
TEST BANK
DATA
MODELING AND
DATABASE DESIGN
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TRUE/FALSE

1. The input source for the conceptual modeling phase is the business rules culled out from the requirements specification supplied by the user community.

   ANS: T PTS: 1 REF: 24

2. Object types correlate the real world to the conceptual world and serve as a foundation for the entity-relationship (ER) modeling grammar.

   ANS: T PTS: 1 REF: 26

3. In the conceptual world an object class is a generalization of different related entity types that have shared attributes.

   ANS: F PTS: 1 REF: 27

4. A rule in the grammar specifies that entity types can only be associated via a relationship type and a relationship type can only show association between entity types.

   ANS: T PTS: 1 REF: 28

5. A composite or molecular attribute can be meaningfully subdivided into smaller subparts with independent meaning.

   ANS: T PTS: 1 REF: 29

6. The source of integrity constraints are the business rules that emerge from the user requirements specification for a database application system.

   ANS: T PTS: 1 REF: 30

7. In general, integrity constraints are considered to be part of the schema in that they are declared along with the structural design of the data model.

   ANS: T PTS: 1 REF: 31

8. The uniqueness constraint is imposed on an attribute to ensure that its observed value is not outside the defined domain.

   ANS: F PTS: 1 REF: 32

9. The unique identifier of the entity type can be used to identify an entity distinctly from other entities in the entity set.

   ANS: T PTS: 1 REF: 32

10. Any attribute that is a constituent part of a unique identifier is a non-key attribute.

    ANS: F PTS: 1 REF: 33

11. In ER diagrams, empty circles represent mandatory attributes while dark circles signify optional attributes.

ANS: F PTS: 1 REF: 33

12. An entity type related to itself is termed a recursive relationship type.

ANS: T PTS: 1 REF: 34

13. The set of all relationship instances involving pilots and flights is defined as a relationship set.

ANS: T PTS: 1 REF: 34

14. The data integrity constraints pertaining to relationship types specified in an ER diagram are referred to as the structural constraints of a relationship type.

ANS: T PTS: 1 REF: 38

15. For a binary relationship between entity types A and B, six mapping cardinalities are possible.

ANS: F PTS: 1 REF: 39

16. The maximum cardinality indicates the maximum number of relationship instances in which an entity participates.

ANS: T PTS: 1 REF: 41

17. Total and partial participation are also commonly referred to as mandatory and optional participation.

ANS: T PTS: 1 REF: 41

18. In a 1:n relationship type, attributes of the relationship can alternatively be shown only as attributes of the parent entity type in the relationship and not of the child entity type.

ANS: F PTS: 1 REF: 46

19. Attributes of m:n relationship types cannot be shown anywhere other than as an attribute of the relationship type.

ANS: T PTS: 1 REF: 46

20. An entity type where the entities have independent existence is referred to as a weak entity type.

ANS: F PTS: 1 REF: 49

21. Some base entity types may have more than one unique identifier.

ANS: T PTS: 1 REF: 49

22. A strong entity type does not have a unique identifier of its own.

ANS: F PTS: 1 REF: 50

23. A weak entity type is not always also existent dependent on the corresponding identifying relationship type.

ANS: F PTS: 1 REF: 51

24. An explicit relationship between attributes of an entity type independent of the entity type is not permitted in the ER modeling grammar.

ANS: T PTS: 1 REF: 56

25. Unique identifiers are identified in ER-Modeling by circled attributes.

ANS: F PTS: 1 REF: 63

MULTIPLE CHOICE

1. The basic units of a(n) ____ are entity type, entity class, attribute, unique identifier, and relationship type.
   a. primitive grammar
   b. concept diagram
   c. ER model
   d. intangible objects

   ANS: C PTS: 1 REF: 26

2. The concept of a(n) ____ is the most fundamental concept of the ER modeling grammar.
   a. type
   b. class
   c. domain
   d. entity

   ANS: D PTS: 1 REF: 27

3. An entity or entity instance is created when a value is supplied for some ____(s) .
   a. domain
   b. data set
   c. object type
   d. attribute

   ANS: D PTS: 1 REF: 27

4. A set of ____ makes up or gives structure to an entity type.
   a. objects
   b. attributes
   c. types
   d. symbols

   ANS: B PTS: 1 REF: 28

5. An entity type can participate in one or more ____ with other entity types.
   a. classes
   b. expressions
   c. correlations
   d. relationships

   ANS: D PTS: 1 REF: 28

6. A(n) ____ data type is used when an attribute's value can consist of positive and negative numbers.
   a. object
   b. numeric
   c. integer
   d. rational

