DBMS : DATABASES

- DBMS stands for Database Management System
- A DBMS is the technology solution that allows for a more structured approach to storing and retrieving data from a database and otherwise managing the database.

- A DBMS takes care of the structuring of the data as well as the details of how the data is saved on the respective physical medium.
- These details, which make up the internal schema, is dependent on the DBMS used
- However, another type of schema, the logical schema, which dictates how the database is to be structured (ie. what tables, columns, relations, etc.) is independent of the DBMS used.

- DBMS' also utilize data dictionaries to store metadata about the database which includes the definition of the tables, attributes, relations between tables, indexing, entry validation rules, and other such details

↳ The use of a data dictionary improves the integrity of the data in the database, making it more accurate and consistent.

Q. How does use of a DBMS solve the following problems?

a) Data Redundancy

When a DBMS is used, related data stored in separate tables can be linked by using primary and foreign keys. This prevents the related data being stored in multiple tables where it may be relevant (ie. first name of a student may be relevant in the STUDENT table as well as in the DEANS_LIST table)

Since data is mostly only stored once, data redundancy is reduced

Note: "Mostly" - because data items being used as foreign keys to link tables (ie. IDs) will be stored more than once

b) Data Inconsistency

Since data is now being mostly stored only once, the chances of data inconsistency are also greatly reduced

↳ As such, the data integrity is also improved

Note: The DBMS software typically has safe-guards in place, which either prevent foreign keys from being updated or are automatically updated everywhere else if updated at one location.

c) Data Dependency

- Since the structure of the data is being managed by the database, the data is completely independent of the programs that utilize it
- Altering the structure of the database will not affect any programs that do not

utilize the altered fields/tables.

SECURITY MEASURES PROVIDED BY A DBMS:

i) Using usernames and passwords to prevent unauthorized access to the database

ii) Using access rights / permissions to manage the actions authorized users can take

iii) Using access rights / permissions to manage the parts of the database that are visible to certain users (ie. external user can be prevented from viewing table of sensitive data)

iv) Automate scheduling and creation of regular backups

v) Encryption of the data stored

vi) Automatic creation of an audit trail or activity logs to record the actions taken by the users of the database