



## Final Assessment Test – November 2019

Course: CSE2004 - Database Management Systems

Class NBR(s): 0601/0617/0638/0657/0722/1227/1230/  
1859/2039/2040/5378/6611/6629/6753

Slot: D1

Time: Three Hours

Max. Marks: 100

**KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS EXAM MALPRACTICE**

**PART – A (8 X 5 = 40 Marks)**

Answer ALL Questions

1. Detail the following Architectures for Database Management Systems.

- Centralized
- Two-Tier Client/Server Architecture
- Three-Tier Client/Server Architecture

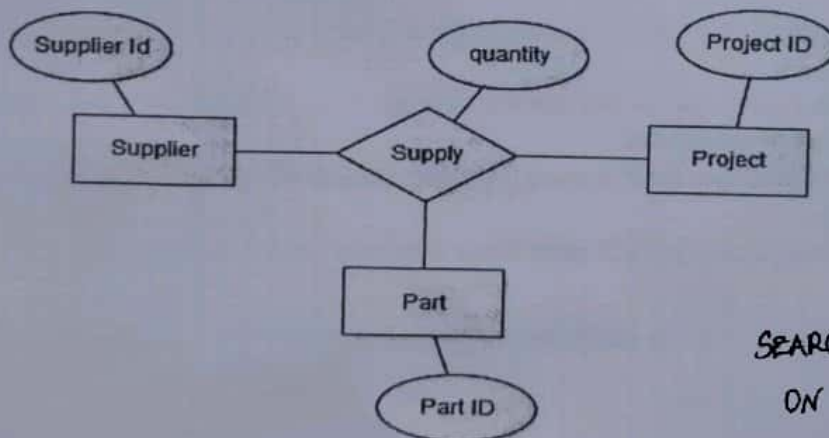
2. Consider the customer schema given below

customer(id,name,phone1,phone2,gender,branchid,income)

Demonstrate with SQL queries how to establish table level constraints on the customer schema for the following

- Combination of phone1 and phone2 should be unique in the customer table.
- Gender column should be allowed to take only 'MALE' or 'FEMALE' values.
- Branchid is a foreign key mapped to the branchid in the branch table.

3. Map the ER model to relation schemas and identify the primary and foreign keys for each relation.



SEARCH VIT QUESTION PAPERS  
ON TELEGRAM TO JOIN

4. Derive the proof for the following Inference Rules.

- $X \rightarrow YZ$ , then  $X \rightarrow Y$  and  $X \rightarrow Z$
- $X \rightarrow Y$  and  $X \rightarrow Z$ , then  $X \rightarrow YZ$
- $X \rightarrow Y$  and  $WY \rightarrow Z$ , then  $WX \rightarrow Z$



5. Consider the schema given below

Employee\_details (EmployeeSSN, ProjectID, DependentID)

An Employee can work on many projects.

An Employee can have many dependents.

- Identify the primary key for the relation.
- Check if there are any non-trivial multivalued dependencies in the relation.
- Apply the tests for Normalization and achieve 4NF for the given relation.

6. Detail the disadvantages of a 2 Phase Locking Protocol and how it is overcome using Rigorous 2 Phase Locking with suitable examples.
7. What do you think are the disadvantages of multi-level indexing? Detail how dynamic multi-level indexes address the issues of multi-level indexes with suitable examples.
8. Construct a graph data model using the relations given below.

Employee

Employee SSN	Name	Department Number
123	Sam	111
124	Ram	222

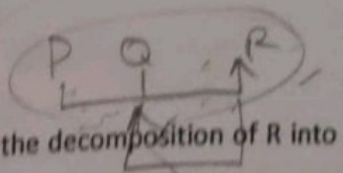
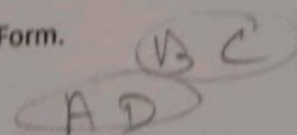
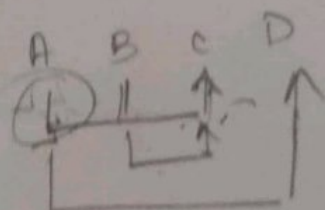
Department

Department Number	Department Name
111	SCOPE
222	SITE

**PART - B (6 X 10 = 60 Marks)**

**Answer ALL Questions**

9. Construct an ER Model for the given Scenario and map the ER Model to relational schemas.
- Scenario for a Banking Enterprise
- Every Customer in the bank should be identified by a unique customer number and described by a name, date of birth, street and city
  - Customers hold an account in the bank. Every account is identified by a unique account id and account type.
  - Customers can borrow loans from the bank. Each loan is identified by a unique loan number and amount fields.
  - Customers can make payments on a loan in instalments. Each payment is identified by a payment number, payment date and payment amount.
  - Customers can nominate nominees for their account. Every nominee is identified by a name, date of birth, gender, street, city.
  - The bank has branches in many locations. Each customer is associated with a bank branch.
10. a) Determine all the keys, Prime and Non-Prime Attributes for the relation T(PQRS) with the following Functional Dependencies. [5]
- $F = \{PQ \rightarrow R, R \rightarrow S, S \rightarrow Q\}$
- b) Identify the Normal Form for the relations R and S given below [5]
- Relation R(ABCD) with set of Functional Dependencies  $F = \{AB \rightarrow C, B \rightarrow C, A \rightarrow D\}$
  - Relation S(PQR) with set of Functional Dependencies  $F = \{PQ \rightarrow R, R \rightarrow Q\}$
- Decompose the relations R and S such that they attain Boyce Codd Normal Form.
11. A relation R(ABCDE) with the set of Functional Dependencies  $F = \{A \rightarrow C, B \rightarrow C, C \rightarrow D, DE \rightarrow C, CE \rightarrow A\}$  is decomposed as shown below  $R_1(AD), R_2(AB), R_3(BE), R_4(CDE),$  and  $R_5(AE).$  Apply the test for non-additive Join Property and determine if the decomposition of R into  $\{R_1, \dots, R_5\}$  is a lossless join decomposition.





12. Consider the following relation schemas.

- Employee(ssn, name, designation, dep\_number)
- Department(dep\_number, dname, dlocation)
- Workson(ssn, project\_id)
- Project(project\_id, project\_name)

Construct an Initial Query Tree and Optimized Query Tree using Heuristic Query Optimization Techniques for the SQL query given below.

Select e.name, p.project\_name from employee e, department d, workson w, project p where e.dep\_number=d.dep\_number and e.ssn=w.ssn and w.project\_id=p.project\_id and d.dname='SBST' and p.project\_name='OS';

13. a) Detail the following issues with Concurrent Transactions using suitable examples. [5]

- Lost Update Problem
- Temporary Update Problem
- Incorrect Summary Problem

b) Explain the log based recovery techniques for transactions. [5]

14. a) Detail the differences between the following with suitable examples. [5]

- Primary and Secondary Indices
- Dense and Sparse Indices

b) Compare BASE and ACID Properties of Transactions [5]

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