**Q 01: [C1, CLO-1]**

**Question # 01: (10)**

What are the current database challenges?

1. **Scalability**: With the exponential growth of data, databases must be able to scale efficiently to handle increasing volumes of information while maintaining performance.
2. **Data Security and Privacy**: With the rise in cyber threats and regulations like GDPR and CCPA, ensuring data security and privacy remains a significant challenge for database administrators.
3. **Data Integration**: Many organizations operate with heterogeneous data sources, making it challenging to integrate data from various systems into a cohesive database structure.
4. **Real-time Data Processing**: Businesses increasingly require real-time insights from their data. Achieving real-time data processing often requires sophisticated database architectures and technologies.
5. **Complexity of Data Models**: As data becomes more diverse and complex, designing appropriate data models that can effectively represent and organize the data poses a challenge.
6. **Data Quality**: Maintaining data quality is crucial for making informed business decisions. However, ensuring data consistency, accuracy, and completeness across various data sources can be challenging.
7. **Database Performance Optimization**: Optimizing database performance to ensure responsiveness and scalability while minimizing resource consumption remains an ongoing challenge, particularly for large-scale systems.
8. **Data Governance**: Establishing policies and procedures for data governance, including data access controls, data lineage tracking, and metadata management, is critical for ensuring data integrity and compliance.
9. **Cloud Migration and Management**: Many organizations are transitioning their databases to the cloud to take advantage of scalability and cost-efficiency. However, migrating existing databases to the cloud and managing them effectively in a cloud environment pose challenges.
10. **Data Storage Costs**: Storing large volumes of data can be expensive, particularly as data grows exponentially. Optimizing storage costs while ensuring data accessibility and performance is a challenge for organizations.
11. **Distributed Data Management**: With the increasing adoption of distributed computing architectures, managing distributed data across multiple locations while ensuring consistency and availability presents challenges.
12. **Vendor Lock-in**: Organizations often face challenges related to vendor lock-in when selecting and implementing database technologies. Switching between database vendors or platforms can be costly and complex.