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Subject: Database Management Systems

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Module 1- File Organization and Structure

Short answer questions:

1. What can be defined as a set of isolated and unrelated raw facts with an implicit meaning?
2. What are two components for which DBMS acts as an interface of an enterprise-class database system?
3. How data differs from information?
4. Which are four major criteria that classify DBMS into different categories?
5. List four applications which you have seen, that most likely used a database system to store persistent data.
6. Which type of user interacts with the database by an application program and which type of user interacts with database without application program?
7. Give at least four advantages of centralized data management in DBMS.
8. Which of the product was the first to implement true relational algebra in a PC (Personal Computer) DBMS?
9. What are three different types of cache memory available?
10. Who describes the data in terms of a collection of files, indices, and other storage structures such as record formats, record ordering, and access paths?
11. What is the significance of different colors for CDs/DVDs?
12. Which DBMS combines a DBMS and an application generator?
13. How seek time and latency time differs from each other?
14. What details about an index for a relation is stored in data dictionary?
15. List any four information stored in data dictionary.
16. If any of the file organization has inconsistent data-dictionary, will you be able to access required information? Justify in brief.
17. Which file organization technique is more suitable to store a file having two fields custid as primary key and 11 digits phone number? Justify your answer.
18. Which is the fastest memory directly accessible by the CPU?
19. What is a difference between a file organization and access method?

Long answer questions:

1. What are the advantages of a database system? What are the various cost and risk factors involved in implementing a database system?
2. Explain all three generations of database systems.
3. Explain purpose of given physical storage media: cache memory, main-memory, flash-memory, magnetic discs.
4. List any four physical storage media. Classify them by their speed, storage space and characteristics with which data can be accessed.
5. Assuming that a file contains thousands of record having frequent insertion and deletion. Which file organization technique is more suitable to store the file? Why?
6. Reading and searching of the record(s) are expensive procedure for unordered records. Justify.
7. Insertion of the record(s) is expensive procedure for ordered records. Justify.
8. Suppose customer information such as customer_id, customer_name, city, phone_no is to be

stored in a file and also it is frequently accessed and searched on customer_name. Assuming such scenario, why it is suitable to store records in sequential file organization rather than heap file organization technique? Justify your reasons.

9. What are the constituents of file? Explain all the possible file operations.
10. Explain the classification of DBMS based on number of users, number of sites, and on the purpose.
11. How insertion and deletion are managed in fixed length records?
12. How insertion and deletion are managed in variable length records?
13. Using example, explain the insertion and deletion of records in heap file organization.
14. Differentiate primary and secondary storage by giving their advantages and disadvantages.
15. How static and dynamic file differs from each other?

Multiple choice questions:

1. An on-line commercial site such as Amazon.com is an example of a(n) _____.
a. single-user database application c. multiuser database application
b. e-commerce database application d. data mining database application
2. Which of these is not an advantage of database systems?
a. Data redundancy c. Program-data independence
b. Centralized data management d. Data abstraction
3. The access method used for magnetic tape is _____.
a. Direct b. Random c. Sequential d. None of the above
4. Which among the following is fastest storage media?
a. Online storage b. Offline storage c. Primary storage d. None of the above
5. A file is organized logically as sequence of _____.
a. blocks b. bits c. pages d. records
6. The header in slotted page structure doesn't contain one of the following:
a. Name of the file c. End of free space in the block
b. Location and size of record d. All of the above
7. Large objects are often represented using _____ file organization.
a. Heap b. Sequential c. B+ d. Hash
8. Careful use of multi table clustering maximizes _____.
a. Response time c. I/O operation
b. Rotational delay d. System performance
9. If data are stored sequentially on a magnetic tape, they are ideal for: _____.
a. On-line applications c. Batch processing applications
b. Spreadsheet applications d. Decision making applications
10. Which of the following is auxiliary device?
a. Magnetic disks c. Magnetic tapes
b. Optical disks d. All of the above
11. Which of the following is sequential access storage device?
a. Hard disk b. Magnetic tape c. Floppy disk d. All the above
12. Optical storage is a
a. High speed direct access storage device.
b. Low speed direct access storage device.
c. Medium speed direct access storage device.
d. High-speed sequential access storage device.
13. Access time is the time:
a. From when a read or write request is issued to when data transfer begins.

- b. Amount of time required to transfer data from the disk to or from main memory.
 - c. Required to electronically activate the read/write head over the disk surface where data transfer is to take place.
 - d. None of these.
14. Data transfer time is the time:
- a. From when a read or write request is issued to when data transfer begins.
 - b. Amount of time required to transfer data from the disk to or from main memory.
 - c. Required to electronically activate the read/write head over the disk surface where data transfer is to take place.
 - d. None of these.
15. _____ is a form of Electrically Erasable Programmable read-only memory.
- a. Flash Memory b. Main Memory c. Optical Storage d. All of above
16. The fastest storage media for example, cache and main memory are referred to as
- a. Secondary storage b. Tertiary storage c. Volatile storage d. Primary storage

State whether the below given statements are true or false:

