

2124
B.E. (Information Technology)
Third Semester
PC-IT-303: Database Management System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

- Q1. a) Define Data Independence in DBMS.
b) Enlist two differences between Hashing and B-trees techniques for accessing records in a Database.
c) State three major DCL commands in SQL.
d) Throw light on the basic Query Optimization Strategies.
e) Explain the term 'Aggregation'. (5 x 2 = 10)

SECTION-A

- Q2. Explain the concept of File Organization in Databases. How do fixed-length and variable-length records impact storage and access efficiency? Also throw light on how different Indexing Techniques can optimize Data Retrieval. (10)
- Q3. Using suitable Case Based scenarios draw differences between Hierarchical Model, Network Model and Relational Model of Database Systems. (10)
- Q4. 'Integrity Constraints Violation leads to serious Anomalies in a Database'. Do you Agree/Disagree? Support your answer stating the constraints clearly and using suitable examples. (10)

SECTION-B

- Q5. (a) Consider the following relations for a University System:
- Students (StudentID, Name, Major)
 - Courses (CourseID, CourseName, Credits)
 - Enrollments (EnrollmentID, StudentID, CourseID, Grade)

Write SQL queries for the following:

- i) Retrieve the names of students enrolled in 'Database Systems'.
- ii) Calculate the average grade for each student in their enrolled courses.
- iii) Update the grade for a student who retakes a course.

- (b) Suppose that a relation RRR is in 3NF but not in BCNF. Is it always possible to decompose this relation into BCNF without losing information or violating Dependency Preservation? Explain. (6, 4)

- Q6. (a) Consider a relation Employee (e_name, e_id, e_address, e_salary, e_age). Write a PL/SQL code for creating a Cursor named high_salary_cursor to fetch name and id of employees having salary greater than Rs. 50000 and then updating their salary giving an increment of Rs. 10000 to each.

- (b) Differentiate between Wait-Die and Wound-Wait techniques in context of Deadlocks. (6, 4)

- Q7. (a) Consider a Transaction System where two Concurrent Transactions are running. One transaction reads a data item, while another tries to update it. Explain the "Lost Update Problem" and how two-phase locking (2PL) can resolve this issue.

- (b) Describe how the Two-Phase Commit Protocol ensures atomicity in Distributed transactions. (5, 5)

x-x-x