

Jan 2025

- ① Define transaction. Discuss ACID properties.  
(Chapter 2)
- ② With a neat diagram, explain transition diagram of a transaction. (Chapter 2)
- ③ Demonstrate working of assertion and triggers in SQL with example. (Chapter 1)
- ④ Explain cursor and its properties in embedded SQL with suitable example.  
(Chapter 1)  
(We don't have topic 'cursor' in theory But its  
IPCC we have it in lab program)
- ⑤ Determine if the following schedule is serializable and explain your reasoning.

① T<sub>1</sub>: R(x) w(x)    T<sub>2</sub>: R(x) w(x)    (Chapter 2)

T<sub>1</sub>: COMMIT    T<sub>2</sub>: COMMIT

② T<sub>1</sub>: w(x) R(y)    T<sub>2</sub>: R(x) w(y)

T<sub>1</sub>: COMMIT    T<sub>2</sub>: COMMIT    (Chapter 2)

⑥ Consider the tables below:

Sailors (sid: integer, sname: string,  
rating: integer, age: real)

Boats (b\_id : integer, bname : string,  
color : string);

Reserves (s\_id : integer, b\_id : integer,  
day : date)

Write SQL queries for the following.

- ① Write create table statement for reserves
  - ② Find all information of sailors who have reserved boat number 101.
  - ③ Find the names of sailors who have reserved at least one boat.
  - ④ Find the names of sailors who have reserved a red boat.
  - ⑤ Find the average age of sailors for each rating level. (chapter 1)
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- ⑥ What do understand by correlated Nested Queries in SQL ? Explain with suitable example. (chapter 1)
- ⑦ Discuss the ACID properties of a Database transaction (chapter 2)

⑧ Consider the following relations.

(2)

Student (Snum, Sname, Branch, level, age)

Class (Cname, meet-at, room, fid)

Enrolled (Snum, Cname)

Faculty (fid, fname, deptid)

Write the following queries in SQL. No duplicate  
should be printed in any of the answers.

- ① Find the names of all Juniors (level = JR)  
who are enrolled in a class taught by L Teach
- ② Find the names of all classes that either  
meet in room R128 or have five or more  
students enrolled.
- ③ For all levels except JR, print the level and  
the average age of students for that level.
- ④ For each faculty member that has taught classes  
only in room R128, print the faculty member's  
name and the total number of classes she or he  
has taught.
- ⑤ Find the names of students not enrolled in  
any class.

(Chapter 1)

- ⑨ What are the views in SQL ? Explain with examples . (Chapter 1)
- ⑩ In SQL, write the usage of GROUP BY and HAVING clauses with suitable examples . (Chapter 1)
- ⑪ Discuss the types of problems that may encounter with transactions that run concurrently . (Chapter 2)

June 2024 (Supplementary)

- ⑫ List the problems that occurs during concurrency control and also explain them with supporting transaction diagram . (Chapter - 2)
- ⑬ Explain the various DBMS - Specific Buffer replacement policies.
- How are triggers and assertion defined in SQL ? Explain with example (Chapter - 1)
  - Write the syntax and example of view in SQL . Explain efficient view implementation (Chapter - 1)
  - Explain the syntax of creating and updating views in SQL and give examples for each

- ③
- (14) Demonstrate the System Log in database transaction. (Chapter 2)
- (15) Explain the ACID properties of a transaction. Also explain why concurrency control is needed. (Chapter 2)
- (16) What is two-phase locking protocol? How does it guarantee serializability? (Chapter 2)
- (17) Why concurrency control is needed? Demonstrate with an example. (Chapter 2)
- (18) Discuss the desirable properties of transaction (Chapter 2)
- (19) Explain transaction support in SQL. — (Chapter 2)
- (20) Define Schedule? Illustrate with an example. (Chapter 2)
- (21) What is serializability? Explain serial, non-serial and conflict-serializable schedules with appropriate examples. (Chapter 2)

