1)

The company XYZ intends to store its employee data in a heap file with a clustered index on the emp name field. It is to be noted that a heap is a table with two clustered indexes. Data is stored without specifying any orders to store the row efficiently.

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

Alternatively, it is completely possible to store data with empid field because it eventually becomes a primary index and thus, non clustered indices are ~~allocate~~ allowed a heap file.

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2) a) DDL is important in Representing information in DBMS because, it is used to describe External and Logical schemes

b) DML is used to Modify and Manipulate data, it is not important for Representing the Data

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3) TRUE

DBMS interleave the actions of different transactions instead of executing transactions one after the other.

Justification:

Usually DBMS is shared among many users. Transactions from these users can be interleaved to improve the execution time of users queries. By interleaving queries users donot have to wait for other users transactions to complete fully before theirown transaction begins. Without interleaving, if user1 begins a transaction that will take 15 seconds to complete and user2 wants to begin a transaction, user2 would have to wait an additional 15 seconds for user1's transaction to complete before the database would begin processing user2's request. It is to increase the transaction troughput. Assume that there are five billing machines in some clothstore and all these machines are connected to a database server. If the server handles transactions in serial order i.e, one after other then use of 5 billing machines is of mere waste. If many transactions are able to be executed simultaneously by server, then we would add more billing machines and able to generate many bills

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4)

a) A user must guarantee that his or her transaction does not corrupt data or insert nonsense in the database.

for ex: 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 databes application would be worthless if a person removed 2000/- from an ATM but the transaction set their balance to zero.

b) A DBMS must guarantee that transactions are executed completely and independently of other transactions. An essential property of DBMS is that a transaction should execute atomically, or as if it is the only transaction running. Also transactions will either be completed or will be aborted and the database returned to its initial state. This ensures that the database remains consistant.

5) Yes, we can determine the key of relation with the help of instance eg: In a one ~~of~~ to many relation we can consider the column / attribute with unique values as a primary key

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c) a) Create a clustered index Ix_empname_index ON STUDENT Table (StudentName DESC)

" Select email from STUDENTTable"

This query displays all emails in the descending order of the studentname. First the table gets sorted based on studentname in DESC order then the select query displays the emails in that order

b)

Student ID	StudentName	Email	Age
1005	krishna	krishna@pg.com	22
1030	John	Null	23
1020	John	Jh@xyz.com	22

7. Let the two suppliers be R_1, R_2:

$R(R_1, catlog)$
$R(R_2, catlog)$

$\Pi_{R1.pid}\ \sigma_{R1.pid = R2.pid \wedge R1.sid != R2.sid}(R_1 \times R_2)$

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

SQL:

```
SELECT  C.sid
FROM    Catalog C
WHERE   EXISTS ( SELECT C1.sid
FROM    Catalog C1
WHERE   C1.pid = ( pid AND  C1.sid = 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 some will not return anything.