**Lab 11**

1. What is meant by granularity? Give examples.
   Ans:-
   -Size of data items chosen as *unit of protection* by
   concurrency control protocol
   E.g.: The entire Database, a file ,a page, record ,a file value of a record.

2. Discuss the types of failures that may occur in a database environment. Explain why it is important for a multi-user DBMS to provide a recovery mechanism.
   Ans:-

- System crash due to h/w or s/w errors resulting in loss of main memory
- Media failures such as head crash, resulting in loss of parts of secondary storage.
- Application software errors causing one or more transaction fail
- Natural physical disasters, carelessness or unintentional destruction of data by users or operators

ALL the above cause of failures has two principal effects

- The loss of main memory (database buffers)
- Loss of the disk copy the DB

If an organization faces system outages or data loss, a full database recovery could cause serious operational delays. To shorten the time it takes to restore data and systems, database backups should be performed on a regular basis.

3. Discuss how the log file (or journal) is a fundamental feature in any recovery mechanism.
   Ans:-

   Because log file to be made at regular interval without a need to stop the system first to back up the copy. And the backup copy is used in the event DB is damaged or destroyed.

   Explain what is meant by forward and backward recovery and describe how the log file is used in forward and backward recovery.
   Ans:-

Roll Forward (redo):- if transaction commit and failure occcure when buffer began flushing to secondary storage, the recovery manager don't need to undo it b/c it is already commited. Therefore recovery manager will Roll forward it.

Roll backward (Undo):- if transaction not commited and failure occcure, the recovery manager need to undo it b/c it is not commited but it may affect the data on the DBMS.

Therefore recovery manager will Roll forward it.

4. What is the significance of the write-ahead log protocol? How do checkpoints affect the recovery protocol?

Ans:-

When log records are written before the corresponding write to the database, we call it write-ahead log protocol. If updates were made to the database first and failure occurred before the log record was written, then the recovery manager would have no way of undoing (or redoing) the operation. By limiting the amount of searching and subsequent processing that we need to carry out on the log file.

5. Compare and contrast the deferred update and immediate update recovery protocols.

Ans:-

**deferred update:-**

- Updates are not written to the database until after a transaction has reached its commit point.
- no undoing of changes required.
- May be necessary to redo updates of committed transactions

**immediate update:-**

- Updates are applied to database as they occur without waiting to reach the commit point.
- May need to undo effects of transactions
- Need to redo updates of committed transactions