## Module - 5

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- ① Explain the CAP theorem. (Chapter 2)
  - ② What is NoSQL graph database?  
Explain Neo4j. (Chapter 2)
  - ③ Why concurrency control and recovery are needed in DBMS? Demonstrate with suitable examples types of problems that may occur when two simple transactions run concurrently. (Chapter 1)
  - ④ Explain basic operations (CRUD) in MongoDB (Chapter 2)
  - ⑤ Explain deadlock prevention protocols.  
(Chapter 1)
  - ⑥ Briefly discuss the two-phase locking techniques for concurrency control.  
(Chapter 1)
- ⑦ Describe the wait-die and wound-wait protocols for deadlock prevention. (Chapter 1)
- ⑧ List and explain the four major categories of NoSQL system. (Chapter - 2)

⑨ What is Multiple Granularity locking ?  
How is it implemented using intension locks ? Explain . ( chapter - 1 )

⑩ Discuss the following MongoDB CRUD operations with their formats :

① Insert ② Delete ③ Read ( chapter - 2 )

⑪ Briefly discuss about Neo4j data model .  
( chapter - 2 )

June 2024 ( Supplementary )

⑫ Demonstrate with example deadlock in transaction . Discuss deadlock prevention algorithm ( chapter - 1 )

⑬ What are Binary locks ? Explain with lock and unlock operations with algorithm ( chapter - 1 )

⑭ Write a short note on :

① Properties of NoSQL system

② The CAP Theorem

③ Document based NoSQL system

④ NoSQL Graph database .

( chapter 2 )

(15) Explain the two phase locking protocol used for concurrency control (Chapter - 1). ②

(16) What is NoSQL ? Explain the CAP theorem. (Chapter - 2)

What are document based NoSQL systems? Basic operations CRUD in MongoDB.

What is NoSQL graph database?  
Explain Neo4j. (Chapter - 2)

(19) Explain ① deadlock

② Starvation

③ Prevention

④ Multi Version concurrency control protocols.

(20) Discuss the time stamp ordering algorithm for concurrency control. How does strict time stamp ordering differ from basic time stamp ordering? (Chapter - 1)

Q1 what is a deadlock? consider the following sequences of actions listed in the order they are submitted to DBMS sequence

S1: R1(A), W2(B), R1(B), R3(C),  
W2(C), W4(B), W3(A).

Draw waits for graph in case of deadlock situation.

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Module - 3

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① Explain Armstrong inference rules. (Chapter 1)

(out of syllabus)

② What is the need for normalization?

Explain INF, 2NF and 3NF with example  
(chapter 1)

③ What is functional dependency? Write an algorithm to find minimal cover for set of functional dependencies. Construct minimal cover M for set of functional dependencies.

Construct minimal cover M for set of functional

dependencies which are:  $E = \{B \rightarrow A, D \rightarrow A,$

(Much topics are not there  
in syllabus)

$AB \rightarrow D\}$  (chapter 1)

④ Explain the types of update anomalies in SQL with an example. (chapter 1)

⑤ Explain types of TBBC drivers

(out of syllabus) (It's JDBC)

⑥ Consider the schema  $R = ABCD$  subjected

to FD's  $F = \{A \rightarrow B, B \rightarrow C\}$ , and the

non-binary partition  $D_1 = \{ACD, AB, BC\}$ . State

whether  $D_1$  is a lossless decomposition?

[give all steps in detail] (chapter 1)

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- ⑦ Discuss the informal design guidelines for relation schema design. (Chapter 1)
- ⑧ Define 1NF, 2NF and 3NF with examples. (Chapter 1)
- ⑨ Write the syntax for INSERT, UPDATE and DELETE statements in SQL and explain with suitable examples. (Chapter 2)  
Discuss insertion, deletion and modification anomalies. Why are they considered bad?  
Illustrate with examples. (Chapter 1)
- ⑩ Illustrate the following with suitable examples:
  - ① Datatypes in SQL (Chapter 2)
  - ② Substring Pattern Matching in SQL

June 2024 (Supplementary)

- ⑪ What is the need for normalization? Explain 2<sup>nd</sup> normal form. Consider the relation  
 $EMP\_PROJ = \{ SSN, Pnumber, Hours, Ename, Pname, Plocation \}$ . Assume { SSN, Pnumber } as a primary key. The dependencies are

SSN ; Pnumber  $\rightarrow \{ \text{Hours} \}$

(1)

(Chapter 1)

SSN  $\rightarrow \{ \text{Ename} \}$

Pnumber  $\rightarrow \{ \text{Pname}, \text{Plocation} \}$

Normalize above relation into 2NF.

