#### **1) What are the 5 major components of the DBMS environment?**

Hardware, Software, Data, Procedures, Database Access Language

#### **2) List at least 5 advantages and 5 disadvantages of DBMS (in short, no long essays needed).**

#### **Reducing Data Redundancy**

The file based data management systems contained multiple files that were stored in many different locations in a system or even across multiple systems. Because of this, there were sometimes multiple copies of the same file which lead to data redundancy.

This is prevented in a database as there is a single database and any change in it is reflected immediately. Because of this, there is no chance of encountering duplicate data.

#### **Sharing of Data**

In a database, the users of the database can share the data among themselves. There are various levels of authorisation to access the data, and consequently the data can only be shared based on the correct authorisation protocols being followed.

Many remote users can also access the database simultaneously and share the data between themselves.

#### **Data Integrity**

Data integrity means that the data is accurate and consistent in the database. Data Integrity is very important as there are multiple databases in a DBMS. All of these databases contain data that is visible to multiple users. So it is necessary to ensure that the data is correct and consistent in all the databases and for all the users.

#### **Data Security**

Data Security is vital concept in a database. Only authorised users should be allowed to access the database and their identity should be authenticated using a username and password. Unauthorised users should not be allowed to access the database under any circumstances as it violates the integrity constraints.

#### **Privacy**

The privacy rule in a database means only the authorized users can access a database according to its privacy constraints. There are levels of database access and a user can only view the data he is allowed to. For example - In social networking sites, access constraints are different for different accounts a user may want to access.

#### **Backup and Recovery**

Database Management System automatically takes care of backup and recovery. The users don't need to backup data periodically because this is taken care of by the DBMS. Moreover, it also restores the database after a crash or system failure to its previous condition.

#### **Data Consistency**

Data consistency is ensured in a database because there is no data redundancy. All data appears consistently across the database and the data is same for all the users viewing the database. Moreover, any changes made to the database are immediately reflected to all the users and there is no data inconsistency

**3) DML allows users to:**

D) All above

**4) Which of the following is Database Language:**

D) All above

**5)**

**a. Write the DDL to create the table Employee.**

CREATE TABLE Employee(

Employeeld INTEGER PRIMARY KEY,

firstName VARCHAR(50) NOT NULL,

lastName VARCHAR(50) NOT NULL,

Title VARCHAR(50) NOT NULL,

Email VARCHAR(100) NOT NULL,

Managerld INTEGER NOT NULL,

Departmentld INTEGER NOT NULL,

FOREIGN KEY(Departmentld ) REFERENCES Department(departmentld)

)

**B) List only the emails of managers which have 5 or more employees reporting directly to them. " Manager" is a value in the "title" attribute. The email should be printed just once.**

[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **email FROM employee WHERE employeeld** [**IN**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/comparison-operators.html#function_in) **(**[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **managerld FROM `employee` WHERE managerld** [**IN**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/comparison-operators.html#function_in) **(**[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **employeeld FROM `employee` where title='Manager') GROUP BY managerld HAVING** [**COUNT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/group-by-functions.html#function_count)**(employeeld) > 4)**

**C) Update the title of managers ("manager" is a value in the "title" attribute) which have 10 or more employees reporting directly to them to say "director".**

[**UPDATE**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/update.html) **employee** [**SET**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/set.html) **title="director" WHERE employeeld** [**IN**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/comparison-operators.html#function_in) **(**[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **managerld FROM `employee` WHERE managerld** [**IN**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/comparison-operators.html#function_in) **(**[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **employeeld FROM `employee` where title='Manager') GROUP BY managerld HAVING** [**COUNT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/group-by-functions.html#function_count)**(employeeld) > 9)**

**D) List the name and (total) revenue of the department which brought in the most revenue (the revenue of a department is the sum of all the invoices made by all employees working in this department).**

[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **d.name,**[**SUM**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/group-by-functions.html#function_sum)**(amount) FROM `invoice` c INNER JOIN (**[**SELECT**](http://localhost/phpmyadmin/url.php?url=https://dev.mysql.com/doc/refman/5.5/en/select.html) **a.name,b.departmentId,b.employeeId FROM `department` a INNER JOIN `employee` b ON a.departmentId=b.departmentId) d ON c.employeeId=d.employeeId GROUP BY d.departmentId**

**6) Your name**

**7) You are the DBMS expert at a small business\_ "The SQL bank", a place where people come to borrow money for their needs. Design the database (create the E-R diagram) and show the tables and the relationship between the tables. A few queries that your design should be able to answer are: Which customers have a loan greater than 10000 USD What is the average interest rate across all accounts at the bank How many loans have been paid off last year.**

**8) Explain the concept of "Referential integrity constraint".**

**A) How referential integrity is created between tables**

In relationships, data is linked between two or more tables. This is achieved by having the foreign key reference a primary key. Because of this, we need to ensure that data on both side of the relationship remain intact.

So, referential integrity requires that, **whenever a foreign key value is used it must reference a valid, existing primary key in the parent table.**

**B) Examples of actions (sql commands) which can violate the constraint.**

**C) How Sql server can help in avoiding the violation of the integrity constraint? It is more than just "returning an error"**

**9) Explain the "Rishi Devata and Chandas" (knower, known and the process of knowing) SCI concept and how it is manifested in the DBMS world.**