- 1. Insertion and deletion of fixed length records are simple to implement than that in variable length records.
- 2. The slotted page structure requires that there be no pointers that point directly to records.
- 3. Insertion is easy in heap file organization.
- 4. Deletion is difficult in sequential file organization.
- 5. Overflow blocks are used during insertion in sequential file organization.
- 6. Auxiliary storage devices are also useful for transferring data from one computer to another.
- 7. It is more economical to store data on secondary storage devices than in primary storage devices.
- 8. In case of sequential file organization, records are stored in some predetermined sequence, one after another.
- 9. A file could be made of records which are of different sizes. These records are called variable-length records.
- 10. Permanent storage of data is done on the main memory.
- 11. Auxiliary memory devices are volatile in nature.
- 12. Cost of auxiliary memory device is much more than that of main memory.
- 13. Magnetic tapes are direct access media.
- 14. Direct access systems do not search the entire file, instead, they move directly to the needed record.
- 15. When using sequential access to reach a particular record, all the records preceding it need not be processed.

Fill in the blanks with appropriate answer.

- 1. _____ is used for backup and archival data.
- 2. Jukebox is a kind of _____ storage.
- 3. _____ storage loses its contents when the power to the device is removed.
- 4. _____ is the fastest and costliest form of storage.
- 5. _____ file organization is used to store large objects.
- 6. In _____ file organization, mixing of tuples from more than one relation is done, but it allows efficient processing of the join.
- 7. _____ of memory is available for storage of copies of disk blocks.
- 8. _____ stands for write once, read many.
- 9. Sequential file organization is also known as _____.

10. In sequential file organization, usage of ____ search technique helps to search record faster.
11. In sequential processing, one field referred to as the _____, usually determines the order in which the records are stored.
12. The overflow area is essentially used to store _____, which cannot be otherwise inserted in prime area without rewriting the sequential file.

Module 2- Database Management System

Short answer questions:

1. Which data model describes the data in terms of a collection of files, indices, and other storage structures such as record formats, record ordering, and access paths?
2. What do you mean by data inconsistency?
3. What is the importance of atomicity?
4. What is the basic difference between transaction manager and database manager?
5. What does durability mean?
6. How does concurrent access result into anomalies?
7. What do you mean by database schema?
8. Which are two approaches in which conceptual data model is represented?
9. What is physical, logical and view level of data abstraction?
10. Why does database system offer different level of abstraction?
11. In client/server architecture, who sends request to the server connected to the network?
12. What is the importance of data model?
13. What is mapping cardinality?
14. Who translates DML statement in a query language into low-level instruction that the query evaluation can understand?
15. State the role of buffer manager.
16. What is DML compiler?
17. What is query evaluation engine?
18. What is DDL interpreter?
19. Explain five duties of database administrator.
20. What is the purpose of transaction manager?
21. State the function of file manger.

Long answer questions:

1. What is the aim of designing a database? Explain the overall database design and implementation process.
2. How does conventional file processing system work?
3. Discuss the disadvantages of file processing system that led to the development of database system.
4. What are the anomalies related to traditional file processing systems?
5. What are the disadvantages of file processing system? What are the advantages of DBMS?
6. What are the advantages of a database system? What are the various cost and risk factors involved in implementing a database system?
7. Explain all three levels of data abstraction.
8. Explain in brief object based and semi-structured databases.
9. Explain working of storage manager and query processor component.
10. Write a note on relational constraints.
11. Explain the basic difference with suitable duties of data administration and database administration.
12. How different users interact with the database system?

13. Explain with suitable example data redundancy and inconsistency problem.
14. Explain atomicity problem in detail with suitable example.
15. Explain concurrent access anomaly with suitable example.

Multiple choice questions:

1. In a relational schema each tuple is divided into fields called
 - a. Relations
 - b. Queries
 - c. Domains
 - d. All of above
2. A top-to-bottom relationship among the items in a database is established by
 - a. Hierarchical schema
 - b. Network schema
 - c. Relational schema
 - d. All of above
3. A recursive relationship is a relationship between an entity and _____ .
 - a. itself
 - b. a subtype entity
 - c. an archetype entity
 - d. an instance entity
4. Which of the following statements are correct?
 - i)an entity is an object to the real world
 - ii)entity is described using attributes
 - iii)attributes are described using entity
 - iv)each attribute must identify a domain
 - v)we can have more than 1 candidate key
 - a. i, iii, v
 - b. ii, iv
 - c. i, iii, iv
 - d. i, ii, iv, v
5. Data item grouped together for storage purpose are called
 - a. Record
 - b. Title
 - c. List
 - d. String
6. An instance is _____.
 - a. a set of relationships
 - b. set of attributes
 - c. set of entities
 - d. schema
7. In a one-to-many relationship, the entity that is on the many side of the relationship is called a(n) _____ entity.
 - a. parent
 - b. child
 - c. instance
 - d. subtype
8. The entity set that participates in a relationship are
 - a. distinct
 - b. need not be distinct
 - c. may or may not be distinct
 - d. none of above
9. The language associated with a database management system that is employed by end users and programmers to manipulate data in the database is the:
 - a. Data Definition Language
 - b. Data Presentation Language
 - c. Data Manipulation Language
 - d. Data Translation Language
10. Which of the model(s) strictly require the relationships be predefined?
 1. Network model
 2. Hierarchical model
 3. Relational model
 4. None
 - a. 1 only
 - b. 2 only
 - c. Both 1 and 2
 - d. 4
11. The DML is used for:
 1. Creating tables
 2. Retrieving data
 3. Deleting users
 4. Inserting data
 5. Deleting data
 - a. 2, 4, 5
 - b. 2, 3, 4
 - c. None of this
 - d. All of these
12. Which of the following are the roles of the Database Administrator?
 1. Managing security issues
 2. Storage structure definition
 3. Develop application programs
 4. Take backups of the database
 - a. 1
 - b. 1, 2, 3
 - c. 1, 2, 4
 - d. All of these
13. Which language is used to permit or prohibit access to a table?

