

*Candidates are required to give their answer in their own word as far as practicable.*

**Group A**

**Attempt any six [6 X 5 = 30]**

1. What are the differences and similarities between object and literals in ODMG object model?
2. Explain row level and statement level active rules.
3. Define map reduce. Explain how map reduce way of implementation based on Dean and Ghemawat(2004).
4. Discuss semi-join and anti-join as operators to which nested queries may be mapped with suitable example.
5. What is cost-based query optimization?
6. Explain two-tier and three-tier client-server architecture in detail.
7. Describe distributed database query processing steps in detail.

**Group B**

**Attempt any three [3 x 10=30]**

8. What is physical optimization? Differentiate between materialization and pipelining. Explain the cost components for query execution.
9. Explain 2PC and 3PC. What is sharding? Describe distributed concurrency control based on distinguished copy of data.
10. What are the data modeling concepts used in MongoDB? What are the main CRUD operations of MongoDB? Discuss how replication and sharding are done in MongoDB.
11. What are the differences among valid time, transaction time, and bitemporal relations? What are some of the challenges faced by big data technologies today? Describe the function of the NameNode and secondary NameNode in HDFS?