

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-GURUJADA VIZINAGARAM**II B. Tech I Semester Regular Examinations, November – 2024****Database Management Systems
(CSE (AIDS,CS),AI &DS, AI &ML)****Time: 3 hours****Max. Marks: 70**

*Question paper consists of Part A, Part B.
Part A is compulsory, Answer all questions.
In Part B, Answer any one question from each unit.*

PART-A**(20 Marks)**

- 1 a) Briefly describe the hierarchical, network, and relational data models. [2]
- b) Define an entity in ER model and how the entities represented in an ER diagram. [2]
- c) What are DML operations and why are they important in SQL? [2]
- d) How do you create a table in SQL? Provide an example. [2]
- e) Mention the use of ORDER BY clause in SQL [2]
- f) List various relational set operations in SQL [2]
- g) What are Multi-Valued Dependencies (MVD) [2]
- h) Write the difference between 1NF and 2NF [2]
- i) What is a transaction in the context of a database? [2]
- j) List the ACID properties of a transaction. [2]

PART-B**(50 Marks)****Unit-1**

- 2 a) Define database system and how does it differ from a traditional file system? [5]
- b) What is a relationship set and how is it represented? Write the difference between binary, ternary, and higher-degree relationships. [5]

(OR)

- 3 a) List different types of users in a database system and discuss the role of DBA in a database system. [5]
- b) Write attributes in the ER Model and Explain how are they associated with entities. [5]

Unit-2

- 4 a) Explain the concept of key constraints and their significance. [5]
- b) Compare and contrast tuple relational calculus and domain relational calculus. [5]

(OR)

- 5 a) Describe the basic operations of relational algebra [5]
- b) What are the integrity constraints? why are they important in a relational database? [5]

Unit-3

- 6 a) Write the SQL statement to create a students table with columns for student_id, first_name, last_name, age, and major. Make student_id as primary key. Add a new column email to the students table. [5]
- b) i. Write a query to count the number of students in each major from the students table. [5]
- ii. Write an SQL query to select the name and age of all students from the students table who are older than 20.

*** (By using students table)***

(OR)

- 7 a) i. Create a courses table with a foreign key student_id referencing the students table. [5]
ii. Write a query to count the number of students in each major from the students table.
- b) i. Discuss the role of aggregation functions in SQL. [5]
ii. Discuss the use of the WHERE clause in SQL.

Unit-4

- 8 a) Define and explain Second Normal Form (2NF). What are the steps to convert a relation into 2NF, and what are the benefits? [5]
b) Discuss the importance of Lossless Join and Dependency-Preserving Decomposition in the normalization process. [5]

(OR)

- 9 a) Explain the purpose of normalization in database design. Why is normalization important for relational databases? [5]
b) Given the relation Supplier Part with attributes Supplier_ID, Part_ID, Supplier_Address, Part_Price, and Part_Description, and the functional dependencies: [5]
• Supplier_ID -> Supplier_Address
• Part_ID -> Part_Price, Part_Description **Normalize this table to 3NF.**

Unit-5

- 10 a) Discuss the concept of a database transaction. Explain the different states a transaction can be in during its lifecycle. [5]
b) Explain the concept of indexing in databases. [5]
- (OR)
- 11 a) What is a deadlock in a database system? Explain how deadlocks occur and discuss the various techniques for detecting, preventing, and recovering from deadlocks. [5]
b) Compare the use of B+ Trees and hash-based indexing [5]
