CS/B.Tech/Even/CSE/6th Sem/CS-601/2014

2014

Data Base Management System

Time Alloted : 3 Hours   *Full Marks : 70*

The figure in the margin indicate full marks.
Candidates are required to give their answers in their
own words as far as practicable

GROUP - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following questions.

                         10x1=10

i) Consider the following SQL statements:

A) select * from student where year = '2nd' or year = '3rd'
B) select * from student where year in ('2nd', '3rd')

     (a) A is correct while B is not
     (b) B is correct while A is not
     (c) Both will generate same result set
     (d) A and B will generate different result sets.

ii) The employee salary should not be greater than Rs.20,000. This is

     (a) integrity constraint
     (b) referential constraint
     (c) over-defined constraint
     (d) feasible constraint

iii) Consider the following query:

(((P WHERE COLOUR = 'RED') [P#] JOIN SP) [S#] JOIN S) [SNAME] Which one of the following set of operations does the above query involve?

    (a) 1 selection, 2 joins, 3 projections

    (b) 1 projection, 2 joins, 3 selections

    (c) 2 selections, 2 joins, 3 projections

    (d) 1 selection, 2 joins, 3 intersections

iv)   Second Normal Form

    (a) Eliminates transitive dependency between non-key attributes & key attributes

    (b Eliminates partial dependency between non-key attributes & key attributes

    (c) Creates separate tables for the set of values that apply to multiply records

    (d) Creates a separate table for each set of related data and identify a primary key for each such set

v)   When a row is deleted which one of the following techniques should be used to maintain integrity?

    (a) The row is deleted and nothing else is done

    (b The row is deleted and the references to the deleted primary key, if any, are replaced by NULL

    (c) The delete operation is not allowed if the row's primary key is a target of a foreign key

    (d) The row is deleted as well as the rows from other tables that have foreign keys that have the deleted primary key as their target

vi)   What is the name of a trigger that triggers itself?

    (a) Triggering trigger

    (b) Cascading trigger

    (c) Mutating trigger

    (d) None of the above

vii)   Given the following relation instance

X	Y	Z
1	4	2
1	5	3
1	6	3
3	2	2

Which of the following functional dependencies are satisfied by the instance?

(a) XY→Z and Z→Y

(b) YZ→X and Y→Z

(c) YZ→X and X→Z

(d) XZ→Y and Y→X

viii) If a table R consists only of its primary key (which may consists of a number of attributes) and has no other attributes, the table would always be in

(a) 2NF but may not be in 3NF

(b) 3NF but may not be in BCNF

(c) 4NF

(d) none of these

ix) Three transactions attempt to book seats on a flight that has 12 seats available. The transactions are transaction T1 for 3 seats, transaction T2 for 5 seats and transaction T3 for 7 seats. If a schedule that is serializable is executed, the number of seats sold cannot be

(a) 7　　　　　　　　(b)8

(c) 10　　　　　　　 (d) 12

x) Which of the following is the size of the data item chosen as the unit of protection by a concurrency control program?

(a) Lock　　　　　　(b) Blocking factor

(c) Granularity　　　(d) None of the above

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.　　　　3x5=15

2. (a) Discuss the properties of decomposition including attribute preservation, dependency preservation and lossless join with example.

(b) Give an example of table decomposition which is not lossless.

(3+2)

CS/B.Tech/Even/CSE/6th Sem/CS-601/201

3. Could a modern university be supported if a file processing system was used to manage enterprise information? List four major difficulties that are likely to arise if no database system was available to the university. Discuss the difficulties.

(1+4)

4. (a) What is the disadvantage of Cartesian product and how to recover from it?

(b) Explain full outer join, left outer join, right outer join with examples.

(2+3)

5. What is the single most significant difference between two-phase locking and the time-stamping technique concurrency control? Explain briefly.

6. Consider the following "SAILOR" and "RESERVE" relation:
SAILOR (sid, sname, rating, age)
RESERVE(sid, bid, day)
Formulate relational algebra query:

a) Find names of sailors who have reserved boat #XXX.

b) Find names & ages of sailors who have reserved a boat.