- a. DCL b. DDL c. DML d. All of these
14. What type of database is described as an electronic repository?
a. A database used to store, sort and manipulate information
b. A database used to store vast quantities of information that can be searched for relevant information
c. A database management system
d. An older database system
15. What is one function of a database management system (DBMS)?
a. Ensuring usability
b. Identifying what a user needs
c. Deciding what to do with legacy systems
d. Preventing errors arising, while enabling multiple, simultaneous users
16. Which database structure consists of a set of two or more related tables with a minimum of one shared field between them?
a. Hierarchical b. Network c. Object-oriented d. Relational
17. What is a logical data model?
a. An item about which information is stored in the database.
b. The model that focuses on representing the data as it exists in the real world.
c. The models that identify the data that different groups will need and will eventually translate into forms and reports.
d. Characteristics attached to each entity.

State whether the below given statements are true or false:

1. DCL is used to define the schema of the database.
2. DDL is used to define the integrity constraints.
3. The security features of the database are set up by the naïve users.
4. Physical model is conceptual model used in databases.
5. The relationship between data is defined in the view level.
6. The group of associated fields is called attribute.
7. "Tuple" is another name of table in an RDBMS.
8. "Database" and "Database Management System" are different concepts.
9. Schema means value in the system at particular time.
10. Data dictionary contains syntax of each command.
11. The models that identify the data that different groups will need and will eventually translate into forms and reports are called logical models.
12. Maintaining consistency of data in database is called data integrity.
13. Rules that limit the actions that particular users can perform are called constraint rules.
14. Query-by-example is a DML tool.

Fill in the blanks with appropriate answer.

1. If an entity has a physical existence, it is termed as _____ entity.
2. _____ program module, which is responsible for fetching data from disk storage into main memory and deciding what data to be cache in memory.
3. One of the responsibilities of a _____ is to create database schema.
4. Data is raw whereas information is _____.
5. Two important languages in the database system are _____ and _____.
6. To access information from a database, one needs a _____.
7. _____ language enables users to access or manipulate data.
8. _____ is a language for specifying the database schema and as well as other properties of

the data.

9. The ___ subsystem provides the interface between the low level data stored in the database and the application programs and queries submitted to the system.
10. The _____ subsystem compiles and executes DDL and DML statements.
11. _____ management ensures that the database remains in a consistent state despite of system failures.
12. Under the function _____ the DBA creates the original database schema by executing a set of data definition statements in the DDL.
13. Granting of authorization for data access is done by _____ user.
14. _____ users are unsophisticated users.
15. _____ files stores the database itself.

Module 3- Data Modeling

Short answer questions:

1. You have been given a set of tables with data and asked to create a new database to store them. When you examine the data values in the tables, what are you looking for?
2. What are descriptive attributes?
3. Who assigns restriction on the tuples of a relation and ascertains the accuracy and consistency of the database?
4. What do you mean by arity (predicate) of a relationship?
5. What do you mean by participation constraints?
6. Who ensures that the data in the database is logically consistent and complete with respect to the real world?
7. What is intension?
8. How is a super key different from candidate key?
9. What is domain constraint?
10. How can we define the primary key of a weak entity set?
11. Define: Identifying relationship.
12. Why is a database considered to be "self-describing"?

Long answer questions:

1. Which are four different types of relationships? Give an example for each.
2. Explain all four types of mapping cardinality with appropriate examples.
3. Explain the terms primary key, candidate key, alternate key and secondary key. In the given table identify each key.
STUDENT(SID, Regno, Name, City)
4. How strong and weak entity set are different from each other?
5. Describe various relationship constraints by giving suitable examples.
6. Explain the concept of keys in relational model and specify its importance.
7. Show with example the transformation of an E-R diagram into database design.
8. Give an appropriate example of total participation with proper explanation.
9. Explain the concept of generalization and aggregation in E-R diagrams. Give one example for each one of them.
10. Draw an E_R Model for the following:
An organization uses number of items of a equipment to produce goods. Each item is at one LOCATION, of one TYPE and has a DETAILED_DISCRIPTION. Faults on the equipment are identified by a unique FAULT_ID and are reported at a TIME_REPORTED. Any number of persons may be assigned to a fault and work on the fault until it is fixed. The TIME_FIXED is recorded as is the TIME_SPENT by each person on a fault. Any number of parts may be used to repair a fault.

