



FIFTH SEMESTER EXAMINATION-2012

DATABASE MANAGEMENT SYSTEMS

[CS 502]

Full Marks: 60

Time: 3 Hours

Answer any SIX questions including Question No.1 which is compulsory.

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable and all parts of a question should be answered at one place only.

1. a) Is every candidate key a primary key? Justify your [2 × 10] answer with a suitable example.
- b) What is a view? How it is created using relational algebraic operation?
- c) Find the candidate key for a relation schema R(A,B,C,D,E,F) from the given set of functional dependency = {A → BC, C → D, F → E}
- d) What is a partial dependency? With what normal form is it associated?
- e) Write 2 commands for each DCL and TCL statement.
- f) How will you eliminate duplicates from the result of a SELECT statement?
- g) What is a multi-valued attribute? Draw an entity set having one multi-valued attribute and then translate the entity set into relations.
- h) Explain how the naïve user uses the database.
- i) Define the ACID property in transaction.
- j) What is a domain and how is it related to a data value?

2. a) Discuss the difference between a composite key and a composite attribute. How would each be indicated in an ER- diagram? [4]
- b) Given the relation $R(A, B, C, D)$ and the set $F: \{AB \rightarrow C, B \rightarrow D, D \rightarrow B\}$ of functional dependencies. Find the candidate keys of the relation. How many candidate keys are in the relation? What are the prime attributes? [4]
3. a) Discuss the different types of data models with suitable examples. [4]
- b) What is a key? Explain each key with suitable example. [4]
4. a. Define the lossless join decomposition and dependency preserving decomposition with example. [4]
- b) What is Aggregation? How it is used in Extended ER Model? Support example for your answer. [4]
5. a) What is locking? How it contributes in database consistency? Write the two phase locking protocol and explain it with suitable example. [4]
- b) Distinguish between Recoverable schedule and Cascadeless schedule. [4]
6. a) Find a 3NF decomposition of the following relation scheme (Faculty, Dean, Department, Chairperson, Professor, Rank, Student). The relation satisfies the following functional dependencies: [4]
- $\{Faculty\} \rightarrow \{Dean\}, \quad \{Dean\} \rightarrow \{Faculty\},$
 $\{Department\} \rightarrow \{Chairperson\}, \{Professor\} \rightarrow \{Rank,$

Chairperson}, {Department} → {Faculty},
{Student} → {Department, Faculty, Dean}, {Professor,
Rank} → {Department, Faculty}}

b) What are the duties and responsibilities of a DBA? [4

7. Express the following in relational algebra and SQL [2 × 4
from the following schema.

Employee(F_name, L_name, SSN, B_Date, Address,
Gender, Salary, Superssn, D_no)

Department(D_name, D_number, MGR_SSN,
MGR_startdate)

Dept_Locations(D_number, D_Location)

Works_on(ESSN, P_NO, Hours)

Project(P_Name, P_Number, P_Location, D_Num)

Dependent(ESSN, Dependent_name, Gender,
B_date, Relationship)

- (i) Retrieve the names of all employees in department 10 who work more than 10 hours per week on the 'product X' project.
- (ii) List the names of all employees who have a dependent with the same first name as themselves.
- (iii) For each project, list the project name and the total hours per week (by all employees) spent on that project.
- (iv) Retrieve the names of all employees who work on every project.

[4 × 2]

8. Write short notes (any two):
- a) Tuple Relational Calculus
 - b) 4NF
 - c) Generalization/Specialization

x x x x x