

CBCS SCHEME

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17CS53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022 Database Management System

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define DBMS. Explain in detail the characteristics of database approach. How does it differ from traditional file system? (10 Marks)
- b. What are the functions of Database Administrators (DBA)? (04 Marks)
- c. Explain the Three – Schema Architecture, with a neat diagram. (06 Marks)

OR

- 2 a. Write an E – R diagram for a banking database. Assume your own entries (minimum 5 entities), attributes and relations. Also mention cardinality ratio. (10 Marks)
- b. Explain with neat sketch, the different phases of database design. (10 Marks)

Module-2

- 3 a. Consider the following schema for a Company database :
EMPLOYEE (Name, SSN, Address, Sex, Salary, DNo)
DEPARTMENT (DName, DNumber, MGRSSN, MGRSTARTDATE)
PROJECT (PName, PNumber, PLocation, DNum)
WORKS-ON (ESSN, PNo, Hours)
DEPENDENT (ESSN, DependentName, Sex, BDate, Relationship)
Write the queries in relational algebra to
 - i) Retrieve the name and address of all employees who work for the 'Research' department.
 - ii) Find the names of employees who work on all projects controlled by department number 5.
 - iii) List all the projects on which employee 'Smith' is working.
 - iv) Retrieve the names of employees who have no dependents. (10 Marks)
- b. What is a Relation? Explain the characteristics of relations. (10 Marks)

OR

- 4 a. Explain the syntax of SELECT statement. Write the SQL query for the following relational algebra expression
 $\Pi_{Bdate, Address} (\sigma_{FName = 'John' \text{ AND } LName = 'Smith'} (EMPLOYEE)).$ (06 Marks)
- b. With examples, explain aggregate function in SQL. (10 Marks)
- c. Explain how the ALTER TABLE command can be used to add and drop constraints. (04 Marks)

Module-3

- 5 a. How is a view created and dropped? What are the problems associated with updation of views? (10 Marks)
- b. Explain the following :
 - i) Embedded SQL
 - ii) Database Stored Procedures. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8=50, will be treated as malpractice.

OR

- 6 a. Explain the various steps in JDBC process by giving examples for each step. (10 Marks)
 b. What is a Trigger? Explain with an example, how a trigger is created. (10 Marks)

Module-4

- 7 a. What is a Functional Dependency? Write an algorithm to find a minimal cover for a set of functional dependencies. (10 Marks)
 b. What is the need of Normalization? Explain second normal form. Consider the relation EMP_PROJ = {SSN, PNumber, Hours, EName, PName, PLocation}
 Assume {SSN, PNumber} as Primary key.
 The dependencies are
 $\{SSN, PNumber\} \rightarrow \{Hours\}$
 $SSN \rightarrow \{EName\}$
 $PNumber \rightarrow \{PName, PLocation\}$
 Normalize the above relation into 2NF. (10 Marks)

OR

- 8 a. Explain Multivalued dependency and fourth normal form, with an example. (10 Marks)
 b. Consider the relation schema
 $R = \{A, B, C, D, E\}$. Suppose the following dependencies hold :
 $\{E \rightarrow A, CD \rightarrow E, A \rightarrow BC, B \rightarrow D\}$.
 State whether the following decomposition of R are lossless join decomposition or not, Justify.
 i) $\{(A, B, C), (A, D, E)\}$ ii) $\{(A, B, C), (C, D, E)\}$. (10 Marks)

Module-5

- 9 a. Explain why a transaction execution should be atomic. Explain ACID properties by considering the following transaction :
 $T1 : \text{read}(A);$
 $A := A - 50;$
 $\text{write}(A);$
 $\text{read}(B);$
 $B := B + 50;$
 $\text{write}(B).$ (10 Marks)
 b. Explain the Database Recovery techniques. (10 Marks)

OR

- 10 a. Draw a state diagram and discuss the typical states that a transaction goes through during execution. (10 Marks)
 b. With an algorithm, explain two phase locking. (10 Marks)