The QTY_USED of each part is recorded against the fault. Each part is identified by a PART_ID and has a given weight and MAX_DIMENSION and can have any number of colors.

11. What is an E-R model? Draw an E-R Diagram for the company database with following descriptions:

The company is organized into departments. Each department has a unique name and a unique number with several locations. A department controls a number of projects, each of which has a unique name, unique number and a single location. We store each employees name, social security number, address, and salary. An employee is assigned to one department but may work on several projects, which are not necessarily controlled by the same departments. We want to keep track of the dependents of each employee for insurance purposes. We keep each dependent's name, age and relationship to the employee.

12. Discuss the correspondence between the E-R model construct and the relation model construct. Show how each E-R model construct can be mapped to the relational model using the suitable example?

13. A university registrar's office maintains data about the following entities:

- Courses, including number, title, credits, syllabus, and prerequisites;
- Course offerings, including course number, year, semester, section number, instructor(s), timings, and classroom;
- Students, including student-id, name, and program;
- Instructors, including identification number, name, department, and title.

Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled. Construct a E-R diagram for registrar's office. Document all assumptions that you make about the mapping constraints.

Multiple choice questions:

1. Which of the following indicates the maximum number of entities that can be involved in a relationship?
a. Minimum cardinality b. Maximum cardinality
c. ERD d. Greater Entity Count (GEC)
2. What is specified as an association among several entities?
a. Relationship b. Entity c. Entity Set d. Relationship Set
3. Which type of entity cannot exist in the database unless another type of entity also exists in the database, but does not require that the identifier of that other entity be included as part of its own identifier?
a. Weak entity b. Strong entity c. ID-dependent entity d. ID-independent entity
4. In a one-to-many relationship, the entity that is on the one side of the relationship is called a(n) _____ entity.
a. parent b. child c. instance d. subtype
5. Which type of entity represents an actual occurrence of an associated generalized entity?
a. Super type entity b. Subtype entity
c. Archetype entity d. Instance entity
6. A recursive relationship is a relationship between an entity and _____.
a. itself b. a subtype entity
c. an archetype entity d. an instance entity
7. The entity set that participates in a relationship are
a. distinct b. need not be distinct c. may or may not be distinct d. none
8. In which of the following is a single-entity instance of one type related to many entity instances of another type?

- a. One-to-One Relationship b. One-to-Many Relationship
c. Many-to-Many Relationship d. Composite Relationship
9. Properties that describe the characteristics of entities are called:
a. entities b. attributes c. Identifiers d. relationships.
10. Entities can be associated with one another in which of the following?
a. Entities b. Attributes c. Identifiers d. Relationships
11. Pick the relationship from the following:
a. a classroom b. teacher c. attends d. cost per dozen
12. Pick the meaningful relationship between entities
a. vendor supplies goods b. vendor talks with customers
c. vendor complains to vendor d. vendor asks prices
13. The entity set is a
a. set of entities b. collection of different entities
c. collection of related entities d. collection of similar entities
14. Pick entity set from the following
a. all vendors supplying to an organization b. vendors and organizations they supply
c. vendors and transporters d. a vendor supplying to many organizations
15. Attributes are
(i) properties of relationship
(ii) attributed to entities
(iii) properties of members of an entity set
a. i b. i and ii c. i and iii d. iii
16. The attributes of relationship teaches in “*teacher teaches course*” should be
a. teacher code, teacher name, dept, phone no
b. course no, course name, semester offered, credits
c. teacher code, course no, semester no
d. teacher code, course no, teacher name, dept, phone no

State whether the below given statements are true or false:

1. E-R models are expressed using a single standardized set of universally accepted symbols.
2. A schema is a representation of something of interest to the modeler.
3. An internal schema is a representation of how users view the database.
4. A conceptual schema is a complete logical view of the database.
5. An entity is something in the users’ work environment that the users want to track.
6. Entities of a given type are grouped into entity classes.
7. An entity class is described by the structure of the entities in that class.
8. An entity instance of an entity class is the representation of a particular entity and is described by the values of the attributes of the entity.
9. In E-R modeling, entities within an entity class may have different attributes.
10. In E-R modeling, an attribute may be either composite or multi-value, but it cannot be both.
11. An identifier of an entity instance must consist of one and only one attribute.
12. A “composite identifier” is defined as a composite attribute that is an identifier.
13. An identifier may be either unique or non-unique.
14. E-R modeling recognizes both relationship classes and relationship instances.
15. Relationships do not have attributes.
16. A single relationship class involves only one entity class.

Fill in the blanks with appropriate answer.

