Faculty of Electronic Eng.
Computer Science and Eng. Dept.
Fourth Year
First Term Final Exam.

جامعة المنوفية

Subject: Advanced Database Systems
Date: 20/1/2019
Time: 3 Hours Total Marks: 90
Examiner: Dr. Mohammed Badawy

Answer the following questions:

Question One **Choose the correct answer** **(28 Marks)**

1. Count function in SQL returns the number of
(a) values (b) distinct values.
(c) groups (d) columns.

2. In the _____ normal form, a composite attribute is converted to individual attributes.
(a) First (b) Second (c) Third (d) Fourth

3. The EXISTS keyword will be true if:
(a) Any row in the subquery meets the condition only
(b) All rows in the subquery fail the condition only
(c) Both of these two conditions are met
(d) Neither of these two conditions is met

4. Functional Dependencies are the types of constraints that are based on_____
a) Key b) Key revisited
c) Superset key d) None of the mentioned

5. It is possible to define a schema completely using
(a) VDL and DDL. (b) DDL and DML.
(c) SDL and DDL. (d) VDL and DML.

6. All aggregate functions except _____ ignore null values in their input collection.
(a) Count(attribute) (b) Count(*)
(c) Avg (d) Sum

7. We can test for the nonexistence of tuples in a subquery by using the _____ construct.
(a) Not exist (b) Not exists
(c) Exists (d) Exist

8. Which of the following database object does not physically exist?
(a) base table (b) view
(c) index (d) none of the above

9. Aggregate functions can be used in the select list or the_____clause of a select statement or subquery. They cannot be used in a _____ clause.
(a) Where, having (b) Group by, where
(c) Having, where (d) Group by, having

10. Authorization on a relation allows a user to update any tuple in relation, is known to be
(a) select authorization (b) grant authorization
(c) update authorization (d) define authorization

11. Which forms are based on the concept of functional dependency:
(a) 1NF (b) 2NF (c) 3NF (d) 4NF

12. Which of the following is not an aggregate function?
(a) Avg (b) Sum (c) With (d) Min

13. A DBMS query language is designed to
(a) support end users who use English-like commands.
(b) support in the development of complex applications software.
(c) specify the structure of a database.
(d) all of the above.

14. Authentication refers to:
(a) methods of restricting user access to system
(b) controlling access to portions of database
(c) controlling the operation on the data
(d) all of the above

15. Which of the following is an advantage of view?
(a) Data security (b) Derived columns
(c) Hiding of complex queries (d) All of the above

16. Data security threats include:
(a) privacy invasion (b) hardware protection
(c) fraudulent manipulation of data
(d) all of the above

17. To revoke an authorization, we use statement
(a) Revoke (b)Modify
(c) Alter (d) Define

18. Which of the following terms indicates that information is to be read only by those people for whom it is intended?
(a) Confidentiality (b) integrity (c) availability

19. What is used to identify a person before giving access?
(a) Authentication (b) encryption
(c) access control (d) auditing

20. What is the process of identifying an individual?
(a) Authentication (b) authorization
(c) Accounting (d) auditing

21. Which one of the following is not true for a view:
(a) View is derived from other tables.
(b) A view definition is permanently stored as part of the database.
(c) View is a virtual table.
(d) View never contains derived columns.

22. Data integrity means:
(a) providing first access to stored data
(b) ensuring correctness and consistency of data
(c) providing data sharing
(d) none of the above

23. What is the process of giving individual access to a system or resource?
(a) Authentication (b) authorization
(c) Accounting (d) auditing

24. Which of the following makes sure that data is not changed when it not supposed to be?
(a) Confidentiality (b)integrity
(c) Availability (d) accounting

25. Prevention of access to the database by unauthorized users is referred to as:
(a) Integrity (b) Productivity
(c) Security (d) Reliability

26. SQL authorization mechanism grants privileges on
(a) Entire relation (b) Specified attributes
(c) Both A and B (d) Specified tuples

27. Which concept determines what resources users can access after they log on?
(a) Authentication (b) auditing
(c) access control (d) defense in depth

