

1. Mention some of the major responsibilities of a database administrator.
2. Give an example for one to one and one to many relationships.
3. What are aggregate functions? And list the aggregate functions supported by SQL?
4. Write a SQL statement to find the names and loan numbers of all customers who have a loan at XYZ branch.
5. Highlight the role of a recovery management component.
6. Give the drawbacks of shadow-paging technique.
7. Why is a B+- tree usually preferred as an access structure to a data file?
8. What are the ways in which the variable-length records represented in database systems?
9. How are transactions performed in Object oriented database?
10. How spatial databases are more helpful than active database?

PART B — (5 × 13 = 65 marks)

11. (a) Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. State any assumptions you make.

Or

- (b) Suppose that we have the following three tuples in a legal instance of a relation schema S with three attributes ABC (listed in order): (1,2,3), (4,2,3), and (5,3,3).

- (i) Which of the following dependencies can you infer does not hold over, schema S?

(1) $A \rightarrow B$ (2) $BC \rightarrow A$ (3) $B \rightarrow C$

- (ii) Can you identify any dependencies that hold over S?

12. (a) Consider the following relational schema:

Employee (empno, name, office, age)

Books (isbn, title, authors, publisher)

Loan (empno isbn, date)

Write the following queries in relational algebra.

- (i) Find the names of employees who have borrowed a book Published by XYZ Ltd.,
 (ii) Find the names of employees who have borrowed all books Published by XYZ Ltd.,
 (iii) Find the names of employees who have borrowed more than five different books published by XYZ Ltd.,
 (iv) For each Publisher, find the names of employees who have borrowed more than five books of that Publisher.

Or

- (b) (i) Since indices speed query processing why might they not be kept on several search keys? List as many reasons as Possible.
 (ii) How does a DBMS represent a relational query evaluation plan?

13. (a) Explain the methods used to handle Deadlock.

Or

- (b) (i) Differentiate strict two phase locking protocol and rigorous two phase locking protocol. (6)
 (ii) How the time stamps are implemented? Explain. (7)

14. (a) (i) Explain why allocations of records to blocks affect database system performance significantly. (5)

- (ii) Explain the concept of Deadlock avoidance and prevention in detail. (8)

Or

- (b) (i) Explain how reliability can be improved through redundancy? (6)

- (ii) How the records are represented and organized in files. Explain with suitable example. (7)

15. (a) Discuss the issues and steps involved in building a data warehouse. How the concept of relational view is related to data warehouse and data marts?

Or

- (b) (i) Compare and contrast between object oriented and XML databases. (7)

- (ii) Give XML representation of bank management system and also explain about Document Type Definition and XML schema. (6)

PART C — (1 × 15 = 15 marks)

16. (a) Given: VAR Exam_Marks BASE RELATION { Student_ID SID, Course_ID CID, Mark INTEGER} KEY {Student ID, Course ID};

Write down the relational algebra expression to give, for each pair of students sitting in the same exam, the absolute value of difference between the marks. Assume you can write ABS (x) to obtain the absolute value of x.

Or

- (b) Give an example of a relation that is in 3NF but not in BCNF. How will you convert that relation into BCNF.