Roll No IC1532

M. Sc. (Informatics) 3rd Semester, 2015
Paper: IT-32- **Database Management System**

Please write your Roll No on question paper after receiving it immediately from Invigilator

Time allowed: **03 Hrs** Maximum Marks: **75**

Note: Answer any five questions in all.

Q1 (a) Draw and label database system structure. 3

(b) Explain with examples which all possible types of constraints may be defined in Data definition Language. 4

(c) What are ACID properties and state diagram for Transaction execution over a database system. 4

(d) Compare different Data models like E R model, Relational model, Object Oriented and Object Relational Model for feasibility of database systems. 4

Q2 (a) Consider following database 6

employee (person_name, street, city), works(person_name, company_name, salary) , company (company_name, city) manages (person_name, manager_name) . Using Relational Algebra, answer following queries

(1) Find the names of all employees who earn more than every employee of company "Informatics Systems".

(2) Find the name of all employees who live in same city as do theirs mangers.

(b) Explain how relational algebra deals with Null values with respect to arithmetic operations, and relational algebra operations like joins, select, projection, aggregate and union etc. 4

(c) Give guidelines with examples to transform ER model design into relational database design. 5

Q3 (a)Consider following set F of functional dependencies for relation schema R=(A,B,C,D,E). A->B, CD->E, B->D, E->A, compute B^+ (attribute closure of B). 4

(b) Take one schema that is not in BCNF, Use BCNF decomposition algorithm to reduce resulting schema into BCNF. Check whether resulting decomposed schema is dependency preserving and lossless decomposition. 5

(c) Prove that every functional dependency is also a multivalued dependency and therefore implies that a schema which is in 4NF is also in BCNF. Give example in support of above result. 6

Q4 (a) Design an E-R diagram for statistics regarding your favorite Sports teams. For 7

A→B
B→D
A→D

example matches played, score in each match, players in each match, and individual player statistics for each match. Also consider a derived attribute, summary statistics while modeling data design.

(b) Explain with the help of an example difference between total and partial constraints. 3

(c) What is a view in SQL? What are different problems which may be there if modification of database e.g insertion is allowed through views? When a view is said to be updateable? 5

Q5 (a) State Conflict serializability, view serializability, Recoverability and Cascadeless Rollback. Compare Lock Based and Time Stamp based protocols for concurrent transaction execution in terms of above constraints . 10

(b) Consider the following query for bank database 4

```
select T.branch_name
from branch T, branch S
where T.assets > S.assets and S.branch_city =" Punjabi Bagh"
```

Write an efficient equivqlent expression for above query. Justify your answer.

(c) What are persistent programming Languages? 1

Q6 Let relations r1(X1,Y1,Z1) and r2 (X2, Y2, Z2) have 10,000 and 50000 tuples respectively such that 50 tuples of r1 fits on one block and 25 tuples of r2 fits on one block . Estimate number of block transfers and seeks required for Nested Join (a) Using Nested-Loop Join (b) Block Nested-loop join. 4

(b) Consider a relation with following tuples: (Rishu, 70), (Shalini, 80), (Jiya, 75), (Riya, 69), (Yash, 65), (Seema, 73), (Anita, 72), (Babita, 90), (Omi, 85), (Whitty, 59), (Zaniual, 82), (Inu, 78) Assume that only one tuple fits in a block and memory holds at most 2 blocks at a time. Show the passes of External merge sort with number of block transfers and number of seeks required. 4

(c) Define Heuristics for query optimization and Justify how it can improve the cost of query execution. 4

(d) Explain with example how Materialized Views may used in query optimization 3