Discuss the four ACID properties and their importance. (8)
- b) Differentiate serial and concurrent schedules. Elaborate Conflict serializability with suitable example. (6)

OR

20. a) Discuss the main characteristics of Family DB and Graph DB, (6)
- b) Demonstrate ARIES Recovery Scheme in detail. Write a short note on Transaction Roll-back and Roll-Forward. (8)