1. An attribute which can be used to uniquely identify the individual instances of the entity is _____.

2. A relationship that has a cardinality constraint depicted as is named ____.
3. An attribute whose value can be calculated from related attribute values is ____.
4. A relationship that relates instances of an entity to instances of the same entity is ____.
5. The relationship between a weak entity type and its owner is called ____.
6. E-R model was introduced by _____ in _____.
7. A relationship is an _____ among two or more _____ that is of interest to the enterprise.
8. The database model uses the _____, _____ and _____ to construct representation of the real world system.
9. The relationship is joined by _____ to the entities that participate in the relationship.
10. An association among three entities is called _____.
11. A relationship between the instances of a single entity type is called _____.
12. The association between the two entities is called _____.
13. The actual count of elements associated with the connectivity is called _____ of the relationship connectivity.
14. The components of an entity or the qualifiers that describe it are called _____ of the entity.
15. In E-R diagram, they _____ are represented by a rectangular box with the name of the entity in the box.
16. _____ entities are also referred to as parent, owner or dominant entities.
17. _____ is an attribute composed of a single component with an independent existence.
18. In E-R diagram, _____ are underlined.
19. A _____ relationship exists when two entities are associated.
20. In an E-R diagram, if the attribute is _____, its component attributes are shown in ellipses emanating from the composite attribute.

Module 4-Relational Database Design Process

Short answer questions:

1. Which concept helps the user to change the schema at one level of the database system without having to change the schema at the other levels?
2. Which of the product was an early implementation of the relational model developed by E.F. Codd of IBM?
3. How is the concept of functional dependency associated with the process of normalization?
4. Define the term partial dependency.
5. What are the main characteristics of functional dependencies that are used when normalizing a relation?
6. Define trivial functional dependency.
7. Compare BCNF and 3NF.
8. Define the term normalization. Write need for normalization.
9. What is denormalization and why would someone consider doing so?
10. Which normal form is considered adequate for normal relational database design?
11. What do you mean by multivalued attribute?
12. What is dependency preservation?
13. Define prime and non-prime attribute.
14. What are atomic values?

Long answer questions:

1. Discuss insertion, deletion and modification anomalies with suitable examples.
2. Why should NULLs in a relation be avoided as far as possible? Discuss the problem of spurious tuples and how we may prevent it.
3. Write a note on inference rules of functional dependency. Explain with suitable examples.

4. Describe the characteristics of a table in unnormalized form (UNF) and describe how such a table is converted to a first normal form (1NF) relation.
5. Summarize normal forms based on primary key and the corresponding normalization processes.
6. Describe how a database designer typically identifies the set of functional dependencies associated with a relation.
7. What do you understand by attribute closure? Give an example.
8. When are two sets of functional dependencies equivalent? How can we determine their equivalence?
9. What is the minimal normal form that a relation must satisfy? Provide a definition for this normal form.
10. Describe the characteristics of a table that violates first normal form (1NF) and then describe how such a table is converted to 1NF.
11. Describe an approach to converting a first normal form (1NF) table to second normal form (2NF) table(s).
12. Describe what is meant by full-functional dependency and describe how this type of dependency relates to 2NF. Provide an example to illustrate your answer.
13. Describe what is meant by transitive dependency and describe how this type of dependency relates to 3NF. Provide an example to illustrate your answer.
14. Discuss the purpose of Boyce-Codd normal form and describe how BCNF differs from and is stronger than 3NF. Illustrate your answer with an example.
15. Describe the concept of transitive dependency and explain how this concept is used to define 3NF.
16. What undesirable dependencies are avoided when a relation is in 2NF?
17. What undesirable dependencies are avoided when a relation is in 3NF?
18. Consider the following relation for published books:
BOOK(Book_title, Author_name, Book_type, List_Price, Author_affil, Publisel)
Author_affil refers to the affiliation of author. Suppose the following dependencies exist:
Book_title \rightarrow Publisher, Book_type
Book_type \rightarrow List_price
Author_name \rightarrow Author_affil
 - a) What normal form is the relation in? Justify your answer.
 - b) Apply normalization until you cannot decompose the relations further. State reason behind every decomposition.
19. Explain the meaning of functional dependency with suitable example. Convert below attribute in normalize form up to third normal form.
Project number, Project Name, Employee number, Employee name, Rate category, Hourly rate

Multiple choice questions:

1. The different classes of relations created by the technique for preventing modification anomalies are called:
 - a. normal forms.
 - b. referential integrity constraints.
 - c. functional dependencies.
 - d. None of the above is correct.
2. If $X \rightarrow Y$ and $Y \rightarrow Z$ then using transitive rule we can say
 - a. $X \rightarrow Y$
 - b. $Y \rightarrow Z$
 - c. $X \rightarrow Z$
 - d. $Z \rightarrow Y$
3. The set of all dependencies that include F as well as all dependencies that can be inferred from F is called
 - a. closure
 - b. minimal cover
 - c. cover
 - d. None of these