2x2.5

GROUP - C

(Long Answer Type Questions)
Answer any *three* of the following.   3x15=45

7. (a) Draw an ER diagram for the system given as follows:

An organization has number of faculties who are expert in one or more subjects. For each subject, number of such experts is there, system will store faculty and subject information and must support query on finding expertise on subjects. Students get enrolled to have training on one or more subjects. System will keep student information also. One faculty is allotted to teach one or more subjects and for one subject only one faculty is assigned. System will keep the information regarding such assignment.

(b) Describe how the entity animal (in a ZOO) can be developed into a specialization hierarchy.

(c) What is meant by a recursive relationship type? Give one example of recursive relationship type.

8+4+3

8. (a) Consider the following tables:

RESTAURANTS(rid, rname, rcity, phone, seat-capacity)

DISHES(did, dname, dtype)

CUSTOMER (cid, ename, ccity)

SERVES(rid, did)

HAS_ALLERGY(cid, did)

i) Find the names of the restaurants that serve "Burger" (dish name).

ii) List the names of dishes that customer "Roy" can eat without allergy problem.

iii) List the names of dishes that appear in all restaurants in Kolkata.

iv) Find the names of customers who are in the same city as restaurant "Maachan" and who can eat at least one dish at "Maachan" without allergy problem.

(b) What are the major problems with performing update operations through VIEW. Briefly discuss each.

(c) Specify the following constraints in SQL using accurate applicable command:

(i) All values of attribute mark in relation enrolment must be within 0 and 100.

(ii) If the value of attribute grade is 'A' then the mark must be more than or equal to 80. If the value of attribute grade is 'B' then the mark must be less than 80 but greater than or equal to 70.

$$[(4 \times 2) + 3 + (2 \times 2)]$$

9. (a) Prove or disprove the following:

(i) If $AB \rightarrow C$, $A \rightarrow D$, $CD \rightarrow EF$ then $AB \rightarrow F$

(ii) If $XW \rightarrow Y$ and $XY \rightarrow Z$ then $X \rightarrow (Z - W)$

(b) A table R has attributes P, Q, R, S, T, U, V, W and satisfies the following functional dependencies:

$$PQR \rightarrow S, PQ \rightarrow U, Q \rightarrow V, R \rightarrow W$$

(i) What are the candidate keys?

(ii) Is this an irreducible set of functional dependencies?

(c) Consider the relation R (A, B, C, D, E) with the set of F = {A →C, B → C, C →D, DC → C, CE →A}. Suppose the relation has been decomposed by the relations R1(A, D), R2(A, B), R3(B,E), R4(C,D,E) and R5(A, E). Is this decomposition lossy or lossless? Justify your answer.

(d) If 'α' be the set of attributes then write the algorithm to compute 'α+', (Closure of attribute set).

$$(2 \times 2) + (2 \times 2) + 4 + 3$$

10. (a) Why do we normalize a relation? Describe the anomalies.

(b) Consider each order has unique order_id for each order, following information are stored:

order_id, order_dt, customer_name, customer_address, salesman_name, salesman_address and for each requested item store item_code, item_name, quantity and rate.
Further assume, following functional dependencies:
salesman_name →salesman_address
customer_name →customer_address
order_id →order_dt, salesman_name, customer_name
order_id, item_code →quantity
item_code →item_name, rate

Normalize the database up to 3NF showing the steps. Indicate PRIMARY & FOREIGN KEYS.

(c) Is a table with only two columns that is in 3NF, always is in BCNF. What about a table with three columns that is in 3NF? Explain your answer and give examples to support it.

(d) What is MVD's? What do you mean by lossless (or non-additive) join property of decomposition?

$$3+6+3+3$$

CS/B.Tech/Even/CSE/6th Sem/CS-601/201

11. (a) What are the roles of the Analysis, Redo and Undo phases in the recovery algorithm 'ARIES'.

(b) Consider the following transactions and find how many different schedules of the two transactions are possible? How many of these are serializable?

Transaction 1	Transaction 2
Read (X)	Read (X)
X := X-N	X := X+M
Write (X)	Write (X)
Read (Y)	————
Y := Y+N	————
Write (Y)	————

(c) Transactions cannot be nested inside one another. Why not?

(d) Systems do not allow a given transaction to commit changes to databases on an individual basis. i.e., without simultaneously committing changes to all other databases. Why not?

4+5+3+3