1. Which of the following statements best defines database recovery in DBMS?
   1. The process of restoring data from backup tapes
   2. The process of ensuring that the database remains secure
   3. **The process of restoring the database to a consistent state after a failure**
   4. The process of recovering deleted data from the Recycle Bin
2. Which of the following is NOT a common reason for the need of database recovery?
   1. Hardware failures
   2. Software bugs
   3. Human errors
   4. **Data compression techniques**
3. Which of the following is an example of a logical error in a database?
   1. A power outage that causes data corruption
   2. **Accidental deletion of important records**
   3. A hard disk failure that results in data loss
   4. Unauthorized access to the database
4. Which type of error occurs when the database crashes while a transaction is being executed?
   1. **System error**
   2. Media error
   3. Transaction error
   4. Operator error
5. Which of the following recovery techniques ensures that all the changes made by a transaction are either committed or rolled back?
   1. Undo logging
   2. Redo logging
   3. Deferred update
   4. **Immediate update**
6. Which recovery technique uses a log file to record all the changes made to the database?
   1. Checkpointing
   2. Shadow paging
   3. Deferred update
   4. **Log-based recovery**
7. Which of the following recovery techniques uses checkpoints to minimize the time required for recovery?
   1. Undo logging
   2. Redo logging
   3. Deferred update
   4. **Checkpointing**
8. Which recovery technique requires that the transaction redo all its changes during the recovery process?
   1. Undo logging
   2. **Redo logging**
   3. Deferred update
   4. Shadow paging
9. Which of the following is a disadvantage of the shadow paging recovery technique?
   1. **Increased disk space requirement**
   2. Slower recovery process
   3. Limited support for concurrent transactions
   4. Difficulty in implementing locking mechanisms
10. Which recovery technique uses backward recovery to undo the changes made by a failed transaction?
    1. **Undo logging**
    2. Redo logging
    3. Deferred update
    4. Immediate update
11. Which of the following recovery techniques requires the use of Write-Ahead Logging (WAL)?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Immediate update
12. Which type of error occurs when the data written by a transaction is not yet permanently stored on the disk and a failure happens?
    1. System error
    2. **Media error**
    3. Transaction error
    4. Operator error
13. Which recovery technique guarantees that a committed transaction's changes survive a crash and are not lost?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Immediate update
14. Which of the following statements is true about deferred update recovery technique?
    1. It requires more disk space for logging.
    2. **It provides better concurrency control.**
    3. It guarantees immediate crash recovery.
    4. It is also known as shadow paging.
15. Which recovery technique requires the use of compensation transactions to undo the changes made by a failed transaction?
    1. **Undo logging**
    2. Redo logging
    3. Deferred update
    4. Immediate update
16. Which of the following recovery techniques is based on maintaining multiple copies of the database at different points in time?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Replication**
17. Which type of error occurs when a user accidentally executes the wrong SQL statement?
    1. System error
    2. Media error
    3. Transaction error
    4. **Operator error**
18. Which recovery technique requires that the entire database be restored from a previous backup after a failure?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Full recovery**
19. Which of the following recovery techniques is commonly used in distributed databases to ensure fault tolerance?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Replication**
20. Which type of error occurs when the database is damaged due to a disk crash?
    1. System error
    2. **Media error**
    3. Transaction error
    4. Operator error
21. Which recovery technique requires that transactions be logged in reverse order during the recovery process?
    1. **Undo logging**
    2. Redo logging
    3. Deferred update
    4. Immediate update
22. Which of the following is NOT a disadvantage of the log-based recovery technique?
    1. Increased disk I/O overhead
    2. Slower transaction processing
    3. Increased disk space requirement
    4. **Limited support for concurrent transactions**
23. Which recovery technique ensures that the changes made by a committed transaction survive a crash?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Immediate update
24. Which type of error occurs when an authorized user accidentally modifies or deletes important data?
    1. System error
    2. Media error
    3. Transaction error
    4. **Operator error**
25. Which recovery technique is suitable for databases with large amounts of write-intensive operations?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Shadow paging
26. Which of the following recovery techniques provides the best performance for read-intensive workloads?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Shadow paging**
27. Which recovery technique uses write-ahead logging to ensure that all changes are recorded before they are applied to the database?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Immediate update
28. Which of the following recovery techniques requires the transaction logs to be stored on a separate device from the database?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Shadow paging
29. Which recovery technique guarantees immediate crash recovery but may result in a high number of disk I/O operations?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Immediate update**
30. Which of the following recovery techniques provides better concurrency control by delaying the updates made by a transaction?
    1. Undo logging
    2. Redo logging
    3. **Deferred update**
    4. Immediate update
31. Which recovery technique requires that the transaction logs be processed during the recovery process to ensure consistency?
    1. Undo logging
    2. **Redo logging**
    3. Deferred update
    4. Shadow paging
32. Which of the following recovery techniques is suitable for real-time databases where immediate crash recovery is critical?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Immediate update**
33. Which recovery technique maintains a consistent copy of the database at all times, allowing for fast recovery from a failure?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Shadow paging**
34. Which of the following errors can be mitigated by using database recovery techniques?
    1. Syntax errors in SQL queries
    2. Network connectivity issues
    3. **Power outages**
    4. Insufficient disk space
35. Which recovery technique allows for incremental backup and recovery, reducing the time and space required for recovery operations?
    1. Undo logging
    2. Redo logging
    3. Deferred update
    4. **Incremental backup**