4. The property that guarantees that the spurious tuple generation should not occur is
 - a. Lossless Join
 - b. Dependency Preservation
 - c. Both (a) & (b)
 - d. None of these
5. A multivalued dependency is denoted by
 - a. $X \twoheadrightarrow Y$
 - b. $X \twoheadrightarrow Y$
 - c. $X \rightarrow Y$
 - d. None of above
6. An MVD $X \twoheadrightarrow Y$ in R is called a trivial MVD if
 - a. Y is subset of X
 - b. $XUY=R$
 - c. Both (a) and (b)
 - d. None of these
7. Dr. Codd published list of 12 rules in
 - a. 1970
 - b. 1985
 - c. 1990
 - d. 1987
8. The information rule specifies
 - a. All data should be presented in tabular form
 - b. All data should be accessible
 - c. A file should be allowed to remain empty
 - d. Both (a) and (b)
9. Lossless join is also called
 - a. lossy decomposition
 - b. composition
 - c. lossless join composition
 - d. lossy join decomposition
 - e. nonadditive join
10. Second normal form is based on
 - a. Partial functional dependency
 - b. Fully functional dependency
 - c. Dependency
 - d. Transitive dependency
11. Third normal form is based on the concept of
 - a. Partial functional dependency
 - b. Fully functional dependency
 - c. Dependency
 - d. Transitive dependency
12. The 1 NF attribute value is permitted a _____ value.
 - a. atomic
 - b. single
 - c. unique
 - d. multiple

State whether the below given statements are true or false:

1. Normalization is the process of removing anomalies from database design.
2. Normalization is the process of finding common data in the database.
3. Not being able to insert data because other data is required is an example of an insertion anomaly.
4. An insertion anomaly occurs when you enter data inaccurately.
5. An update anomaly occurs when you have to update the same data in multiple places.
6. An update anomaly occurs when you have date fields conflict in the database.
7. A deletion anomaly occurs when deleting a set of data accidentally deletes other unintended data.
8. A deletion anomaly occurs when you are unable to delete data in a primary key table because a foreign key table contains records related to that data.
9. Normal forms are sets of rules designed to remove anomalies and redundancy from database design.
10. Normal forms are the forms programmers create to access database data more easily.
11. The first normal form removes all repeating groups and arrays.
12. When all entities are in the first normal form, a database is ready to use.
13. Rather than put several values in a single column, you should create several columns and number them like column1, column2, etc.
14. Second normal form removes functional dependencies.
15. Second normal form combines several sub themes into one entity.

16. Functional dependencies consist of groups of related attributes that form subsets within an entity.
17. Functional dependency refers to one entity depending on another entity for its meaning.
18. Failure to normalize a database can lead to numerous problems.
19. Failure to normalize a database never causes problems.
20. Third normal form removes transient dependencies.
21. A transient dependency is where an attribute depends on another attribute for its meaning and not on the key.
22. A transient dependency is one that comes and goes.
23. If you have two related entities, one named Customer and one CustomerOrder, you should always add the customer's name to both entities because you know you will want to see the name with the order when you look at the data.

Fill in the blanks with appropriate answer.

1. The lossless join is also called _____.
2. The only attribute values permitted by 1NF are single _____ values.
3. A relation schema R is in BCNF if for every nontrivial functional dependency $X \rightarrow A$ holds in R, X is a _____.
4. Rule specifies that all data should be accessible without ambiguity.
5. Rule specifies that a field should be allowed to remain empty.
6. If $X \rightarrow Y$ then $XZ \rightarrow YZ$ is specified by _____ Rule.
7. If Y is not subset of X, then $X \rightarrow Y$ is called _____ dependency.
8. The process of storing the join of higher normal form relations as a base relation which is in a lower normal form is known as _____.
9. Second normal form is based on _____.
10. Third normal form is based on the concept of _____.
11. E.F CODD rules published in _____ year.
12. The only attribute values permitted by 1 NF are single _____.

Module 5 – Database language – Structured Query Language

Short answer questions:

1. What are the four objectives of the selection of a data type?
2. How do you insert a record with a null column?
3. What do you mean by NOT NULL WITH DEFAULT? When will you use it?
4. How do you eliminate duplicate values in DB2 SELECT?
5. What is relation? What are primary, candidate and foreign keys?
6. How do you retrieve the data from a null column in DB2?
7. What is composite primary key? Explain it with proper syntax and example.
8. What are two rules for giving a table name and column name while creating a table?
9. What is the difference between DELETE and DROP commands?
10. What do you mean by constraint?
11. Which clause is used to arrange the tuples of relation in some particular order?
12. Which clause is used to define criteria that determine the tuples to be retrieved or not?
13. What is the difference between CHAR and VARCHAR data type?

Long answer questions:

1. List and explain data types available in DB2.
2. Consider the following relations with keys underlined
Street (name, location, city)

House (number, street_name)

Lives (name, house_number)

Define the above relations as tables in SQL making real world assumptions about the type of the fields. Define the primary keys and the foreign keys.

