NAME: KUPPA VENKATA KRISHNA PAANCHAJANYA
Regn. No: 19BCS063

Database Management Systems End-Sem Examination

Q1) The company XYZ intends to store it's employee data in a heap file with a clustered index on the empname field. It is to be noted that a heap is a table with no clustered indices. Data is stored without specifying any order to store the rows efficiently.

Thus, it is not possible to store data in a heap file with a clustered index on a field.

Alternatively, it is completely possible to store the data with an index on empid field because it eventually becomes a primary index and thus, nonclustered indices are allowed in heap files. We can even keep indices on both empname and empid fields if used unclustered.

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We can even store it as a field sorted by the attribute empid using the sorted file method where, new record is always inserted at the file's end, and then it will sort the sequence in an ascending or descending order based on a key (primary or any others).

Q2)
- DDL is important in designing database schemas because it is used to describe data structures and consistency constraints.
- DML is used to access and manipulate data; it is not important for representing data

Q3) Since a database management system usually

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Provides Concurrent access to many users at a time, transactions from these users can be interleave to improve the user's query execution time. Thus, parallel scheduling of transactions occur and users thereby do not have to wait for other user's transactions to completely fully before their own transaction begins

TRUE.

Q4) a) A user should guarantee that any data query he causes to process should not tamper with the current state of DBMS to cause eventual server crash. Also, he needs to make sure any transaction committed

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to the database must change affected data in allowed ways only. It must be completely valid according to all predefined rules, constraints, etc.

b) A DBMS must guarantee that transactions are executed completely and independent of other transactions abiding the 'Isolation' of ACID property and 'Atomicity' of ACID property. Thus, a transaction must execute either completely or none and should be isolated from other transaction activities occuring concurrently. This ensures that the DBMS remains consistent.

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Q5) Yes, we can determine the primary key of a relation with the help of an instance. We can consider the column with unique values and no null values as a key. Also, we can figure out Candidate keys using Closure of functional dependencies.

Q6) a) Create Clustered Index empname-index ON Student(Name DESC);

Select email from Students;

This query displays all names in descending order. First table gets sorted and then email display in that order

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Q7) Relational Algebra:

$\rho_{R_1}(Catalog)$

$\rho_{R_2}(Catalog)$

$\Pi_{R1.pid}(\sigma_{R_1.Pid = R2.Pid \wedge R1.sid != R2.sid}(R1 \times R2))$

SQL QUERY:

```
SELECT R1.pid FROM Catalog as R1 CROSS JOIN Catalog as R2
    WHERE R1.pid = R2.pid AND R1.sid <> R2.sid;
```

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Q8) $\Pi_{sname}(\Pi_{sid}((\sigma_{color='red'} Parts) \bowtie (\sigma_{cost<100} Catalog) \bowtie Supplies))$

Catalog:

SID	PID	cost
1	1	₹10
1	2	₹20
2	3	₹30
2	4	₹40

Parts:

PID	Pname	Color
1	Red1	Red
2		
3	Green1	Green
4	Blue1	Blue
	Yellow1	Yellow

SID	SName	Address
1	Krishna	Hyderabad
2	Suvarna	Delhi

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OUTPUT: $\sigma_{color='red'}$ Parts $\bowtie$ $\sigma_{cost<100}$ Catalog $\bowtie$ Supplies :

PID	Pname	Color	SID	Cost	Sname	Address
1	Red 1	Red	1	₹10	Krishna	Hyderabad

Now, Projection on sid gives 1 but further Sname cannot be accessed. Thus, it is an invalid query.

Q9)

```
CREATE VIEW RetiredEmp (eid, ename, age, salary) AS
    SELECT E.eid, E.ename, E.age, E.salary FROM Emp
    as E WHERE E.age >60;
```