KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

10 JUL 2023

Level : B.E./B.Sc.
Year : II
Time : 2 hrs. 30 mins.

Course : COMP 232
Semester : II
F. M. : 40

SECTION "B"
[6 Q.× 4 = 24 marks]

Attempt *ANY SIX* questions.

1. How does the database design process differ in relational databases versus non-relational databases (NoSQL)?

2. Explain the situations that arise with Concurrent executions in Database management system and discuss some common techniques used for concurrency control. [2+2]

3. Explain the concept of database recovery in a database management system (DBMS). Discuss some common database recovery techniques used to ensure data durability and availability. [2+2]

4. Taking references with the graph shown in Figure 1, answer the following questions.
   a. Write a Cypher Query to create the above graph Database.
   b. Write a Cypher Query to check whether the particular name exist in the list or not.

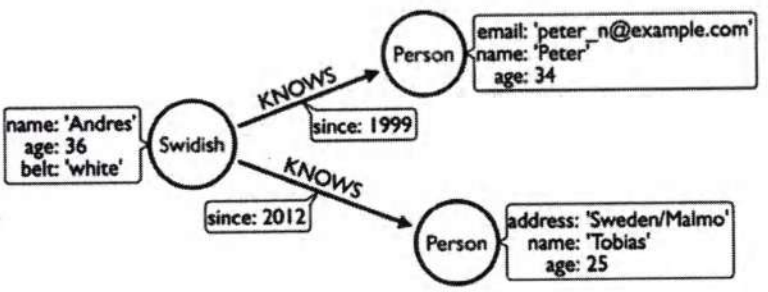

Figure 1: Graph

5. Define the terms schema, tuple, domain and cardinality in DBMS.

6. Discuss the different types of SQL language. Write a SQL query to calculate the average salary of employees in each department, along with the total number of employees in that department. [2+2]

7. State whether the schedule given below is serializable or not. If not state which instruction(s) should be removed else show the conflict equivalent. [2+2]

T_1	T_2
read (A)	
$A := A - 50$	
write (A)	
	read (A)
	$temp := A * 0.1$
	$A := A - temp$
	write (A)
read (B)	
$B := B + 50$	
write (B)	
commit	
	read (B)
	$B := B + temp$
	write (B)
	commit

Figure: Schedule

SECTION "C"
[2 Q. × 8 = 16 marks]

Attempt *ALL* questions.

8. Based upon the Database schema and dependencies given below, explain how does the normalization help in the minimization of redundancy in Database Management System.

R(Project_code,Project_title, Project_Manager, Project_budget, Emp_no, Emp_name, Dept_no, Dept_name,Hourly_rate).

Dependencies:

Project_code,Project_Title→Project_budget,
Project_code,Emp_no→Hourly_rate
Emp_no→Ename,Dept_no
Dept_no→Dept_name
Emp_no, Project_code→Project_manager
Project_code→Project_title

9. How does the process of conceptual modeling using an entity relationship diagram (ERD) facilitate the accurate representation and understanding of complex data structures in a database management system (DBMS)? Discuss the significance of each component of an ERD and explain how they contribute to the overall integrity and efficiency of a database system. [4+4]

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SECTION "A"
[20 Q. × 0.5 = 10 marks]

Mark **[X]** in the most appropriate option. All symbols have their usual meanings.

1. Every weak entity must be associated with an identifying entity; that is, the weak entity is said to be_____ on the identifying entity set.
   [ ] Existence dependent [ ] Discriminator
   [ ] Acceptance dependent [ ] Primary dependent

2. Which one of the following features does not belongs to the extended E-R features in the Entity Relationship Diagram?
   [ ] Ternary relationship [ ] Inheritance
   [ ] Specialization [ ] Aggregation

3. Which of the following statement/s is/are true regarding the Projection Operator in relational algebra?
   [ ] The projection operator in relational algebra output specified attributes from all rows of the input relation removing the duplicates tuples from the output.
   [ ] The projection operator in relational algebra output specified attributes from all rows of the input relation retaining the duplicates tuples from the output.
   [ ] The projection operator in relational algebra output pairs of two input relations that have the same value on all attributes that have the same name.
   [ ] The projection operator in relational algebra output pairs of two input relations that have the different value on all attributes that have the different name.

