CS310 - DBMS
End Term Exam

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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 organised according empname alphabetically.
- Using empid as a clustered item is definitely possible, considering everyone already has a unique id assigned to them. The tuples will be organized accordigly to empid.
- Using both empname and empid as clustered indexes may not be possible, but possible when every employee has a unique name. one will be clustered and the other is non-clustered index.

2.

- DDL is important in representing information because its used to describe external and logical schemas.
- DML is used to access and update data, not important for representing data.

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3. True.

Since a DBMS is typically shared among many users, the transactions from these users can be interleaved to improve the execution time of user's queries. So by interleaving queries, users don't have to wait for other user's transactions to complete fully before their own transaction begins. Without it there will be a delay in processing other's request since the first user's transaction is begun and being processed.

4.

a. A user must guarantee that his/her transaction doesn't 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/her account.

b. A DBMS must guarantee that transactions are fully executed fully and independently of other transactions. An essential property of a DBMS is that a transaction should execute atomically, or as if it is the only transaction running. Also, transactions will either complete fully, or will

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be aborted and the database returned to it's initial state. This will ensure that the database remain consistent.

5. Yes, we can determine the key of relation with the help of instance. E.g. In a one to many relation we can consider the column/attribute with unique values as a Primary key.

6.

Student ID	Student name	Email	Age
1005	Krishna	Krishna@pqr.com	22
1030	John	Null	23
1020	John	Jh@pxyz.com	22

7. SQL query:-

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

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7. Let the two supplies be R_1, R_2:

P(R1, catalog)

P(R_2, catalog)

$\Pi\, R_1.pid \sigma R_1.pid = R2.pid \wedge R_1.sid != R2.sid\,(R1 \times R_2)$

Using the following:

SID	PID	Cost
1	1	1000
2	1	2000
2	3	3000
3	1	4000

$R_1 \times R_2$ gives us:

SID	PID	cost	SID	PID	Cost
1	1	1000	1	1	1000
1	1	1000	2	1	2000
1	1	1000	2	3	3000
1	1	1000	3	1	4000
2	1	2000	1	1	1000
2	1	2000	2	1	2000
2	1	2000	2	3	3000
2	1	2000	3	1	4000
2	3	3000	1	1	1000
2	3	3000	2	1	2000
2	3	3000	2	3	3000
2	3	3000	3	1	4000
3	1	4000	1	1	1000
3	1	4000	2	1	2000
3	1	4000	2	3	3000
3	1	4000	3	1	4000

$\sigma R_1.pid = R_2.pid$ gives us:

SID	PID	cost	SID	PID	Cost
1	1	1000	1	1	1000
1	1	1000	2	1	2000
1	1	1000	3	1	4000
2	1	2000	1	1	1000
2	1	2000	2	1	2000
2	1	2000	3	1	4000
2	3	3000	2	3	3000
3	1	4000	1	1	1000
3	1	4000	2	1	2000
3	1	4000	3	1	4000

$\sigma R_1.pid = R_2.pid \wedge R_1.sid != R_2.sid$ gives us:

SID	PID	cost	PID	cost
1	1	1000	2	2000
1	1	1000	3	3000
2	1	2000	1	1000
2	1	2000	3	3000
3	1	3000	1	1000
3	1	3000	2	2000

Projecting on PID gives us a single part number — 1 (eliminating all duplicates).

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8. $\Pi_{sname}(\Pi_{sid}((\sigma_{color='red'}(parts)) * (\sigma_{cost<100}(catalog)) * suppliers))$.

Invalid query.

(Explanation:- This relational algebra statement doesn't return anything because of sequence of projection operators. projecting on only field in the set after sid is projected, will not return anything).

9. The following view on Emp can be updated automatically by updating Emp:

```
CREATE VIEW Senior Emp (eid, name, age, salary)
AS SELECT E.eid, E.ename, E.age, E.salary.
E.salary FROM Emp E
    WHERE E.age > 50.
```