

# QUESTION BANK

**Subject: Advanced Database Management System**

**Subject code: 20MCA102**

## MODULE – I

### [Short Answer Type Questions]

**##Ref.Text:ABRAHAM SILBERSCHATZ 6<sup>TH</sup> EDITION Chap 1,2,6,7 .**

**ER – to Relational model -Text: RAMEZ ELMASRI Chap 7 ##**

1. Define Database? Discuss about applications of Database Systems?
2. Discuss the advantage of Database Management System over file based system.
3. Define internal architecture of DBMS.
4. Explain the role of DBA.
5. Explain the advantages of DBMS.
6. What is Data Abstraction? Explain about different views of data?
7. Define Instance and Schema? List different data models and explain?
8. Draw the Architecture of Database?
9. Discuss about Database users and Administrators
10. Draw ER diagram for Ternary Relationship set with suitable example?
11. What do you understand by generalization and specialization attributes in DBMS?
12. Define Entity, Attributes, Entity set, relationship with appropriate notations?
13. What is a weak entity? Explain with example?
14. Differentiate between DBMS and RDBMS.
15. Explain the term cardinality ratio with an example.

### [Long Answer Type Questions]

16. Explain three-tier architecture of DBMS?
17. Explain about Database languages with examples?
18. Write about logical database design (ER to Relational) with suitable examples?
19. A company needs to store information about employees (identified by ssn, with salary and phone as attributes), departments (identified by dno, with dname and budget as attributes), and children of employees (with name and age as attributes). Employees work in departments, each department is managed by an employee; a child must be identified uniquely by name when the parent (who is an employee; assume that only one parent works for the company) is known. We are not interested in information about a child once the parent leaves the company.  
Design an E-R diagram indicating all entities with generalization and specialization, attributes with key and cardinality ratio?
20. A large Bank named “XYZ” is an international bank having 28 branches overseas and country and different cities. Each branch offer services banking and trading. Customer can select saving/current account with single or join operation in the banking. Each branch maintains the account detail of customers keep record of each transaction in each service by the customer to his/her account.

Design an E-R diagram indicating all entities with generalization and specialization, attributes with key and cardinality ratio?

21. Construct an E-R diagram for a university Director's office. The office maintains data about each class, including the instructor, the enrolment, and the time and place of the class meetings. For each student-class pair, a grade is recorded. Document all assumptions that you make about the mapping constraints.
22. Explain the mapping procedure of ER – to Relational model with suitable example.
23. Explain different 'Extended ER features' with examples.
24. Explain ER model of DBMS and with suitable example.
25. Explain the different constraints of ER model.

## **MODULE– I(RELATIONAL ALGEBRA) (WORK OUT PROBLEMS)**

1. Consider the following relation  
Employee (person\_name, street, city)  
Works (person\_name, company\_name, salary)  
Company (Company\_name, manager\_name)  
Manages (person\_name, manager\_name)

Consider primary key according to relation.

Give an expression in the relational algebra to express each of the following:-

- a. Find the names of all employees who work for corporation bank.
- b. Find the names and cities of residence of all employees who work in corporation bank.
- c. Find the names of all employees in this database who live in the same city as the company for which they work.
- d. Find the names of all employees who live in the same city and on the same street as do their managers.

2. Consider the following relation  
Project (proj#, proj\_name, chief\_architect)  
Employee (emp#, emp\_name)  
AS Signed (proj#, emp\_name)

Use relational algebra to express following queries.

- a. Get details of employee working on project?
  - b. Get the employee number of employees who work on all projects.
  - c. Get details of project on which employee with name „AAA" is working.
3. Consider the following relation  
Department (dept\_name, building, budget)  
Course (course\_id, title, dept\_name)  
Instructor ( id, name, dept\_name, salary)  
Teaches (id, course\_id, section\_id, semester, year)

The key fields are underline as primary key. Give the SQL express of the following:-

- a. Select the department name of instructor whose name neither „A“ nor „B“.
- b. Find the number of instructors of each department who teach course „DBMS“
- c. Find the department that have the highest average salary.
- d. Give a 5% salary raise to instructor whose salary is less than average.

4. 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.