4. Which one of the following patterns matches all the strings beginning with "ab\cd" in SQL operation?
   [ ] like 'ab\\cd%' escape '\' [ ] like 'ab\%cd%' escape '\'
   [ ] like 'ab//cd%' escape '\' [ ] like 'ab\%cd%' escape '\'

5. After a transaction completes successfully, the changes it has made to the database persist, even if there are system failure is best illustrated by the _____ transactional properties.
   [ ] Atomicity [ ] Consistency [ ] Isolations [ ] Durability

6. The failed transaction state will eventually enters to the _____ state which can be further go ahead by either _____ or _____.
   [ ] Aborted, Restart, Kill [ ] Partially committed, Abort, Kill
   [ ] Deadlock, Abort, Wait [ ] Deadlock, Kill, Abort

7. Transaction I and J conflict if they are operated by _____ transactions on the _____ data item, and at least one of these instructions is _____ operation.
[ ] different, same, write
[ ] same, different, read
[ ] same, same, write
[ ] different, different, write

8. Schema is defined by:
[ ] DML [ ] DDL [ ] DCL [ ] DQL

9. The technique on which the transaction modifies the database after it has executed the commit statement is referred as _____ technique.
[ ] immediate- modification
[ ] deferred-modification
[ ] Undo/Redo modification
[ ] shadow upgrade modification

10. Which one of the following database system does not fall under the document based NoSQL database?
[ ] Mongo DB [ ] Couch DB [ ] Raven DB [ ] Cassendra DB

11. Which one of the statement is **TRUE** regarding the cypher Query Language?
[ ] Cypher language focuses on the clarity of expressing what to retrieve from a graph, not on how to retrieve it.
[ ] Cypher language focuses on the clarity of both expressing what to retrieve from a graph and how to retrieve it also.
[ ] Cypher language focuses on the clarity of expressing how to retrieve from a graph, not on what to retrieve.
[ ] Cypher language focuses on the clarity of expressing the methods of retrieval of the desired data optimally.

12. Which one of the following is the equivalent graphical path representation of (a)- [*2]→(b) in Neo4j.
[ ] (a)→( )→(b)
[ ] (a)→( )→( )→(b)
[ ] (a)→(*)→(b)
[ ] (a)→(*..*) →(b)

13. Rollback in a database management system is a _____ statement.
[ ] Data Definition language
[ ] Data manipulation Language
[ ] Transaction control language
[ ] Data control Language

14. In SQL, which command is used to remove a stored function from the database?
[ ] Remove Function
[ ] Delete Function
[ ] Drop Function
[ ] Truncate Function

15. When an entity instance may be a member of multiple subtypes or it does not have to be a member of a subtype, it is which of the following?
[ ] Disjoint with total specialization
[ ] Disjoint with partial specialization
[ ] Overlap with total specialization
[ ] Overlap with partial specialization

16. Pick the correct number of super keys of R if a relation R (A,B,C,D,E) with the functional dependencies exist.
ABC -> DE and D -> AB
[ ] 2 [ ] 7 [ ] 10 [ ] 12

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17. he idea of subclass in object oriented programming is represented by _____ relationship in DBMS system.
[ ] Binary [ ] ISA [ ] n-ary [ ] symmetric

18. Which one of the following statement is **FALSE** regarding operation on NULL?
[ ] When we operate on a NULL and another value (including another NULL) using,, etc., the result is NULL
[ ] Aggregate functions ignore NULL
[ ] NULL and ZERO value are manipulated in different sense.
[ ] COUNT, like aggregate function, ignores NULL in SQL statement.

19. Which of the line will produce error in the following query?

```
Line1:  Create Table students
Line2:  { roll_no int not Null,
Line3:  std_name varchar2(20) unique,
Line4:  std_dob date,
Line5:  Primary key (roll_no)
Line6:  );
```

[ ] Line 2 [ ] Line 3 [ ] Line 4 [ ] Line5

20. An entity in A is associated with at most one entity in B. An entity in B, however, can be associated with any number (zero or more) of entities in A is defined by_____ relation.
[ ] One to One [ ] One to Many [ ] Many to One [ ] Many to Many