28. What technology is not used to implement confidentiality?
(a) Encryption (b) access controls
(c) Auditing (d) authentication

Question Two (20 Marks)

Given the following relational database state

Name	Age	Salary
Abel	63	120,000
Baker	38	42,000
Jones	26	36,000
Murphy	42	50,000
Zenith	59	118,000
Kobad	27	34,000

SALESPERSON

Number	CustName	SalespersonName	Amount
100	Abernathy Construction	Zenith	560
200	Abernathy Construction	Jones	1800
300	Manchester Lumber	Abel	480
400	Amalgamated Housing	Abel	2500
500	Abernathy Construction	Murphy	6000
600	Tri-City Builders	Abel	700
700	Manchester Lumber	Jones	150

ORDER

Name	City	IndustryType
Abernathy Construction	Willow	B
Manchester Lumber	Manchester	F
Tri-City Builders	Memphis	B
Amalgamated Housing	Memphis	B

CUSTOMER

a) In SQL, specify the following queries:
1. Retreive the name of the oldest salesperson. Show the result of your query
2. Retreive the names and ages of salespeople who have an order with Abernathy Construction, in descending order of age (use a subquery). Show the result of your query

3. Retreive the names of salespeople who have two or more orders. Show the result of your query
4. Retreive the order number and its amount that sold by a salesperson with salary more than 50,000. Show the result of your query

b) Specify a **view** that has the order number, customer name, industry type, salesperson name and age. Show the contents of the view.

Question Three (11 Marks)

Consider the relation T(A,B,C,D,E,F,G,H), and Suppose the following dependencies exist:

FD1: D,E → A,B,C; FD2: D→F; FD3: E→G,H; FD4: H → G

Suppose that the key of the relation is {D,E}.

a) What normal form is the relation in? Why?

b) Apply normalization until you cannot decompose the relations further. State the reasons behind each decomposition.

Question Four (10 Marks)

Consider the COMPANY relational database schema shown above. Suppose that all the relations were created by (and hence are owned by) user X, who wants to grant the following privileges to user accounts A, B, and C:

a) Account A can retrieve or modify any relation except DEPENDENT and can grant any of these privileges to other users.

b) Account B can retrieve any attribute of EMPLOYEE or DEPENDENT and can modify DEPENDENT.

c) Account C can retrieve any attribute of EMPLOYEE but only for EMPLOYEE tuples that have Dno = 3.

Write SQL statements to grant these privileges. Use views where appropriate.

Question Five (21 Marks)

a) Consider the data set shown in Figure 1. Apply the **Apriori** algorithm. Assume minimum support value is 0.3.

b) Use the data in Figure 2. Construct a classification tree starting from the **income** attribute.

TID	Produce
1	MILK, BREAD, EGGS
2	BREAD, SUGAR
3	BREAD, CEREAL
4	MILK, BREAD, SUGAR
5	MILK, CEREAL
6	BREAD, CEREAL
7	MILK, CEREAL
8	MILK, BREAD, CEREAL, EGGS
9	MILK, BREAD, CEREAL

Figure 1

Record	*age*	*ownhouse?*	*married?*	*income*	*gender*	*class*
1	22	no	no	28,000	male	bad
2	46	no	yes	32,000	female	bad
3	24	yes	yes	24,000	male	bad
4	25	no	no	27,000	male	bad
5	29	yes	yes	32,000	female	bad
6	45	yes	yes	30,000	female	good
7	63	yes	yes	58,000	male	good
8	36	yes	no	52,000	male	good
9	23	no	yes	40,000	female	good
10	50	yes	yes	28,000	female	good

Figure 2

c) Given are the points A = (1,2), B = (2,2), C = (2, 1), D = (-1, 4), E = (-2, -1), F = (-1,-1). Starting from initial clusters Cluster1 = {A} which contains only the point A and Cluster2 = {D} which contains only the point D. Run the **K-means** clustering algorithm and report the final clusters.

Best Wishes

Dr. Mohammed Badawy