- Find the names of employees who have borrowed a book Published by Navathe.
- Find the names of employees who have borrowed all books Published by Navathe.
- For each publisher, find the names of employees who have borrowed more than five books of that publisher.

5. Consider the following tables:

Employee (Emp\_no, Name, Emp\_city)

Company (Emp\_no, Company\_name, Salary)

- Write a SQL query to display Employee name and company name.
- Write a SQL query to display employee name, employee city, company name and salary of all the employees whose salary > 10000
- Write a query to display all the employees working in "XYZ" company

## MODULE -11

### [Short Answer Type Questions]

- What do you understand by Functional dependency?
- Explain the term candidate key using functional dependency.
- Explain the term atomicity in DBMS.
- Explain the anomalies of DBMS.
- What is redundancy? What are the problems caused by the redundancy?
- If  $R = \{A, B, C, D, E\}$  and FD's  $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$  List all the candidate keys.
- Compute canonical cover  $F_c$  for the  $R = \{A, B, C, D\}$  and FD's  $= \{A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C, AC \rightarrow D\}$ .
- Explain database decomposition? Why it is necessary.
- Explain BCNF in detail.
- Explain lossy decomposition in detail.

## [Long Answer Type Questions]

11. Explain Codd's rules for relational database management system in detail.
12. Explain Normalization of DBMS.
13. Explain 1<sup>st</sup> Normal Form, 2<sup>nd</sup> Normal form and 3<sup>rd</sup> Normal Form with suitable example.
14. Consider the universal relation  $R = \{A, B, C, D, E, F, G, H, I\}$  and the set of functional dependencies  $F = \{(A, B) \rightarrow C, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$ . What is the key for Decompose R into 2NF, the 3NF relations.
15. Normalize the given relation up to 3 NF:  
 $R = \{A, B, C, D\}$   
 $Fd's = \{AB \rightarrow D, AC \rightarrow BD, B \rightarrow C\}$
16. Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF?
17. Explain lossless join decomposition in
18. How do you find lossy and lossless decomposition?
19. Suppose you are given a relation  $R = \{A, B, C, D, E\}$  with the following functional dependencies  
 $F = \{CE \rightarrow D, D \rightarrow B, C \rightarrow A\}$ 
  - a. Find all candidate keys.
  - b. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).
  - c. If the relation is not in BCNF, decompose it until it becomes BCNF.
20. Suppose you are given a relation R  $\{A, B, C, D, E\}$  with the following functional dependencies  
 $F = \{AB \rightarrow C, DC \rightarrow AE, E \rightarrow F\}$ 
  - a. What are the keys of this relation?
  - b. Is this relation in BCNF? If not, explain why by showing one violation
  - c. Is this decomposition (A, B, C, D) (B, C, D, E, F) a dependency preserving decomposition? If not, explain briefly.

## **Unit – IV**

### **[Short Answer Type Questions]**

1. What do you understand by transaction in DBMS.
2. Define transaction management.
3. Explain Armstrong Axiom in functional dependency.
4. What do you understand by schedule in transaction?
5. Explain all types of schedule.
6. What do you mean by serializability.
7. Explain the term recoverability.
8. Explain concurrency control in brief.
9. What do you understand by dirty read in concurrency control.
10. Differentiate between shared lock and exclusive lock in concurrency control system
11. Define Timestamp in brief.
12. How can you secure your database?
13. How can you avoid deadlock in database.
14. Differentiate between growing and shrinking phase in 2PL(Two-phase locking)

### **[Long Answer Type Questions]**

15. Explain transaction states with example?
16. Explain ACID properties of transaction management
17. What do you mean by serial and serializable schedules? Explain conflict serializability.
18. What is deadlock? Discuss various protocols for deadlock prevention.
19. What is two-phase locking? How does it guarantee serializability
20. Explain the key features of Recoverability of schedule. Also explain log based recovery.
21. Explain all types of problems arising in concurrency control
22. Explain concurrency protocol in detail.
23. Explain Two-phase locking protocol with an example.
24. Explain the working of Timestamp Ordering Protocol
25. What is meant by the concurrent execution of database transaction in a multi-user system? Explain why concurrency control is needed with a suitable example.