[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 3624 **L**

Unique Paper Code : 6202451201

Name of the Paper : Database Management Systems

Name of the Course : **B.VOC Software Development**

Semester : II

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No- on the top immediately on receipt of this question paper.
2. The paper has two sections. Section A (15 Marks) is compulsory.
3. Attempt any three questions from Section B. Each question is of 15 marks.

Section A

1	a)	What is meant by the **closure** of a set of functional dependencies? Explain with an example.	2
	b)	Describe the TCL (Transaction Control Language) commands along with their usage.	2
	c)	Explain types of anomalies.	3
	d)	Define database. Briefly discuss the advantages of using DBMS.	4
	e)	Given the relation **R(A, B, C, D, E)** with the following functional dependencies: • $A \rightarrow B$ • $A \rightarrow C$ • $C \rightarrow D$ • $A, D \rightarrow E$ Normalize the relation to **2NF.**	4

P.T.O.

Section B

2 a) What is an ER model? Write about different types of attributes in ER model. Draw the notation of each. Design an ER Diagram for keeping track of Information about Bank Database, Taking into account 4 entities: BANK, ACCOUNT, BRANCH and LOAN. 10

b) Write any Five Codd's Rules . 5

3 a) What is a data model? Describe various data models. 10

b) Given the following two tables: 5

- **Orders**(Order_ID, Customer_ID, Order_Date)
- **Customers**(Customer_ID, Name, Address)

Write SQL queries to:

i. Retrieve the names of all customers who have placed orders.
ii. List the customers who have never placed an order (use a LEFT JOIN).

4 a) What are the three different types of DBMS architectures? Explain 3-tier architecture in detail. 10

b) Given the following table: 5
Student_Course(Student_ID, Course_ID, Instructor, Instructor_Phone, Grade)
with the functional dependencies:

- $Student_ID, Course_ID \rightarrow Grade$
- $Course_ID \rightarrow Instructor$
- $Instructor \rightarrow Instructor_phone$

i. Identify if the table is in **1NF** and **2NF**.
ii. Normalize the table to **2NF** and explain the reasoning behind your decomposition.

5 a) Write Short notes on the following (any 4): 10

i. Generalization and specialization

ii. Different types of keys in DBMS

iii. DDL COMMANDS

iv. DML COMMMANDS

v. Composite attributes

vi. Loss less-join dependency

b) Write SQL Queries for following set of tables: 5
EMPLOYEE (EmpNo, Name, DoB, Address, Gender, Salary, DNumber)
DEPARTMENT (DNumber, Dname, ManagerEmpNo, MnagerStartDate).

i. Display the Age of 'male' employees.

ii. Display all employees in Department named 'Marketing'.

iii. Display the name of highest salary paid 'female' employee.

iv. Which employee is oldest manger in company?

v. Display the name of department of the employee 'SMITH'.

6 a) Given the following two relations: 10

- **Employee(Emp_ID, Name, Dept_ID, Salary)**
- **Department(Dept_ID, Dept_Name)**

i. Write the relational algebra expression for retrieving the names of employees who earn more than $50,000.

ii. Convert the relational algebra expression into an SQL query.

iii. Discuss the differences between relational algebra and SQL, focusing on their usage and advantages.

b) Given the set of functional dependencies for a relation **R(A, B, C, D)**: 5

- $A \rightarrow B$
- $A \rightarrow C$
- $B \rightarrow D$
- $A, C \rightarrow D$

Find the **canonical cover** (minimal cover) of the given set of functional dependencies. Show the steps involved in simplifying the dependencies.

(200)