

Duration: 3hrs

Max Marks:80

- N.B. :** (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

- 1 Attempt **any FOUR** [20]
a How did hierarchical and network models contribute to the development of relational databases?
b How do data models help in communication between users and designers?
c Why is the Entity-Relationship (ER) model used in database design?
d Define projection in relational algebra. How is it different from selection?
e How does SQL handle NULL values in queries?
- 2 a Describe the internal level of data abstraction and its significance in storage [10]
b How do entities and relationships work together to form a data model?. [10]
- 3 a Name and explain any three of Codd's 12 rules for relational databases. [10]
b Compare UML diagrams with ER diagrams in terms of features and usage. [10]
- 4 a Write a relational algebra expression to find all employees in the 'HR' department. [10]
b How are relational comparisons done in relational algebra? Provide an example using the > operator. [10]
- 5 a What are aggregate functions in SQL? Explain COUNT, SUM, AVG, MAX, and MIN with examples. [10]
b Which SQL tool would you recommend for large-scale enterprise applications and why? [10]
- 6 a What is Two-Phase Locking (2PL)? Explain its types: basic 2PL, strict 2PL, and rigorous 2PL. [10]
b How do GRANT and REVOKE commands help manage access control in SQL? [10]
