ALCCS – OLD SCHEME

Code: CS33   **Subject: DATABASE MANAGEMENT SYSTEMS**
Time: 3 Hours   **Max. Marks: 100**

AUGUST 2011

NOTE:
- **Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.**
- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

Q.1

a. List four key advantages of database systems over file systems.

b. Discuss the different levels of abstractions in a database management system.

c. Discuss the different types of data integrity constraints.

d. Differentiate between Data Definition Language and Data Manipulation Language.

e. Discuss the ACID properties in Transactions.

f. Differentiate between Recoverable and Cascadeless schedules.

g. Define a schedule. Differentiate between serial and serializable schedule.   **(7 $\times$ 4)**

Q.2   For the following problem definition:
The musical company wants to store information about the musicians who perform on its albums. Each musician has a musician id, a name, an address, and a phone number. Some musicians may have the same address and some of them may have more then one phone number. Each musician may play several instruments and an instrument and may be played by several musicians. Each instrument has name and a musical key. The album recorded has a title, a copyright date, a format and an album identifier. Each album has a number of songs where a song has a title and an author. Each song may be performed by several musicians and a musician may perform a number of songs. One of the musicians of the song acts as a producer. A producer may produce several albums.
(i)   Draw an E-R diagram.   **(10)**
(ii) Transform the E-R diagram to a Relational Schema.   **(8)**

Q.3   Consider the following relational schema
Sailors(SailorId, SailorName, Rating, Age)
Reserves(SailorId, BoatId, Day)
Boats(BoatId, BoatName, Color)

Express the following queries in Relational Algebra
(i) Find the names of sailors who have reserved the same color boats as the sailor named 'John'.
(ii) Find the colors of boats reserved by sailor 'John'.
(iii) Find the names of sailors who have reserved a red or a green boat.
(iv) Find the names of sailors who have reserved at least two boats.
(v) Find the names of sailors who have reserved all boats.
(vi) Find the names of boats that are reserved by more than one sailor. **(18)**

Q.4 Consider the following relational database schema

SUPPLIER(SupplierNo, SupplierName, SupplierCity)
PART(PartNo, PartName, Weight, Quantity, Color)
SUPPLY(SupplierNo, PartNo, Quantity)

a. Give an SQL DDL definition of the above schema. **(3)**

b. Express the following queries in SQL:
(i) Find the names of parts which are supplied by more than one supplier.
(ii) Find the name of suppliers who have supplied all the red colored parts.
(iii) Find the names of supplier who has supplied blue parts more than average number of the blue parts supplied by the supplier in the same city.
(iv) Find the names of supplier who supply atleast two parts.
(v) Delete Suppliers who have supplied no parts. **(15)**

Q.5 a. State 3NF and BCNF. Compare 3NF and BCNF with respect to lossless join decompositions and dependency preservation with the help of an example. **(5)**

b. Consider the relation schema R(P, Q, R, S, T) and the Functional Dependencies $PQ \rightarrow R, R \rightarrow S$ and $S \rightarrow T$ holds on R. Decompose the relation R, if necessary, into collections of relations that are in BCNF. **(4)**

c. Suppose that we decompose the schema R={P, Q, R, S, T} into R1={P, Q, R} and R2={P, S, T}. Verify whether this decomposition is Lossless or Lossy if the Functional Dependencies $P \rightarrow QR, RS \rightarrow T, Q \rightarrow S$ and $T \rightarrow P$ holds. Also verify whether the decomposition is dependency preserving. **(4)**

d. Consider the relation schema R(P, Q, R, S) and the Functional Dependencies $PQ \rightarrow R, R \rightarrow S$ and $S \rightarrow P$ holds on R. List all the keys of relation R. **(5)**

Q.6 a. Determine whether the following schedules are conflict serializable or not
(i) T_1:R(X), T_2:R(Z), T_1:R(Z), T_3:R(X), T_3:R(Y), T_1:W(X), T_3:W(Y), T_2:R(Y), T_2:W(Z), T_2:W(Y)
(ii) T_1:R(X), T_2:R(Z), T_3:R(X), T_1:R(Z), T_2:R(Y), T_3:R(Y), T_1:W(X), T_2:W(Z), T_3:W(Y), T_2:W(Y) **(6)**

b. What is Deadlock? Discuss the different ways of preventing deadlock and detecting deadlock? **(6)**

c. Compare the deferred modification and immediate modification technique of the log-based recovery scheme for concurrent transactions? Why and how checkpoints are used to perform such log-based recovery. **(6)**

Q.7 Write Short notes on any **THREE** of the following:-

      (i)   Data Warehousing.
      (ii)   Data mining.
      (iii) Database security.
      (iv) Distributed databases. **(6+6+6)**