⑥ ① There are many algorithms for executing a select operation, which is basically a search operation to locate the records in a disk file that satisfy a certain condition. Some of the search algorithms depends on the file having specific access path and they may apply only to certain types of selection conditions. Now take an example to discuss algorithm.

OP1 : $\sigma_{SSN = '123456789'}$ (Employee)
OP2 : $\sigma_{DNumber > 5}$ (Department)
OP3 : $\sigma_{DNo = 5}$ (Employee)
OP4 : $\sigma_{DNo = 5 \text{ AND } Salary > 30000}$ (Employee)
OP5 : $\sigma_{ESSN = '123456789' \text{ AND } PNo = 10}$ (Works_On)

Now, here are the examples of some search method -

- S1 - Linear Search → Retrieve every record in the file and test whether its attribute values satisfy the selection condition.

- S2 - Binary Search → If the selection condition involves an equality comparison on a key attribute on which the file is ordered, binary search can be used.

- S3 - Single Record Search → If the selection condition involves an equality comparison on a key attribute with a primary index, use the primary index to retrieve the record.

- S4 - Multiple Search → If the comparison condition

is >, ≥, < or ≤ on a key field with a primary index, use the index to find the record satisfying the corresponding equality condition, then retrieve all subsequent records in the file.

- S5 - Multiple Search (Clustering) → If the selection condition involves an equality comparison on a non-key attribute with a clustering index, use the clustering index to retrieve all the records satisfying the selection condition.

- S6 - Range Query → To be used to retrieve records on conditions involving >, >=, < or <=. Can also be used for an equality comparison, for single record search if the indexing field has unique values or to retrieve multiple records if the indexing field is not a key.

- S7 - Conjunctive Selection → If an attribute involved in any single condition in the conjunctive condition has an access path that permits the use of one of the most methods S2 to S6, use that condition to retrieve the records and then check whether each retrieved record satisfies the remaining simple conditions in the conjunctive condition.

b) Mobile and Multimedia databases are given as :-

① Mobile Databases : They are separate from the main database and can easily be transported to various places. Even though they are not connected to main database, they can still communicate with the database to share and exchange data.

Advantages : i) The data in the database can be accessed from anywhere using a mobile database. It provides wireless database access.

ii) The database systems are synchronized using mobile databases and multiple users can access the data with seamless delivery process.

iii) Mobile databases require very little support and maintenance.

iv) The mobile database can be synchronized with multiple devices such as mobiles, computer devices, laptop etc.

Disadvantages : i) The mobile data is less secure than data that is stored in a conventional stationary database. This presents a security hazard.

ii) The mobile unit that houses a mobile database may frequently lose power because of limited battery. This should not lead to loss of data in database.

② Multimedia Databases : They are used to store multimedia data such as

images, animation, audio, video along with text. This data is stored in the form of multiple file types like .txt, .jpg, .mp3 etc.

Challenges Of Multimedia Database :

i) Multimedia Database contains data in large type of formats such as .txt, .jpeg, .mp3, .mp4 etc. It is difficult to convert one type of data format to another.

ii) The multimedia database requires a large size as the multimedia data is quite large and needs to be stored successfully in the database.

iii) It takes a lot of time to process multimedia data so multimedia database is slow.