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No. of Printed Pages—4 CS—502

B. TECH.

FIFTH SEMESTER EXAMINATION, 2003-2004

DATABASE MANAGEMENT SYSTEM

Time : 2 Hours *Total Marks : 50*

Note : (1) The question paper contains *FOUR* questions.
(2) Attempt ALL questions.

1. Attempt any *FOUR* parts :— **(3×4=12)**

(a) What are main differences between a File Processing System and a Database Management System ?

(b) What do you mean by Data Abstraction ? Explain the difference between Physical Level, Conceptual Level and View Level of data abstraction.

(c) What is Data Independence ? What are differences between Logical Data Independence and Physical Data Independence ?

(d) What are differences between Super Key, Candidate Key and Primary Key ? Explain with a suitable example.

(e) What are differences between Data Definition Language and Data Manipulation Language ? Explain with example.

(f) What do you mean by Entity and Relationship in ER Model ? Explain how a relationship set is defined.

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2. Attempt any *TWO* parts :— **(6×2=12)**

(*a*) Design an E-R Diagram for Airline Reservation System consisting of Flights, Aircrafts, Airports, Fares, Reservations, Tickets, Pilots, Crew and Passengers. Clearly highlight the entities, relationship, primary keys and mapping constraints. Transform this E-R Diagram to Relational Database Schemas. Clearly mention the Generalization, Aggregation, Weak Entity and Referential Integrity in your Design.

(*b*) Consider following scheme for PROJECT database :—

Project (Project_No , Project_Name , Porject_Manager)

Employee (Employee_No , Employee_Name)

Assigned_To (Project_No , Employee_No)

(*i*) Write SQL-DDL statement for implementation of PROJECT database. The SQL statement should clearly indicate the Primary Key and Foreign Keys.

(*ii*) Write following queries in Relational Algebra and SQL :—

- Get the detail of employees working on both projects 'P1' and 'P2'.
- List the name of employees working on project 'P1' but not on project 'P2'.
- Delete the record of employee whose Employee Number is 'E1'.
- List the name of employees who are working on a project for which 'E1' is the project manager.

(c) Answer the following :—

(i) What are Views ? How is view defined ? Explain with a suitable example. Discuss the problems of Insert, Delete and Update through the views.

(ii) What do you mean by Referential Integrity ? Define Foreign Key and discuss the concept behind declaration of foreign keys.

(iii) What are Triggers ? How are they different from the Assertions ? Discuss the cases where the Triggers and Assertions are used.

3. Attempt any *TWO* parts :— **(6½×2=13)**

(a) What are Normal Forms ? What is the motivation behind normalizing a database ? Discuss the First and Second normal forms. Define and explain the Functional Dependency with a suitable example.

(b) Suppose a relational scheme R= (A,B,C,D,E) is decomposed into following scheme :—

(A,B,C)

(A,D,E)

Prove that this decomposition is a Lossless Join decomposition, if the following set of functional dependencies holds on R :—

$$(A \rightarrow BC,\ CD \rightarrow E,\ B \rightarrow D,\ E \rightarrow A)$$

(c) Define Fourth Normal Form. Consider a relational scheme R = (A,B,C,D,E). Let M is the following set of Multivalued dependencies :—

$$M = (A \twoheadrightarrow BC, B \twoheadrightarrow CD, E \twoheadrightarrow AD)$$

Give a Lossless Join decomposition of scheme R into Fourth Normal Form. Justify your answer.

4. Attempt any *TWO* parts :— **(6½×2=13)**

(a) What is Log ? How is it maintained ? Discuss the salient features of Deferred database modification and Immediate database modification strategies in brief.

(b) What are Schedules ? Define Conflict and View serializable schedules. State whether the following schedule is conflict serializable or not. Justify your answer :—

T_1	T_2
Read (A)	
Write (A)	
	Read (B)
	Write (B)
Read (B)	
Write (B)	
	Read (A)
	Write (A)

(c) What are Locks ? Differentiate Shared Mode and Exclusive Mode locks. How can a serializability be ensured by using Lock based Protocols ? With reference to Two-phase Locking Protocol, explain how the upgrading and downgrading of Locks takes place. Explain with a suitable example.