3. What is NULL? Give an example to illustrate testing for NULL in DB2.
4. Explain the EXISTS and UNIQUE functions of SQL. Give an example for each.
5. List any five string functions and explain with proper use, syntax, description and example.
6. Consider the following relations:

EMP(ENO,ENAME,AGE,BASIC_SALARY)

WORK_IN(ENO,DNO)

DEPT(DNO,DNAME,CITY)

Express the following queries:

- (i) Find names of employees who work in a deptt. in Delhi.
- (ii) Get the deptt. number in which more than one employee is working.
- (iii) Find name of employee who earns highest salary in 'HR' department.

Multiple choice questions:

1. You can add a row using SQL in a database with which of the following?
a. ADD b. INSERT c. CREATE d. MAKE
2. The command to remove rows from a table 'CUSTOMER' is:
a. REMOVE FROM CUSTOMER
b. DELETE FROM CUSTOMER
c. DROP FROM CUSTOMER
d. UPDATE FROM CUSTOMER
3. The SQL WHERE clause
a. limit the row data b. limit the column data
c. both A and B d. neither A nor B
4. Which of the following is the original purpose of SQL?
a. To specify the syntax and semantics of SQL data definition language
b. To specify the syntax and semantics of SQL manipulation language
c. To define the data structures
d. All of the above.
5. The wildcard in a WHERE clause is useful when
a. An exact match is necessary in a SELECT statement.
b. An exact match is not possible in a SELECT statement.
c. An exact match is necessary in a CREATE statement.
d. An exact match is not possible in a CREATE statement.
6. The command to eliminate a table from a database is
a. REMOVE TABLE CUSTOMER; b. DROP TABLE CUSTOMER;
c. DELETE TABLE CUSTOMER; d. UPDATE TABLE CUSTOMER;
7. ON UPDATE CASCADE ensures which of the following?
a. Normalization b. Data Integrity c. Materialized Views d. All of the above.
8. Selecting a data type involves which of the following?
a. Maximize storage space b. Represent most values
c. Improve data integrity d. All of the above.
9. The SQL keyword(s) _____ is used with wildcards.
a. LIKE only b. IN only c. NOT IN only d. IN and NOT IN ONLY
10. Which of the following is the correct order of keywords for SQL SELECT statements?

- a. SELECT, FROM, WHERE b. FROM, SELECT, WHERE
c. WHERE, FROM, WHERE d. SELECT, WHERE FROM
11. A sub query in an SQL SELECT statement is enclosed in
a. Braces -- {...} b. CAPITAL LETTERS
c. Parenthesis -- (...) d. Brackets -- [...]
12. The result of a SQL SELECT statement is a(n) _____ .
a. REPORT b. FORM c. FILE d. TABLE
13. SQL data definition commands make up a(n) _____ .
a. DDL b. DML c. HTML d. XML
14. Which SQL command is used for update data?
a. SELECT b. DELETE c. UPDATE d. MODIFY
15. Which is not considered as DDL command?
a. CREATE b. MODIFY c. ALTER d. UPDATE

State whether the below given statements are true or false:

1. All table columns belong to a single column.
2. In the insert into SQL sentence, table columns and values have to be in one-to-many relationship.
3. The modify command is used to change or modify data values in a table.
4. The name of the table cannot be changed using the ALTER TABLE clause.
5. Business rules that have to be applied to data are completely system dependent.
6. A NULL is equivalent to a value of zero.
7. Setting a NULL is appropriate when the actual value is unknown.
8. A primary key column in a table is an optional column.
9. Drop the constraint using the DROP TABLE command with the DELETE clause.
10. At the time of table creation a default value can be assigned to a column.

Fill in the blanks with appropriate answer.

1. The attribute (or combination of attributes), whose values are distinct for each individual instance of an entity type is known as a _____.
2. A _____ is a database object that holds user data.
3. Table creation is done using the _____ syntax.
4. The _____ command is used to change or modify data values in a table.
5. All table columns belong to a _____.
6. The _____ constraints can only be applied at column level.
7. A single column primary key is called a _____ key.
8. _____ Keys represent relationships between tables.
9. Dropping UNIQUE and PRIMARY KEY constraints also drops all associated _____.
10. When a column is defined as not null, then that column becomes a _____ column.
11. The default behavior of the foreign key can be changed by using the _____ option.
12. _____ command used for modify data.
13. _____ command used for destroy table in database.
14. _____ command used for to change attribute data type in table
15. _____ command used for add new attribute in table.
16. _____ command used for erase data from table.

Module 6 – Retrieving Data using SQL

Short answer questions:

1. What are the different phases of transaction?
2. What do you accomplish by GROUP BY – HAVING clause?

3. Why SELECT * is not preferred in embedded queries?
4. How HAVING and WHERE clauses differ from each other?
5. How to sort the data in SQL?
6. What do you mean by Correlated subquery?
7. What is the difference between a correlated subquery and a regular subquery?
8. What is use of LIKE operator?
9. Can user use LIKE operator with IN operator in DB2? Justify.
10. What is the difference between Exist and Not Exist operators?
11. How can one combine data from multiple database tables?
12. What is "CROSS JOIN"? or What is Cartesian product?
13. Define join and its types.

