



**ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009
 DATABASE MANAGEMENT SYSTEM
 SEMESTER – 6**

Time : 3 Hours]

[Full Marks : 70

**GROUP - A
 (Multiple Choice Type Questions)**

1. Choose the correct alternatives for the following : 10 × 1 = 10

- i) Overall logical structure of a database can be expressed graphically by
- | | | |
|---------------|---------------|--------------------------|
| a) ER diagram | b) Records | |
| c) Relations | d) Hierarchy. | <input type="checkbox"/> |
- ii) A normal form in which every determinant is a key is
- | | | |
|---------|---------|--------------------------|
| a) 2NF | b) 3NF | |
| c) BCNF | d) 4NF. | <input type="checkbox"/> |
- iii) Which of the following levels of abstraction involves the view of data ?
- | | | |
|-------------------|---------------------|--------------------------|
| a) External level | b) Conceptual level | |
| c) Physical level | d) None of these. | <input type="checkbox"/> |
- iv) One of the shortcomings of file system is
- | | | |
|-----------------------|----------------------|--------------------------|
| a) data availability | b) fixed records | |
| c) sequential records | d) lack of security. | <input type="checkbox"/> |
- v) The ability to modify the internal schema without causing any change to external schema is
- | | | |
|-------------------------------|------------------------------|--------------------------|
| a) physical data independence | b) logical data independence | |
| c) external data independence | d) none of these. | <input type="checkbox"/> |

**GROUP - B****(Short Answer Type Questions)**

Answer any *three* of the following questions.

3 × 5 = 15

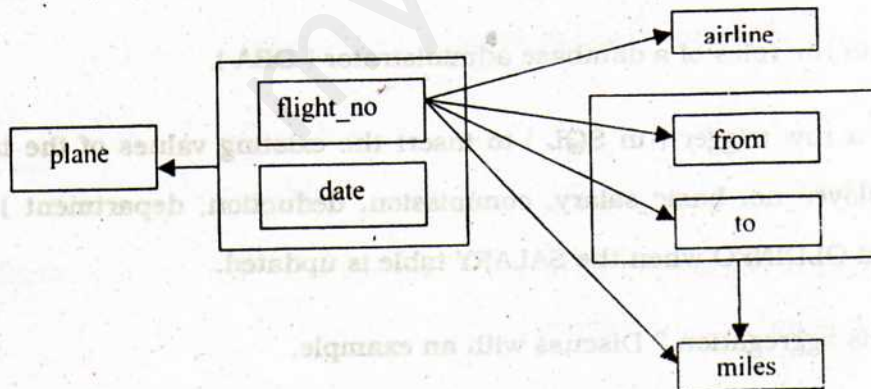
2. a) What do you mean by functional dependency? 2
- b) What are the main characteristics of functional dependencies? 3
3. Define BCNF. How does it differ from 3NF? Why is it considered a stronger than 3NF? 1 + 2 + 2
4. What are ACID properties of a database transaction? How are they selected to the concurrency control? 3 + 2
5. a) What is the difference between a database and a table? 2
- b) Why are entity integrity and referential integrity important in a database? 3
6. a) Give an example of supertype/subtype relationship where the overlap rule applies. 3
- b) What is inheritance in generalization hierarchies? 2

GROUP - C**(Long Answer Type Questions)**

Answer any *three* of the following questions.

3 × 15 = 45

7. a) Given a database schema named PLANE_INFO (flight_no, date, plane, airline, from, to, miles), the functional dependency diagram is given below:



Decompose it up to Boyce-Codd Normal Form (BCNF).



b) Consider the relation $R (A, B, C)$ and a set of functional dependencies $F = \{ A \rightarrow BC, B \rightarrow C, A \rightarrow B, AB \rightarrow C \}$. Compute the canonical cover for F .

c) Given $F = \{ A \rightarrow B, B \rightarrow C \}$. Find an instance of a relation that satisfies F but does not satisfy $B \rightarrow A$. Can you find an instance that satisfies F but not $A \rightarrow C$?

6 + 6 + 3

8. a) Consider the relation schemas given below :

STUDENT (student_id, name)

ENROLLEDIN (student_id, subject_code)

SUBJECTS (subject_code, lecturer)

Write relational algebra for the following :

i) Who teaches CP1500 or CP3020

ii) Who teaches at least two different subjects ?

iii) What are the names of the students taking a subject taught by Roger ?

b) Write down the differences between DBMS and Traditional File Processing System.

c) Describe ACID properties in DBMS.

d) Give an example of derived attribute.

(2 + 2 + 2) + 3 + 4 + 2

9. a) Explain the roles of a database administrator (DBA).

b) Write a row trigger (in SQL) to insert the existing values of the table SALARY (employee_no, basic_salary, commission, deduction, department) into a table named OLDINFO when the SALARY table is updated.

c) What is aggregation ? Discuss with an example.

d) Draw a functional dependency diagram (FD diagram) that is in 3 NF but not in BCNF. Decompose that FD diagram into BCNF.

5 + 4 + 3 + 3



10. a) Draw an E-R diagram for the following :

A department store operates in several cities. In a city there is one headquarters coordinating the local operations. A city may have several stores. Stores hold any amount of items. Customers place their orders for any number of items to a given store.

b) Why we need query optimization ?

c) Consider the relation $R (A, B, C, D, E)$ with the set of $F = \{ A \rightarrow C, B \rightarrow C, C \rightarrow D, DC \rightarrow C, CE \rightarrow A \}$. Suppose the relation has been decomposed by the relations $R_1 (A, D) R_2 (A, B) R_3 (B, E) R_4 (C, D, E), R_5 (A, E)$. Is this decomposition lossy or lossless ? Justify your answer.

7 + 2 + 6

11. Write short notes on any three of the following :

3 × 5

a) Vertical and Horizontal Fragmentation

b) Armstrong's axioms

c) Two-phase locking protocol

d) Conflict serializability

e) Theta (θ) join.

END