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Paper Code : EC-705C

DATABASE MANAGEMENT SYSTEM

Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

ndidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Changing logical schema does not affect view level is an example of

a) Consistency b) Concurrency

c) Data independence d) Data constraints.

ii) Indexing

a) Always increases speed of searching

b) Sometimes increases speed of searching

c) Never increases speed of searching

d) Changes contents of the table.

iii) Which one of the following is true ?

a) Weak entity set has one primary key

b) Relation does not have any attribute

c) One entity set may have relation to itself

d) Generalization is a top-down process.

iv) A table can be logically connected to another table by defining a

a) hyperlink b) primary key

c) common field d) foreign key.

v) Overall logical structure of a database can be graphically represented by

a) ER diagram b) Records

c) Hierarchy d) Relation.

vi) Relations produced from an ER-model will always be in

a) INF b) 2NF

c) 3NF d) 4NF.

vii) Which one of the following is false ?

a) Tuple calculus is a non-procedural query language.

b) Foreign key is different from referential integrity constraint.

c) There may be more than one foreign key in the table

d) There may be more than one candidate key in the table.

viii) Which one of the following is false ?

a) Consistency is maintained by the database system

b) Durability is maintained by the database system

c) All conflict serializable schedules are view serializable

d) Lock upgrade is performed in the growing phase of two phase locking protocol.

ix) Serializability of concurrent transaction are ensured by

a) Locking b) Time stamping

c) Both (a) and (b) d) None of these.

x) Transaction follows

a) ACID properties

b) Starvation properties

c) Preemption properties

d) Non-Preemption properties.

xi) The ability to hide the details of storage structure of database from user applications is known as

a) physical data independence

b) logical data independence

c) external data independence

d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following : 3 × 5 = 15

2. What is Data dictionary ? What do you mean by unary operations in Relational algebra ? Give example. 1 + 4

3. Explain two-phase locking Protocol.

4. Consider the relation R = { A,B,C,D,E,F,G,H,I,J } and the set of functional dependencies :

F = { AB → C, A → DE, B → F, F → GH, D → IJ } Decompose R into 3 NF.

5. Insert the following elements in B-tree of order 4 :

65 66 70 71 74 80 91 81 99 82 75 77 89 56

6. a) What is the difference between immediate updation and deferred updation of database ?

b) Write down the utility of checkpoint mechanism in log based recovery. 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Consider the relational schema where the primary keys are underlined.

Employee (person-name, street, city)

Works (person-name, company-name, salary)

Company (company-name, city)

Manages (person-name, manager-name)

Give an expression in the relational algebra to express each of the following queries.

i) Find the name and cities of residence of all employees who work for TCS.

ii) Find the names of all employees who live in the same city and the same street as do their managers.

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iii) Find the names of all employees in this database who do not work for TCS.

iv) Find the names of all employees who earn more than every employee of Infosys.

b) How does BCNF differ from 3NF ? Explain with a suitable example.

c) What is the need for de-normalization ?

d) Explain outer join. 6 + 4 + 2 + 3

8. a) Describe ACID properties of a transaction.

b) In a concurrent schedule when do two instructions conflict ?

c) Why deadlock cannot be occurred in timestamp based protocol ?

d) What is cascading rollback ? 4 + 4 + 4 + 3

9. a) Construct an ER diagram for a hospital with a set of patients and a set of doctors. Associate with each paitent a log of the various tests on examination conducted.

b) Explain Generalization, Specialization and aggregation.

c) Explain entity integrity and referential integrity constraints on database. 6 + 6 + 3

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10. a) What is B^+ tree ?

    b) Explain the structure of B^+ tree index with the help of a suitable diagram.

    c) What is the difference between vertical and horizontal fragmentation ?

    d) What is trigger in SQL ? 2 + 6 + 4 + 3

11. Write short notes on any *three* of the following : 3 × 5

    a) Query optimization

    b) Relation Decomposition

    c) Features of tuple relational calculus.

    d) Level of data abstraction

    e) Spurious tuple and dangling tuple.