- Illustrate the informal design guidelines for relation schemes with examples.

(Chapter 1)

- ⑫ Write syntax with example in SQL for the DDL and DML SQL statements.

(Chapter 2)

- ⑬ Consider the schema for college database

Student ( USN, Sname, Address, Phone, Gender )

SemSec ( SSID, Sem, Sec )

Class ( USN, SSID )

Subject ( Subcode, Title, Sem, Credits )

IA Marks ( USN, Subcode, SSID, Test1, Test2, Test3, Final IA )

Write SQL Query

- ① List all the students studying in 4<sup>th</sup> sem  
'C' section
- ② Compute total number of male students  
in each semester.
- ③ List Test 1 marks of all students in all  
subjects. (Chapter 2)
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- ⑭ Alter and Drop commands in SQL.  
Explain (Chapter 2)

- ⑮ What is Functional dependency? Explain the  
inference rules for functional dependency  
(Chapter 1) with proof (Inference rules → out of  
syllabus but explained in class)
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- ⑯ Consider two sets of function dependency.
- $$F = \{ A \rightarrow c, AC \rightarrow D, E \rightarrow AD, E \rightarrow H \}$$
- $$E = \{ A \rightarrow CD, E \rightarrow AH \}$$
- Are they equivalent?  
(Chapter 2)

- (17) Consider the following company database.
- EMP (Name, SSN, Salary, SuperSSN, Dno)
- DEPT (Dnum, Dname, ManagerSSN, Dno)
- DEPT-Loc (Dnum, Dlocation)
- DEPENDENT (ESSN, Dep-name, Sex)
- WORKS-ON (ESSN, Pno, Hours)
- PROJECT (Pname, Pnumber, Plocation, Dnum)

Write the SQL queries for the following

- ① Retrieve the name, of the employee who works with same department as Ravi.
- ② Retrieve the number of departments for an employee 'Ravi'
- ③ Retrieve the name of the managers working in location "DELHI" who has no female dependents .
- ④ List female employees from Dno = 20 earning more than 50,000 .

⑤ List 'CSE' department details.

⑯ Define multivalued dependency. Explain 4<sup>th</sup> normal form with an example. (Ch-1)

⑰ Explain the concept of BCNF. (Chapter-1)

⑲ Consider the following tables.

Employee ( Name, SSN, Salary, Supervisor, DNo )

Department ( Dname, Dno, Manager, Mgrstartdate )

Project ( Pname, Pno, Plocation, Dno )

Dept-Location ( DNum, Dlocation )

Works-on ( Essn, Pnum, Hours )

Dependent ( Essn, Depname, Sex )

① List the names of managers who have atleast one dependent.

② For each employee, retrieve the employee's name and name of his or her immediate supervisor.

- (3) For each project on which more than two employees work retrieve the project number, Project name and the number of employees who work on that project. (Chapter 2)
- (4) Retrieve the name of employees whose salary is greater than salary of all the employees working in either department 5 or 6.
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- (21) What are prime and non-prime attributes? Explain with examples. (4 marks) (Chapter 1)
- (22) Consider the relation  $R = \{A, B, C, D, E, F, G, H, I, J\}$  and the set of functional dependencies (FDs)  $F = \{AB \rightarrow C, BD \rightarrow EF, AD \rightarrow GH, A \rightarrow I, H \rightarrow J\}$  What is the key of  $R$ ? Decompose  $R$  into 2NF and 3NF relations (Chapter 1)