(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1004   Roll No. | | | | | | | | | | | |

B.Tech.

FIFTH SEMESTER EXAMINATION, 2004-2005

DATA BASE MANAGEMENT SYSTEM (DBMS)

Time : 2 Hours   *Total Marks : 50*

Note :   *Attempt **ALL** questions.*

1.   Answer *any four* of the following : —   (3x4=12)

   (a)   Define following terms :

         Data, Database, Database System

   (b)   What do you mean by External Schema,
         Conceptual Schema and Internal Schema ?

   (c)   What is the difference between logical data
         independence   and   physical   data
         independence ?

   (d)   Discuss briefly the conventions for displaying
         an ER Schema as an ER diagram.

   (e)   What is the difference between Specialization
         and Generalization with respect to Database ?

   (f)   Explain difference between a weak and a
         strong entity set.

This question contains two sections 'A' and 'B' each containing parts (a), (b) and (c). Attempt *any four* parts, two each from sections 'A' and 'B' : (3x4=12)

(a) Consider the following relations for a database that keeps track of students enrollment in courses and the books adopted for each course.

STUDENT (SSN, Name, Major, Bdate)

COURSE (Course#, Cname, Dept.)

ENROLL (SSN, Course#, Quarter, Grade)

BOOK-ADOPTION (Course#, Quarter, Book-ISBN)

TEXT (Book-ISBN, Book, Title, Publisher, Author)

The underlined attributes form the primary key of a relational schema.

Specify the foreign keys for the above schema, stating any assumptions you make. Then specify the following queries in relational algebra.

(i) List the no. of courses taken by all students named 'John Smith' in Winter 2002 (i.e. Quarter $= 'W_{02}'$).

(ii) Produce a list of text bocks (include course#, Book-ISBN, Book-Title) for courses offered by the 'CS' dept that have used more than two books.

(iii) List any departments that has all its adopted books published by 'BC Publishing'.

(b) Consider the following relational database :

EMPLOYEE (Person-name, Street, City)

WORKS (Person-name, Company-name, Salary)

COMPANY (Company-name City)

MANAGES (Person-name, Manager-name)

(i) Give an SQL DDL definition of this database.

(ii) Identify referential-integrity constraints that should hold.

(iii) Discuss the inclusion of above constraints in DDL definition.

Answer *any two* of the following : (6x2=12)

(a) Discuss lossless join and dependency preservation.

(b) Let $R = \{ A, B, C, D, E, \}$ be a schema and let M be a set of following multivalued dependencies $A \rightarrow\rightarrow BC$, $B \rightarrow\rightarrow CD$, $E \rightarrow\rightarrow AD$. List the nontrivial dependencies in M^+.

(c) Discuss join dependency and fifth normal form (5NF). Why is 5NF also called projection join normal form ?

Answer *any two* of the following : (7x2=14)

(a) Consider the following graph-based locking protocol that allows only exclusive lock modes, and that operates on data graphs that are in the form of a rooted directed a cyclic graph.

• A transaction can lock any vertex first.

- To lock any other vertex, the transaction must have visited all the parents of that vertex, and must be holding a lock on one of the parents of the vertex. Show that the protocol ensures serializability and dead lock freedom.

(b) Which of the following schedules is conflict serializable ? For each serializable schedule, determine the equivalent serial schedules.

(i) $r_1(X); r_3(X); w_1(X); r_2(X); w_3(X);$

(ii) $r_1(X); r_3(X); w_3(X); w_1(X); r_2(X);$

(iii) $r_3(X); r_2(X); w_3(X); r_1(X); w_1(X);$

(c) Consider the three transactions T_1, T_2 and T_3 and the schedules S_1 and S_2 given below. Draw the serializability (precedence) graph for S_1 and S_2.

$T_1 : r_1(X); r_1(Z); w_1(X);$

$T_2 : r_2(Z); r_2(Y); w_2(Z); w_2(Y);$

$T_3 : r_3(X); r_3(Y); w_3(Y);$

$S_1 : r_1(X); r_2(Z); r_1(Z); r_3(X); r_3(Y);$
$\quad\quad w_3(Y); r_2(Y); w_2(Z); w_2(Y);$

$S_2 : r_1(X); r_2(Z); r_3(X); r_1(Z); r_2(Y);$
$\quad\quad r_3(Y); w_1(X); w_2(Z); w_3(Y); w_2(Y);$

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