   ANS: B PTS: 1 REF: 28

7. A(n) ____ data type is associated with an attribute whose value can be either true or false.
   a. alphabetic
   c. logical

b. alphanumeric
d. numeric

ANS: C PTS: 1 REF: 29

8. An attribute can be either a stored attribute or a ____ attribute.
a. temporary
c. saved
b. placeholder
d. derived

ANS: D PTS: 1 REF: 29

9. A step-by-step analysis of the requirements specification will enable an analyst/modeler to extract specific conditions and procedures inherent in the universe of interest as ____.
a. objects
c. systematic rules
b. examples
d. business rules

ANS: D PTS: 1 REF: 31

10. It is important to be able to uniquely identify entities in the ____ of the entity type .
a. objects
c. entity set
b. classes
d. attributes

ANS: C PTS: 1 REF: 32

11. In ER-diagrams a multi-valued attribute is shown by a ____ .
a. double square
c. single circle
b. dotted circle
d. double circle

ANS: D PTS: 1 REF: 33

12. In ER diagrams a ____ is used to represent an entity type.
a. dotted underline
c. single circle
b. rectangular box
d. dotted circle

ANS: B PTS: 1 REF: 33

13. Role names may be used when two entity types are associated through more than one ____ type.
a. object
c. entity
b. relationship
d. role

ANS: B PTS: 1 REF: 37

14. Two independent ____ constraints together define a relationship type: cardinality constraint and participation constraint.
a. binary
c. structural
b. entity
d. type

ANS: C PTS: 1 REF: 38-39

15. A binary relationship between the two entity types, SALESPERSON and VEHICLE, may possess a(n) ____ cardinality constraint, meaning that (a) each salesperson entity can be related to many vehicle entities (up to n), and (b) each vehicle entity is related to at most one salesperson entity.
a. binary
c. 1:n
b. 1:1
d. m:n

ANS: C PTS: 1 REF: 39

16. If, in order to exist, every entity must participate in the relationship, then participation of the entity type in that relationship type is ____ participation.
    a. minimum
    b. partial
    c. integral
    d. total

    ANS: D PTS: 1 REF: 41

17. In an ER- model, the oval and the hash (|) are used to describe the ____ constraints.
    a. participation
    b. cardinality
    c. structural
    d. ratio

    ANS: A PTS: 1 REF: 44

18. When considering the relationship between entities and attributes, a set of attributes gives ____ to an entity type.
    a. constraint
    b. value
    c. structure
    d. independence

    ANS: C PTS: 1 REF: 49

19. To signify the identification dependency of APARTMENT on BUILDING, a ____ is used to portray the identifying relationship type.
    a. double rectangle
    b. circle
    c. double diamond
    d. diamond

    ANS: C PTS: 1 REF: 50

20. A(n) ____ entity type is drawn as a double rectangular box.
    a. relationship
    b. weak
    c. atomic
    d. strong

    ANS: B PTS: 1 REF: 50

21. ____ of an entity type in a relationship type implies mandatory participation of all entities in the entity set of the said entity type in that relationship.
    a. Independent identification
    b. Discrimination
    c. Existence dependency
    d. Implicit requirements

    ANS: C PTS: 1 REF: 51

22. You have a ____ error when there is an incorrect imposition of a business rule implicit in the requirements specification.
    a. syntax
    b. semantic
    c. syntactic
    d. business rule

    ANS: B PTS: 1 REF: 54

23. When a data modeler first reads through a description of a scenario with incomplete specifications, he or she should first identify all ____ implicitly expressed and then list the ambiguities.
    a. scenarios
    b. business rules
    c. relationships
    d. constructs

    ANS: B PTS: 1 REF: 59

24. A weak entity type can have another weak entity type as its identifying ____.
    a. structure
    c. type

b. attribute
d. parent

ANS: D PTS: 1 REF: 60

25. A relationship can exist only between entities. Therefore, in a diagram a diamond cannot connect anything other than ____ .
a. diamonds
c. circles
b. rectangles
d. squares

ANS: B PTS: 1 REF: 61

26. When the composite attribute does not have any value the constituent ____ attributes also do not have any values.
a. stored
c. non-key
b. atomic
d. key

ANS: B PTS: 1 REF: 66

COMPLETION

1. Objects belonging to an object type are considered to be _____ of the corresponding entity type.

ANS:
entities
entity instances

PTS: 1 REF: 27

2. A(n) _____ is a generalization of related object types that have shared properties

ANS: object class

PTS: 1 REF: 27

3. Most attributes have a single value for a particular entity and are referred to as _____ attributes.

ANS: single-valued

PTS: 1 REF: 29

4. An attribute that has a discrete factual value and cannot be meaningfully subdivided is called a(n) _____ or simple attribute.

