

(2<sup>1/2</sup> Hours.)

[Total Marks: 75]

- N. B.:** (1) All questions are compulsory.  
(2) Numbers to the right indicate marks.  
(3) Make suitable assumptions wherever necessary and state the assumptions made.  
(4) Answers to the same question must be written together.  
(5) **Mixing** of Sub-Questions is not allowed.  
(6) Draw neat labelled diagrams wherever necessary.

**1. Attempt any three of the following:**

**15**

- State the advantage and disadvantages of Distributed Database Management Systems.
- Explain different Levels of Distributed Transparent System.
- Discuss the various factors for DDBMS Architecture.
- Describe the Peer- to-Peer Architecture for Distributed DBMS.
- Explain the significance of replication in distributed databases.
- Write a brief note on Query Optimization.

**2. Attempt any three of the following:**

**15**

- Describe in detail the concurrent execution of transactions.
- Explain the Three-Phase Commit Protocol and its advantages over the Two-Phase Commit Protocol.
- Differentiate between intra-query parallelism and inter-query parallelism.
- Define deadlock in distributed transaction management. State its prevention.
- Demonstrate how timestamp ordering ensures serializability in distributed systems.
- Explain the scalability of parallel database systems in handling large-scale data.

**3. Attempt any three of the following:**

**15**

- Differentiate between objects and literals in the ODMG object model. Explain the five key aspects of an object with suitable examples.
- Write about type constructors and inheritance in object-oriented databases.
- Describe the structure of temporal data models with an example.
- Write a detailed note on the structure and granularity of time domains in temporal databases.
- State the differences between raster and vector models in spatial databases.
- Write a brief note of R-trees for storing spatial data.

**4. Attempt any three of the following:**

**15**

- Define recursive queries and explain their use in deductive databases.
- Discuss active databases and compare with traditional database triggers.
- Explain safe Datalog programs and their significance.

- d. What is content-based retrieval in multimedia databases? Explain the two main approaches used for identifying the contents of multimedia sources.
- e. Explain in detail the event-condition-action (ECA) model in active databases.
- f. Write a brief note on deductive database system.

**5. Attempt any three of the following:**

**15**

- a. Compare horizontal and vertical fragmentation techniques.
  - b. Write a short note on object definition language (ODL) and object query language OQL.
  - c. Explain the clustering methods used in spatial databases.
  - d. Define an XML element. What is proper & improper nesting in XML? How does it affect the structure of an XML document?
  - e. Discuss the challenges of implementing multimedia databases.
  - f. What is the role of external schemas in DDBMS architecture?
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