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NEW SCHEME

First Semester M.Tech. Degree Examination, June 2007

Data Base Management Systems

Time: 3 hrs.] [Max. Marks:100

Note : ***Answer any FIVE full questions.***

1 a. Explain subclass/superclass relationships. Discuss user-defined and predicate defined subclasses with examples. Mention the differences among them. **(10 Marks)**

b. What is the difference between specialization hierarchy and specialization lattice? Explain them with an exmple. **(10 Marks)**

2 a. Construct an ER diagram for the BANK database. Each BANK can have multiple BRANCHES and each BRANCH can have multiple ACCOUNTS and LOANS. Consider BANK, BRANCH, ACCOUNT, LOAN and CUSTOMER as entities. Show the different attribute types and cardinality ratio. Also construct the relational database schema for the same. **(10 Marks)**

b. What is functional dependency? Explain how the inference rules for functional dependencies are useful in the normalization of a relation. **(10 Marks)**

3 a. Explain 2NF and 3NF with suitable examples. Also discuss the necessity of applying 2NF and 3NF. **(10 Marks)**

b. What is dependency preservation property and lossless (or nonadditive) join property of decomposition? Among the two, which one must definitely be satisfied? Why? **(10 Marks)**

4 a. Given R = {SSN, ENAME, PNUMBER, PNAME, PLOCATION, HOURS} Decompose the relation R using the following functional dependencies.
F = {SSN → ENAME ; PNUMBER → {PNAME, PLOCATION} ; {SSN, PNUMBER} → HOURS}
Determine whether the decomposition of R has its loss less join property or not, by applying the algorithm to test for loss less join property. **(08 Marks)**

b. Explain the different deadlock prevention protocols. **(06 Marks)**

c. Explain how a query tree can be used to represent a relational algebraic expression, with an example. **(06 Marks)**

5 a. What is a serial schedule and serializable schedule? Write an algorithm for testing conflict serializability of a schedule, with an example. **(10 Marks)**

b. Consider the 3 transactions T_1, T_2 and T_3 and 2 schedules S_a and S_b given below. Draw the serializability (precedence) graphs for S_a and S_b and state whether each schedule is serializable or not. If a schedule is serializable write the equivalent serial schedule.

$T_1 : r_1(X);\ w_1(X);\ r_1(Y);\ w_1(Y);$

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

$T_3 : r_3(Y);\ r_3(Z);\ w_3(Y);\ w_3(Z);$

$S_a : r_2(Z);\ r_2(Y);\ w_2(Y);\ r_3(Y);\ r_3(Z);\ r_1(X);$ **(10 Marks)**
$w_1(X);\ w_3(Y);\ w_3(Z);\ r_2(X);\ r_1(Y);\ w_1(Y);\ w_2(X);$

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

6 a. Explain why concurrency control is needed and discuss the different types of problems encountered during concurrency. **(10 Marks)**

b. For the given query, 'Find the last names of employees born after 1968, who work on a project named, "Computers",
   i) Write its equivalent SQL query and
   ii) Apply heuristic optimization and get optimized query tree from initial query tree. Show the intermediate steps also. **(10 Marks)**

7 a. What are the differences and similarities between objects and literals in the ODMG object model? **(07 Marks)**

b. Explain multimedia database and spatial database concepts. **(08 Marks)**

c. Write a note on object definition language. **(05 Marks)**

8 a. Explain concurrency control and recovery in the case of distributed databases. **(10 Marks)**

b. Discuss the advantages of distributed databases over centralized databases. **(10 Marks)**

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