ANS: atomic

PTS: 1 REF: 29

5. Attributes that need not be assigned a value for each entity are referred to as _____ attributes.

ANS: optional

PTS: 1 REF: 29-30

6. The _____ that requires entities of an entity type to be uniquely identifiable.

   ANS:
   uniqueness constraint
   key constraint

   PTS: 1 REF: 32

7. A(n) _____ is a meaningful association among entity types.

   ANS: relationship type

   PTS: 1 REF: 33

8. Diagrammatic representation of the relationship among entity types in terms of relationship instances among the instances of the participant entity types is called a(n) _____.

   ANS: instance diagram

   PTS: 1 REF: 35

9. The participation of an entity type in a relationship type can be indicated by its _____.

   ANS: role name

   PTS: 1 REF: 37

10. The _____ for a binary relationship type is a constraint that specifies the maximum number of entities of an entity type to which another entity can be associated through a specific relationship set expressed as a ratio.

    ANS: cardinality constraint

    PTS: 1 REF: 39

11. The _____ for an entity type in a binary relationship type is based on whether, in order to exist, an entity of that entity type needs to be related to an entity of the other entity type through this relationship type.

    ANS: participation constraint

    PTS: 1 REF: 41

12. If an entity can exist without participating in the relationship, then participation of the entity type in that relationship type is _____.

    ANS: partial participation

    PTS: 1 REF: 41

13. Total participation of an entity type in a relationship type is also called _____ of that entity type in that relationship type.

    ANS: existence dependency

    PTS: 1 REF: 42

14. _____ data modeling errors arise from misinterpretations of the requirements specification.

    ANS: Semantic

    PTS: 1 REF: 54

15. _____ errors are relatively easy to avoid by simply knowing the rules of the grammar of the modeling language.

    ANS: Syntactic

    PTS: 1 REF: 54

16. At some point in the design cycle one of the _____ identifiers must be designated as the primary means of identifying entities of the entity set and that unique identifier must be a mandatory attribute.

    ANS: unique

    PTS: 1 REF: 64

17. _____ can create semantic problems of data consistency, currency, and correctness in addition to storage inefficiencies during database implementation.

    ANS: Data redundancy

    PTS: 1 REF: 65

ESSAY

1. What are some of the pros and cons of entity-relationship (ER) modeling grammar originally proposed by Peter Chen in 1976?

   ANS:
   Entity-relationship (ER) modeling grammar aspires to capture the overall data semantics of an application in a concise manner in terms appropriate for subsequent mapping to specific database models. While criticized by some for its insufficiency for the completion of a database design, the ER modeling grammar is an effective tool for communicating technical information in the development of large database applications.

   PTS: 1 REF: 26

2. Describe and define five of the main data types associated with attributes.

   ANS:

A numeric data type is used when an attribute's value can consist of positive and negative numbers, and is often used in arithmetic operations. Numeric attributes can further be constrained so as to allow only integer values, decimal values, and so on. The alphabetic data type permits an attribute to consist of only letters and spaces, while an alphanumeric data type allows the value of an attribute to consist of text, numbers (telephone numbers, postal codes, account numbers, and so on), and certain special characters. Alphabetic and alphanumeric data types should not be used for attributes involved in arithmetic operations. Likewise, an attribute not involved in an arithmetic operation should not be defined as a numeric data type even if it contains only numbers (telephone number, Social Security number) to enable textual manipulations. A logical data type is associated with an attribute whose value can be either true or false. Attributes with a date data type occur frequently in database applications, for example date of birth, date hired, or flight date.

PTS: 1 REF: 28-29

3. Why are business rules so important in a data modeling context?

ANS:
A step-by-step analysis of the requirements specification will enable an analyst/modeler to extract specific conditions and procedures inherent in the universe of interest as business rules. Such a systematic analysis will also facilitate identification of ambiguities which, when clarified by the user community, will yield additional business rules and also facilitate correction of other business rules. Business rules not only facilitate development of data models, but also aid in validating them.

PTS: 1 REF: 31

4. Describe and provide an example of a m:n mapping cardinality.

ANS:
An entity in A is associated with any number (zero or more) of entities in B and vice versa. This is the general form of a cardinality constraint in a binary relationship. An example of an m:n cardinality constraint involves the two entity types EMPLOYEE and CERTIFICATION where each Employee could possess many different Certifications and each Certification could be possessed by many different Employees

PTS: 1 REF: 39

5. Explain why a participation constraint exists and how it is used.

ANS:
The participation constraint for an entity type in a binary relationship type is based on whether, in order to exist, an entity of that entity type needs to be related to an entity of the other entity type through this relationship type. Participation can be total or partial. If, in order to exist, every entity must participate in the relationship, then participation of the entity type in that relationship type is total participation. On the other hand, if an entity can exist without participating in the relationship, then participation of the entity type in that relationship type is partial participation. Total and partial participation are also commonly referred to as mandatory and optional participation,

PTS: 1 REF: 41