

B. Engg. (Computer Science and Engineering)
3rd Semester

CS-302: Database Systems

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Q. No. 1 which is compulsory and selecting atleast two questions from each Unit-I & II.

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- I. Write the short note on the following: -
- Entity and Entity Set.
 - What is functional dependency? Give an example.
 - Difference between sparse index and dense index?
 - Mention the ACID properties of transaction?
 - B Tree Index
 - Define deferred update. Give example.
 - Digital signatures
 - Relational Algebra tree
 - What is difference between table and a view? Give the syntax of creating both in SQL.
 - Difference between BCNF and 3NF. (10×1)

UNIT-I

- II. Design an ER diagram for an IT training group database that will meet the information needs for its training program. Clearly indicate the entities, relationships and the key constraints. Map the ER diagram into relational model too. The description of the environment is as follows:-
- The Company has 12 instructors and can handle upto 100 trainees for each training session. The company offers 5 Advanced technology courses, each of which is taught by a team of 2 or more instructors Each instructor is assigned to a maximum of two teaching teams or may be assigned to do research Each trainee undertakes one Advanced technology course per training session. (10)
- III. (a) What is data independence? Describe its different types with example?
(b) What is normalization? Explain 1NF, 2NF, 3NF and BCNF. (5+5)
- IV. (a) What is a relational model? Explain primary key, candidate key and foreign key with examples. Describe other database constraints with example.

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(2)

- (b) What are the three data anomalies that are likely to occur as a result of data redundancy? Can data redundancy be completely eliminated in database approach? Why or Why not? (5+5)

UNIT-II

- V. (a) What is concurrency control? Also three anomalies related to concurrency control with example.
 (b) Why is a B+ tree a better structure than a B-tree for implementation of an indexed sequential file? Explain this with an example. (5+5)
- VI. (a) What are the views? Give syntax and example of creating view.
 (b) Briefly explain various query optimization techniques with example.
 (c) Explain the following in terms of providing security for a database: authorization; backup and recovery; encryption (2+5+3)
- VII. Consider the following relations:-
Employee (empID, FirstName, LastName, address, DOB, sex, position, deptNo)
Department (deptNo, deptName, mgr, empID)
Project (projNo, projName, deptNo)
Work on (empID, projNo, hours worked)
 Write the SQL statements for the following:-
 (a) List the name and addresses of all employees who work for the IT department.
 (b) List the total hours worked by each employee, arranged in order of department number and within department, alphabetically by employee surname.
 (c) List the total number of employees in each department for those departments with more than 10 employees.
 (d) List the project number, project name and the number of employees who work on that project. (10)