

**VIT**

Vellore Institute of Technology

Final Assessment Test – November 2019

Course: ITE1003 - Database Management Systems

Class NBR(s): 2584

Time: Three Hours

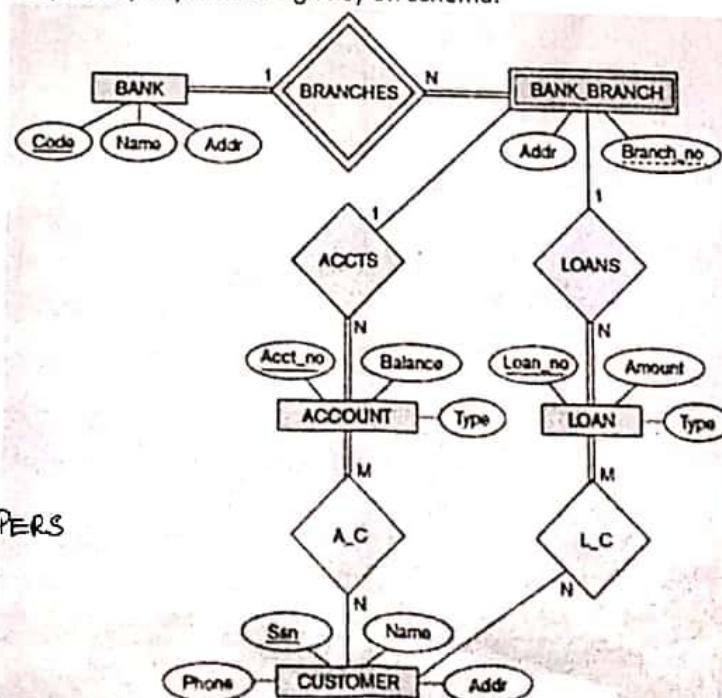
Slot: F1

Max. Marks: 100

KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS EXAM MALPRACTICEAnswer any **TEN** Questions

(10 X 10 = 100 Marks)

1. a) Write down and explain the implicit properties of a database. [5]
b) Write down the responsibilities of a database administrator and database designer. [5]
2. Explain different components of a database management software with the help of a neat diagram. [10]
3. Consider a CONFERENCE_REVIEW database in which researchers submit their research papers for consideration. Reviews by reviewers are recorded for use in the paper selection process. The database system caters primarily to reviewers who record answers to evaluation questions for each paper they review and make recommendations regarding whether to accept or reject the paper. The data requirements are summarized as follows: [10]
Authors of papers are uniquely identified by e-mail id. First and last names are also recorded. Each paper is assigned a unique identifier by the system and is described by a title, abstract, and the name of the electronic file containing the paper. A paper may have multiple authors, but one of the authors is designated as the contact author. Reviewers of papers are uniquely identified by e-mail address. Each reviewer's first name, last name, phone number, affiliation, and topics of interest are also recorded. Each paper is assigned between two and four reviewers. A reviewer rates each paper assigned to him or her on a scale of 1 to 10 in four categories: technical merit, readability, originality, and relevance to the conference. Finally, each reviewer provides an overall recommendation regarding each paper. Each review contains two types of written comments: one to be seen by the review committee only and the other as feedback to the author(s).
Design an Entity-Relationship diagram for the CONFERENCE_REVIEW database.
4. a) Under what conditions can an attribute of a binary relationship type can be migrated to become an attribute of one of the participating entity types? [3]
b) Explain the concept of specialization and generalization with suitable examples. [7]
5. a) Distinguish between a key and a super key. [3]
b) Convert the following entity-relationship schema for a bank database into relational database schema and indicate primary key and foreign key on schema. [7]



SEARCH VIT QUESTION PAPERS
ON TELEGRAM TO JOIN

6. Consider the following relational database schema.

LICENSE(License_id, Fname, Lname, Address, Phone, DoB)

REGISTRATION(License_id, Car_id, Registered),

CAR(Car_id, Model, Year, Colour)

Value set of Registered is {Yes, No}.

Write down an expression in relational algebra for the following queries.

- a) Find out the first name, last name and address of license holders who own blue colour car. [2]
- b) Retrieve the first name and last name of license holders with registered car launched in the 2017. [3]
- c) Retrieve the first name and last name of license holders who have cars that are yet to be registered. [2]
- d) Find out license id of the license holders, car id of the car they have, and model and year of their cars. [3]

7. a) Consider the following relational schema.

CUSTOMER_ORDERS(Cus_id, Cus_Name, Cus_Address, Order_id, Order_Status, Order_date).

Explain update anomaly, deletion anomaly and Insertion anomaly that may be present in a state of the above relation. [4]

- b) Find out a minimal cover for the set of functional dependency $F = \{A \rightarrow BCE, AB \rightarrow DE, BI \rightarrow J\}$. [6]

8. a) Consider the following relation schema.

CAR_SALE(Car_id, Date_sold, Salesperson_id, Commission_pct, Discount_amt).

The primary key is underlined and the additional functional dependencies are

$Date_sold \rightarrow Discount_amt$

$Salesperson_id \rightarrow Commission_pct$.

Based on the given primary key, check whether this relation is in 1NF, 2NF, or 3NF? Why or why not?

- b) Consider the relation schema $R(A, B, C, D, E, G, H)$ and the set of functional dependency $F = \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$ that holds on the relation schema R. Perform a key-based decomposition of R. Is the decomposition dependency preserving? Justify your answer. [7]

9. a) When are two database operations said to be conflicting? [3]

b) Draw the precedence graph for the following schedule [7]

$r_3(Y); r_1(X); r_3(X); r_2(Z); r_2(X); w_3(Y); w_2(X); r_1(Z); w_1(Y); w_1(Z);$

Determine whether the schedule is serializable. If the schedule is serializable, write down an equivalent serial schedule.

10. a) Explain the concept of shared lock and exclusive lock. Also, write down the two-phase locking protocol. [4]

b) Write down the basic timestamp ordering algorithm. [6]

11. a) What is checkpointing? Write down the steps that define checkpointing. [3]

b) Describe the three phases of ARIES algorithm for database recovery. [7]

12. Consider the following relational database schema. The schema captures information about employees, departments, and company finances (organized on per department basis). [10]

EMPLOYEE(E_id, Ename, Salary, DoB, D_id)

DEPARTMENT(Dept_id, P_id, Dname, Budget, Status)

PROJECT(Pri_id, Pname, Code, Report)

The primary keys are underlined. The attribute D_id is a foreign key of the EMPLOYEE relation that refers to the DEPARTMENT relation and P_id is a foreign key of the DEPARTMENT relation that refers to the PROJECT relation.

Find out the best evaluation plan for the following query using heuristic optimization. Show the initial query tree, intermediate query trees and the optimal query tree.

Display project name, department name and employee name for employees drawing a salary higher than \$5000 and for department with budget higher than \$20000.