Long answer questions:

1. Differentiate between the following:
(i) Theta Join (ii) Equi Join (iii) Natural Join (iv) Outer Join
2. How to retrieve and modify data in SQL with example?
3. How to use sub query UPDATE statement?
4. What do you mean by GROUPING? Explain with example.
5. Explain the use of IN, ANY and ALL in sub query.
6. What is use of HAVING clause? Explain with example.
7. Explain different type of joins in SQL with proper examples.
8. Explain the use of sub query in DELETE statement with suitable example.
9. What is use of ORDER BY clause? Explain with example.

Multiple choice question:

1. Which of the following are the five built-in functions provided by SQL?
 - a. COUNT, SUM, AVG, MAX, MIN
 - b. SUM, AVG, MIN, MAX, MULT
 - c. SUM, AVG, MULT, DIV, MIN
 - d. SUM, AVG, MIN, MAX, NAME
2. The HAVING clause does which of the following?
 - a. Acts like a WHERE clause but is used for groups rather than rows.
 - b. Acts like a WHERE clause but is used for rows rather than columns.
 - c. Acts like a WHERE clause but is used for columns rather than groups.
 - d. Acts EXACTLY like a WHERE clause
3. To remove duplicate rows from the results of an SQL SELECT statement, the _____ qualifier specified must be included
 - a. DISTINCT
 - b. UNIQUE
 - c. SINGLE
 - d. ONLY
4. Which of the following do you need to consider when you make a table in SQL?
 - a. Data types
 - b. PRIMARY keys
 - c. Default values
 - d. All of Above
5. Find the SQL statement below that is equal to the following: SELECT NAME FROM CUSTOMER WHERE STATE = 'VA';
 - a. SELECT NAME IN CUSTOMER WHERE STATE IN ('VA');
 - b. SELECT NAME IN CUSTOMER WHERE STATE = 'VA';
 - c. SELECT NAME IN CUSTOMER WHERE STATE = 'V';
 - d. SELECT NAME FROM CUSTOMER WHERE STATE IN ('VA');
6. Which one of the following sorts rows in SQL?
 - a. SORT BY
 - b. ALIGN BY
 - c. ORDER BY
 - d. GROUP BY
7. SQL can be used to:

- a. Create database structures. c. Query database data.
b. Modify database data. d. All of the above can be done by SQL.
8. The SQL statement that queries or reads data from a table is _____
a. Create database structures only.
b. Query database data only.
c. Modify database data only.
d. All of the above can be done by SQL.
9. The SQL keyword BETWEEN is used:
a. For ranges c. To limit the columns displayed.
b. As a wildcard. d. None of the above is correct
10. A sub query in SQL SELECT statement
a. Can only be used with two tables.
b. Can always be duplicated by a join.
c. Has a distinct form that cannot be duplicated by a join.
d. Cannot have its results sorted using ORDER BY.
11. What command used for remove duplicate rows
a. Distinct b. Unique c. Duplicate d. Removal
12. Data manipulation language enable users
a. Retrieval information stored in database.
b. Insertion of new information in database.
c. Deletion of information from database
d. All of above
13. Which SQL statement is used to extract data from a database?
a. SELECT b. GET c. OPEN d. EXTRACT
14. With SQL, how do you select a column named "FirstName" from a table named "Persons"?
a. SELECT Persons.FirstName
b. SELECT FirstName FROM Persons
c. EXTRACT FirstName FROM Persons
d. DISPLAY FirstName FROM Persons

State whether the below given statements are true or false:

1. For character data type the percent sign matches single character.
2. COUNT (<expr>) function returns the number of rows where <expr> is not null.
3. The LOWER function returns char, with all letters in lowercase.
4. The UPPER function returns a string with the first letter of each word in upper case.
5. The length function returns the length of a word.
6. The date data type is used to store date and time information.
7. Joining a table to itself is called equi-join.
8. The statement containing a sub query is called a parent statement.
9. If a select statement is defined as a sub query, the innermost select statement gets executed first.
10. In the union clause multiple queries can be put together but their outputs cannot be combined.
11. Unions can be used in sub queries.
12. The intersect clause outputs only rows produced by both the queries intersected.
13. The minus clause outputs the rows produced by the first query, before filtering the rows retrieved by the second query.

Fill in the blanks with appropriate answer.

1. The _____ predicate allows for a comparison of one string values with another string value which is not identical.
2. For character data types the _____ sign matches any string.
3. Functions that act on a set of values are called as _____, _____.
4. Variables or constants accepting by functions are called _____.
5. The _____ function returns a string with the first letter of each word in upper case.
6. The _____ function returns number of months between two dates.
7. The _____ functions converts a value of a DATE data type to CHAR value.
8. The _____ clause is another section of the select statement.
9. The _____ clause imposes a condition on the GROUP BY clause.
10. A sub query is also termed as _____ query.
11. The concept of joining multiple tables is called _____.
12. The _____ clause merges the output of two or more queries into a single set of rows and columns.
13. Multiple queries can be put together and their output combined using the _____ clause.
14. ABS function returns _____ type of value.
15. LENGTH function returns _____ type of value.