

① Using empname as a clustered index is possible only when every employee will have a unique name. If this is ensured, the tuples will be organized according empname alphabetically

Using empid a clustered index is possible ~~only when every employee with~~ considering everyone already has a unique id assigned to them. The tuples will be organized accordingly to empid.

Using both empname & empid as a clustered indexes may not be possible but it is possible two hand one clustered index & one non-clustered index.

- ② • DDL is important in representing information
in DBMS because it is used to describe
external and logical schemas.
- DML is used to access and update data;
it is not important for representing the
data.

- ③ True, because a DBMS is typically shared among many users. Transactions from these users can be interleaved to improve the execution time of user's queries. By interleaving queries, users do not have to wait for other user's transactions to complete fully before their own transaction begins. Without interleaving, if user A begins a transaction that will take 10 seconds to complete and user B wants to begin a transaction, user B would have to wait an additional 10 seconds for user A's transaction to complete before the ~~db~~ database would begin processing user B's request.

- ④ a) A user must guarantee that his or her transaction does not corrupt data or insert nonsense in the database. For example, in a banking database, a user must guarantee that a cash withdraw transaction accurately models the amount a person removes from his or her account. A database application would be worthless if a person removed 20 dollars from an ATM but the transaction set their balance to zero.
- b) A DBMS must guarantee that transactions are executed fully and independently of other transactions. An essential property of a DBMS is that a transaction should execute automatically, or as if it is the only transaction running. Also, transactions will either complete fully, or will be aborted and the database returned to its initial state.

⑤ Yes, we can determine the key of relation with the help of instance.

Ex:- In a one to many relation we can consider the column/attribute with unique values as a primary key.

7) Relational Algebra:-

$$P(R_1, \text{Catalog})$$

$$P(R_2, \text{Catalog})$$

~~$$\pi_{R_1.pid} \sigma_{R_1.pid = R_2.pid \wedge R_1.sid \neq R_2.sid} (R_1 \times R_2)$$~~

$$\pi_{R_1.pid} \sigma_{R_1.pid = R_2.pid \wedge R_1.sid \neq R_2.sid} (R_1 \times R_2)$$

SQL:-

```
SELECT    C.sid  
  
FROM      Catalog C  
  
WHERE     EXISTS (SELECT C1.sid  
  
                  FROM Catalog C1  
  
                  WHERE C1.pid = C.pid AND  
  
                        C1.sid  $\neq$  C.sid)
```

⑧ Invalid query.

Explanation:- This relational algebra statement does not return anything because of the sequence of projection operators. Once the sid is projected, it is the only field in the set. Therefore, projecting on same will not return anything.