

UNIT-IV: Schema Refinement and Normalization

I. Choose the correct answer:

1. Schema refinement is mainly used to:

- a) Increase data redundancy
- b) Improve database design
- c) Delete records
- d) Increase storage space

Answer: b) Improve database design

2. Decomposition is the process of:

- a) Combining relations
- b) Splitting a relation into smaller relations
- c) Deleting tuples
- d) Creating indexes

Answer: b) Splitting a relation into smaller relations

3. Which property ensures that decomposed relations can be joined back without loss of information?

- a) Dependency Preservation
- b) Lossless Join
- c) Redundancy
- d) Atomicity

Answer: b) Lossless Join

4. Which property ensures that all functional dependencies are retained after decomposition?

- a) Dependency Preservation
- b) Lossless Join
- c) Integrity Constraint
- d) Atomicity

Answer: a) Dependency Preservation

5. A Functional Dependency (FD) is represented as:

- a) $X \rightarrow Y$
- b) $X = Y$
- c) $X + Y$
- d) $X \times Y$

Answer: a) $X \rightarrow Y$

6. In a functional dependency $X \rightarrow Y$, X is called:

- a) Dependent attribute
- b) Determinant
- c) Candidate key
- d) Prime attribute

Answer: b) Determinant

7. Armstrong's axioms are used for:

- a) File organization
- b) Reasoning about Functional Dependencies
- c) Indexing
- d) Query optimization

Answer: b) Reasoning about Functional Dependencies

8. Which normal form eliminates repeating groups?

- a) 1NF
- b) 2NF
- c) 3NF
- d) BCNF

Answer: a) 1NF

9. A relation is in First Normal Form (1NF) if:

- a) All attributes are atomic
- b) No partial dependencies exist
- c) No transitive dependencies exist
- d) Every determinant is a candidate key

Answer: a) All attributes are atomic

10. Second Normal Form (2NF) eliminates:

- a) Transitive dependency
- b) Partial dependency
- c) Multivalued dependency
- d) Join dependency

Answer: b) Partial dependency

11. A relation is in 2NF if it is in:

- a) 1NF only
- b) 1NF and has no partial dependency
- c) 2NF only

d) BCNF

Answer: b) 1NF and has no partial dependency

12. Third Normal Form (3NF) removes:

- a) Partial dependency
- b) Transitive dependency
- c) Multivalued dependency
- d) Join dependency

Answer: b) Transitive dependency

13. BCNF is a stronger version of:

- a) 1NF
- b) 2NF
- c) 3NF
- d) 4NF

Answer: c) 3NF

14. A relation is in BCNF if:

- a) Every determinant is a candidate key
- b) It is in 1NF only
- c) It has no multivalued dependency
- d) It has no join dependency

Answer: a) Every determinant is a candidate key

15. Fourth Normal Form (4NF) deals with:

- a) Partial dependency
- b) Transitive dependency
- c) Multivalued dependency
- d) Functional dependency

Answer: c) Multivalued dependency

16. Fifth Normal Form (5NF) deals with:

- a) Partial dependency
- b) Join dependency
- c) Functional dependency
- d) Transitive dependency

Answer: b) Join dependency

17. Which normal form is also called Project Join Normal Form?

- a) 3NF
- b) BCNF
- c) 4NF
- d) 5NF

Answer: d) 5NF

18. Which of the following is a desirable property of decomposition?

- a) Data redundancy
- b) Lossy join
- c) Dependency preservation
- d) Data inconsistency

Answer: c) Dependency preservation

19. The closure of a set of attributes is represented by:

- a) X^+
- b) X^-
- c) X^*
- d) XY

Answer: a) X^+

20. Which normal form eliminates most anomalies in a database?

- a) 1NF
- b) 2NF
- c) 3NF
- d) BCNF

Answer: d) BCNF

Fill in the Blanks

1. The process of improving database design is called schema _____.
Answer: refinement
2. Splitting a relation into smaller relations is known as _____.
Answer: decomposition
3. A decomposition is said to be _____ if no information is lost after decomposition.
Answer: lossless
4. The property that preserves all functional dependencies after decomposition is called _____ preservation.
Answer: dependency
5. A functional dependency is denoted by the symbol _____.
Answer: $\rightarrow$
6. In $X \rightarrow Y$, X is known as the _____.
Answer: determinant

7. Armstrong's axioms are used for reasoning about _____ dependencies.
Answer: functional
8. The closure of an attribute set X is represented as _____.
Answer: X⁺
9. First Normal Form requires all attributes to contain _____ values.
Answer: atomic
10. Repeating groups are eliminated in _____ Normal Form.
Answer: First (1NF)
11. Second Normal Form removes _____ dependencies.
Answer: partial
12. Third Normal Form eliminates _____ dependencies.
Answer: transitive
13. BCNF stands for _____ Boyce-Codd Normal Form.
Answer: Boyce
14. In BCNF, every determinant must be a _____ key.
Answer: candidate
15. Fourth Normal Form deals with _____ dependencies.
Answer: multivalued
16. Fifth Normal Form deals with _____ dependencies.
Answer: join
17. 5NF is also known as _____ Join Normal Form (PJNF).
Answer: Project
18. Data redundancy can be reduced through _____.
Answer: normalization
19. A relation must first satisfy _____ before it can be in 2NF.
Answer: 1NF
20. Normalization helps reduce insertion, deletion, and _____ anomalies.
Answer: update