



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech (CSE-OLD)/SEM-2/CS-1001/2011

2011

DATABASE MANAGEMENT SYSTEM

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any five questions. $5 \times 14 = 70$

1. a) What do you mean by ACID properties of a transaction ?
Explain the usefulness of each with example.
- b) State two-phase locking protocol with an example.
- c) Explain the distinction between serial schedule and serializable schedule.
- d) Given a schedule S. Test for conflict with serializability.

T1	T2	T3
read (Q)	—	—
—	write (Q)	read (Q)
write (Q)	—	—
—	—	write (Q)

$4 + 4 + 3 + 3$

30039 (M.Tech.)

[Turn over



2. a) Prove that a relation with primary key of single attribute is always in 2NF.

b) Prove that if B is prime attribute in $A \rightarrow B$ then relation is in 3NF.

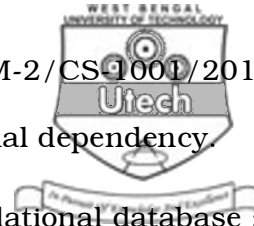
c) Suppose a relation R with attributes A, B, C and D . For following set of FDs :

$$C \rightarrow D, C \rightarrow A, B \rightarrow C.$$

Identify the Candidate Key(s) and best normal form that R satisfies.

d) Explain the disadvantages of normalization. What is renormalization ?

3 + 3 + 4 + 4



3. a) State Armstrong's axioms for functional dependency.
- b) Consider the following schema of a relational database :

Employee (e. no, name address)

Project (p. no, p_name)

Work-on (e_no, p_no)

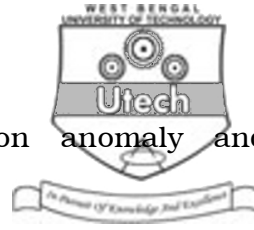
Part (part_no, part_name, qty_on_hand, size)

Use (e_no, p_no, part_no, number)

Solve the following queries using relational Algebra :

- i) Print the names of the employees who are working on a project name 'DBMS'.
- ii) Print the names of all employees where are not working in any project.
- iii) List the names of the employees and the projects with which the employees are associated with and for which they have used no part so far.
- iv) List the names of the projects, such that every employee working on these projects has used a part 'bolts' with size '6'.
- v) List the part number & part names used in both projects 'DBMS' and 'MIS'.

4 + 10



4. a) Explain insertion anomaly, deletion anomaly and modification anomaly with examples.

b) Consider the following relation schema of Library :

Book (book-id, title)

Author (book-id, author-name)

Book-copies (book-id, branch-id, no-of-copy)

Library-branch (branch-id, branch-name)

Book-loan (book-id, branch-id, card no)

Borrower (card-no, name, city).

Write the following queries using SQL :

- i) List the name of books borrowed by the borrowers who reside in KOLKATA.
- ii) Retrieve the names of borrowers who do not borrow any book.
- iii) Retrieve the name of the Library branches which have maximum number of books.
- iv) Retrieve the name of borrowers who have borrowed at least 3 books and not more than 10 books. 6 + 8



5. a) Discuss Apriori algorithm for finding frequent item set.

- b) Apply the Apriori algorithm to the following data set :

Trans ID	Items Purchased
101	milk, bread, eggs
102	milk, juice
103	juice, butter
104	milk, bread, eggs
105	coffee, eggs
106	coffee
107	coffee, juice
108	milk, bread, cookies, eggs
109	cookies, butter
110	milk, bread

The set of items is { milk, bread, cookies, eggs, butter,

coffee, juice }. Use 0.2 for the minimum support

value.

6 + 8



6. a) Explain Functional dependency with example. What is partial Functional dependency ? Give example.

- b) Consider the tables below :

<u>Emp Name</u>	<u>Street</u>	<u>City</u>
Coyote	Toon	Hollywood
Rabote	Tunnel	Carrotville
Smith	Revolver	Jaannom
William	Seaview	Seattle

<u>Emp Name</u>	<u>Brach</u>	<u>Salary</u>
Coyote	Mesa	15,000
Rabote	Mesa	13,000
Gstreen	Redmond	45,000
William	Redmond	17,000

Show the result for their natural join, left outer join, right outer join, full outer join.

6 + 8

7. a) Compare BCNF and 3NF.
- b) What is query tree ? When is it required ?
- c) Construct a query and generate a query tree for that.
- d) What do you mean by query optimization ? Write down the different steps of query optimization from high-level query to output of that query.

3 + 3 + 4 + 4



8. a) Define data warehousing, data mart and data mining.
- b) Discuss the relationship between data warehousing and data mining.
- c) Explains star schema and snowflake schema with example.
- d) Explain slice and dice operation with examples.

6 + 3 + 3 + 2

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