**Part 1: 40 pts**

**QN=1** A collection of programs that enables users to create and maintain a database, this is a definition of

a. Database

b. DBMS

c. Meta-data

d. Application program

**QN=2** Which of the below statements is true regarding databases?

1. A database represents some aspect of the real world, sometimes called the miniworld or the universe of discourse (UoD). Changes to the miniworld are reflected in the database.
2. A database is a logically coherent collection of data with some inherent meaning. A random assortment of data cannot correctly be referred to as a database.
3. A database is designed, built, and populated with data for a specific purpose.It has an intended group of users and some preconceived applications in which these users are interested.
4. All of these statements.

**QN=3** The people whose jobs require access to the database for querying,

updating, and generating reports; the database primarily exists for their using. What type of this user?

a. DBA

b. End users

c. Database designer

d. System Analysts and Application Programmers

**QN=4** The components of Database system:

a. Users, Database application, DBMS, Database

b. Users, Data, DBMS, Information

c. Programmer, Database Admin, Database Application, Database

d. Programmer, Data, DBMS, Database Application

**QN=5** Which of the following is not a relation-algebra operation?

a. Select

b. Union

c. Rename

d. Addition

**QN=6** Which of the following is not a binary operation?

a. Union

b. Project

c. Set difference

d. Cartesian product

**QN=7** The attribute that can be divided into other attributes is called?

a. Simple attribute

b. Composite attribute

c. Multi-valued attribute

d. Derived attribute

**QN=8** The minimal set of super keys are called?

a. Superkeys

b. Candidate keys

c. Attribute keys

d. Foreign keys

**QN=9**  Which of the following relational algebra operations require that both tables involved have the exact same attribute/data types?

a. Join, Projection

b. Multiplication and Division

c. Union, Intersection, Minus

d. Project, Selection, Rename

**QN=10** Which of the following is a data model?

a. Entity relationship model

b. Relational data model

c. Object-relational data model

d. Object oriented data model

e. Hierarchical Data Model

f. All of these answers

**QN=11** A single row of a table that has a single record for such a relation is known as a

a. Domain

b. Tuple

c. Relation

d. Schema

**QN=12** The attribute that can be derived from other attributes is called?

a. Simple attribute

b. Composite attribute

c. Multi-valued attribute

d. Derived attribute

**QN=13** If every non-key attribute is fully functional dependent on the primary key, the relation will be on

a. First normal form

b. Second normal form

c. Third normal form

d. Fourth normal form

**QN=14** Functional dependencies are the type of constraints that are based on

a. Key

b. Superkey

c. Primary key

d. Candidate key

e. All of these answers

**QN=15** Which is a bottom-up approach to database design that design by examining the relationship between attributes?

a. Functional dependency

b. Database modeling

c. Normalization

d. Decomposition

**QN=16** Which of the following concepts is applicable with respect to 2NF?

a. Full functional dependency

b. Partial dependency

c. Transitive dependency

d. Non-transitive dependency

e. Data independence

**QN=17** In a relational model, cardinality is termed as

a. A number of tuples

b. A number of attributes

c. A number of tables

d. A number of constraints

**QN=18** The result of the UNION operation between R1 and R2 is a relation that includes

a. All the tuples of R1

b. All the tuples of R2

c. All the tuples of R1 and R2

d. All the tuples of R1 and R2 which have common attributes

**QN=19** A data manipulation command that combines the records from one or more tables is called

a. SELECTION

b. PROJECTION

c. JOIN

d. PRODUCT

**QN=20** The following functional dependencies are given:

U = {A,B,C,D,E,G} và F = {C→G, BG → CD, AEG → BC, CG → AE, B → CG }Which one of the following options is true?

a. {C}+ = {AECDBG}

b. {B}+ = {ACDEBG}

c. {AE}+ = {ACDEBG}

d. {A}+ = {ACDEBG}

**Part 2: 60 pts**

Giving a database schema:

* Sailors(sid: *integer*, sname: *string*, rating: *integer*, age:*real*)
* Boats(bid:*integer* , bname: *string*, color: *string*)
* Reserves(sid: *integer*, bid: *integer* , day: *date* )

|  |  |  |  |
| --- | --- | --- | --- |
| ***Sid*** | ***Sname*** | ***Rating*** | ***Age*** |
| 22 | Dustin | 7 | 45.0 |
| 29 | Brutus | 1 | 33.0 |
| 31 | Lubber | 8 | 55.5 |
| 32 | Andy | 8 | 25.5 |
| 58 | Rusty | 10 | 35.0 |
| 64 | Horatio | 7 | 35.0 |
| 71 | Zorba | 10 | 16.0 |
| 74 | Horatio | 9 | 35.0 |
| 85 | Art | 3 | 25.5 |
| 95 | Bob | 3 | 63.5 |

|  |  |  |
| --- | --- | --- |
| ***Sid*** | ***Bid*** | ***Day*** |
| 22 | 101 | 10/10/08 |
| 22 | 102 | 10/10/08 |
| 22 | 103 | 10/08/08 |
| 22 | 104 | 10/07/08 |
| 31 | 102 | 11/10/08 |
| 31 | 103 | 11/06/08 |
| 31 | 104 | 11/12/08 |
| 64 | 101 | 9/05/08 |
| 64 | 102 | 9/08/08 |
| 74 | 103 | 4/08/08 |
| 64 | 108 | 1/06/08 |
| 22 | 107 | 19/08/08 |
| 74 | 106 | 4/09/08 |

|  |  |  |
| --- | --- | --- |
| ***Bid*** | ***Bname*** | ***Color*** |
| 101 | Interlake | Blue |
| 102 | Interlake | Red |
| 103 | Clipper | Green |
| 104 | Marine | Red |
| 105 | Interlake | Blue |
| 106 | Voyage | Yellow |
| 107 | Sharper | Grey |
| 108 | Marine | White |

**Sailors**

**Reserves**

**Boats**

**Using relational algebra expression to answer the below queries**

1. Find the names of sailors who have not reserved any boat
2. Find the names of sailors who have reserved only 1 red boat

1. Find the total number of boats reserved by each sailor.
2. Find the names of sailors who have reserved the highest number of boats.
3. Find the names of sailors who have reserved more than 4 colored boats.
4. Find the sids, snames of sailors with age between 20 and 40 who have not reserved any boats.
5. Find the age of sailors who have reserved all boats
6. Find the day Interlake is reserved.
7. Find the rating of sailors who have reserved more boats than Horatio.
8. Find total boat reserved by Dustin and Lubber