[Total No. of Questions : 8]

T.E. (Computer) (Semester - V) Examination, May 2011
DATABASE MANAGEMENT SYSTEMS

Duration : 3 Hours **Total Marks : 100**

Instructions : *1) Answer any five questions, at least one from each module.*
2) Assume suitable data if necessary.

MODULE - I

Q1) a) Explain the following terms: [3×3]

i) data independence.

ii) database languages.

iii) schemas and instances.

b) Construct an extended ER diagram to model an entity set employee which stores the first name, middle name and last name for entities. Every employee has an SSN number, it also stores birth date and address of employee. Employee can be a secretary with typing speed or a technician with a good grade or an engineer of a certain type/branch. Some employees are salaried with a fixed amount while some are hourly employees having some pay scale. The employees working on hourly basis belong to a trade union. [6]

c) What are multivalued attributes? How can they be handled within the database design. Give an example. [5]

Q2) a) Construct an ER for the following: [10]

Shops store books and magazines. These are supplied to the shops by the distributors who themselves pick it up from publishers. Every book has a title, author, cost and category. Magazines have a name, cost, period (weekly, monthly) etc. Details like name and place are stored for shops, distributors and publishers.

b) Explain the various data models. [6]

c) Differentiate between binary and ternary relationships with examples. [4]

MODULE - II

Q3) a) Consider the following relational schema.

library (libno, libname, location, room)

book (bookno, title, pages, authno)

author (authno, authname)

copy (copyno, libno, bookno, cost)

loan (copyno, borrowerno, duedate)

borrower (borrowerno, name, age)

Provide SQL expressions for the following.

i) Retrieve the name and location of libraries that have books written by an author whose name is 'Galvin". [2]

ii) Retrieve the names of borrowers who have no books on loan. [3]

iii) Retrieve the borrowers name and number of books currently on loan for each borrower. [3]

b) What is a view? With reference to the above schema create an SQL view that contains the barrowers name, duedate and copyno of all books borrowed by senior citizens (ie age > 65) [6]

c) List and explain various pitfalls in relational database design. [6]

Q4) a) What do you mean by closure of a set of functional dependencies? Find the candidate keys for the following schema given relation R = (A, B, C, D, E) and functional dependencies amongst attributes.

$F = \{ A \rightarrow B, AC \rightarrow D, B \rightarrow E\}$ [6]

b) Explain the following w.r.t. relational algebra provide notation, purpose and examples for each. [2×4]

i) Aggregate function and its type.

ii) Grouping.

c) When do we say that two sets of functional dependencies are equivalent? Explain. [4]

d) What is query by example? Explain. [2]

MODULE - III

Q5) a) Consider the universal relation R = {A, B, C, D, E, F} and set of functional dependencies $F = \{A \rightarrow B, C \rightarrow DF, AC \rightarrow E, D \rightarrow F\}$

What is the key of R? Decompose R into 2NF and 3NF. [6]

b) Discuss insertion, deletion, modification anomalies. Why are they considered bad? Illustrate with examples. [8]

c) Discuss query tree and query graph with respect to query optimization techniques. [6]

Q6) a) Consider the following database relations. **[12]**

sailors (sid, sname, rating, age)
boats (bid, bname, colour)
reservations (sid, bid, date)
and the SQL query
Select S.sname, B.bname from
Sailors S, boats B, reservation R
Where S.sid = R.sid AND R.bid = B.bid
AND B.colour = 'Red' AND R.date < '1 April 2010'

i) Find an equivalent relational expression for the above query.
ii) Obtain the initial query tree for the above SQL and hence obtain a heuristic optimization of the query tree.

b) Explain 3NF and 3CNF with examples. Point out the difference between the two. **[8]**

MODULE - IV

Q7) a) Explain the different types of transaction failures. **[8]**

b) With respect to 2PL discuss the following **[8]**
→ Basic 2PL
→ Conservative 2PL

c) List the various merits and demerits of 2PL and timestamp based protocol. **[4]**

Q8) a) Compare binary locks to exclusive / shared locks. Which ones are preferred? **[6]**

b) Illustrate serializability with an example. **[6]**

c) Explain the following w.r.t. schedules. **[8]**
→ Strict schedule
→ Serial schedule
→ Non serial schedule
→ Conflict schedule