



**PAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMPUTING AND INFORMATICS**

DEPARTMENT OF COMPUTER SCIENCE

<b>QUALIFICATION:</b> BACHELOR OF COMPUTER SCIENCE HONOURS (INFORMATION SECURITY)	
<b>QUALIFICATION CODE:</b> 08BHIS	<b>LEVEL:</b> 8
<b>COURSE:</b> Database Security and Data Protection	<b>COURSE CODE:</b> DSD821S
<b>DATE:</b> NOVEMBER 2019	<b>SESSION:</b> 1
<b>DURATION:</b> 3 hours	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
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**THIS QUESTION PAPER CONSISTS OF 6 PAGES**  
(Excluding this front page)

**INSTRUCTIONS**

1. Answer ALL the questions.
2. Write clearly and neatly.
3. Number the answers clearly.
4. When answering questions you should be guided by the allocation of marks in [ ]. Do not give too few or too many facts in your answers.

**PERMISSIBLE MATERIALS**

1. Non programmable Scientific Calculator.

### **SECTION A (Multiple Choice questions – 10 marks)**

1. Why is it better to use an INTEGRITY CONSTRAINT to validate data in a table than to use a STORED PROCEDURE?
  - A. Because the stored procedure occupies more space in the database than an integrity constraint definition
  - B. Because an integrity constraint is automatically checked while data is inserted into or updated in a table while a stored procedure has to be specifically invoked
  - C. Because a stored procedure creates more network traffic than an integrity constraint definition
  - D. All pf the above
  
2. What is a trigger
  - A. A piece of logic written in PL/SQL
  - B. Executed at the arrival of a SQL\*FORMS event
  - C. Both A & B
  - D. None of the above
  
3. All datafiles related to a Tablespace are removed when the Tablespace is dropped
  - A. TRUE
  - B. FALSE
  
4. Can an Integrity Constraint be enforced on a table if some existing table data does not satisfy the constraint?
  - A. Yes
  - B. No
  
5. After a server crash due to power failure, what is needed?
  - A. Manual database recovery
  - B. The `STARTUP RECOVER` command
  - C. Automatic rollback of previously unfinished transactions
  - D. Empty out buffers
  - E. Reset the log files
  
6. A User can
  - A. Be assigned multiple roles
  - B. Have multiple schemas
  - C. Have the privilege to access one or more table spaces
  - D. Have an authorization method that does not require a password
  - E. Have multiple concurrent sessions

7. What does the Listener NOT do?
- A. Create a server process
  - B. Monitor network traffic on a particular port
  - C. Receive requests to connect to one or more databases
  - D. Keep a client session active
  - E. Provide network listening services for non-Oracle applications
8. Several DBMS packages contain features that allow the creation of a(n) \_\_\_\_\_, which automatically records a brief description of the database operations performed by all users.
- A. Digital footprint
  - B. Audit log
  - C. Scheduler
  - D. SQL Loader
9. DDL triggers can be applied to \_\_\_\_\_ statement.
- A. CREATE
  - B. UPDATE
  - C. DELETE
  - D. INSERT
10. Which statement is not true?
- A. DDL trigger can be used to observe and control actions performed on the server, and to audit these operations
  - B. DML trigger can be used to observe and control actions performed on the server, and to audit these operations
  - C. DDL triggers can be used to manage administrator tasks such as auditing and regulating database operations
  - D. None of the mentioned

## **SECTION B**

### **Question 1**

- a. Distinguish between. [6]
- a. Validation and verification
  - b. Confidentiality and privacy
  - c. System privileges and object privilege
- b. Database administrators can use triggers to protect and audit a database. Outline at least three advantages two and disadvantages of using database triggers for auditing. [10]
- c. Outline two ways by which database views can protect data in a database. [4]

### **Question 2**

Giving examples explain how the following techniques can be used to secure a statistical database. [10]

- i. Access Restriction
- ii. Query Set Restriction
- iii. Microaggregation
- iv. Data Perturbation
- v. Output Perturbation
- vi. Auditing

### **Question 3**

One way of protecting a database in a client-server setup is to restrict network access. This can be achieved by use of a firewall and protecting the listener among other means.

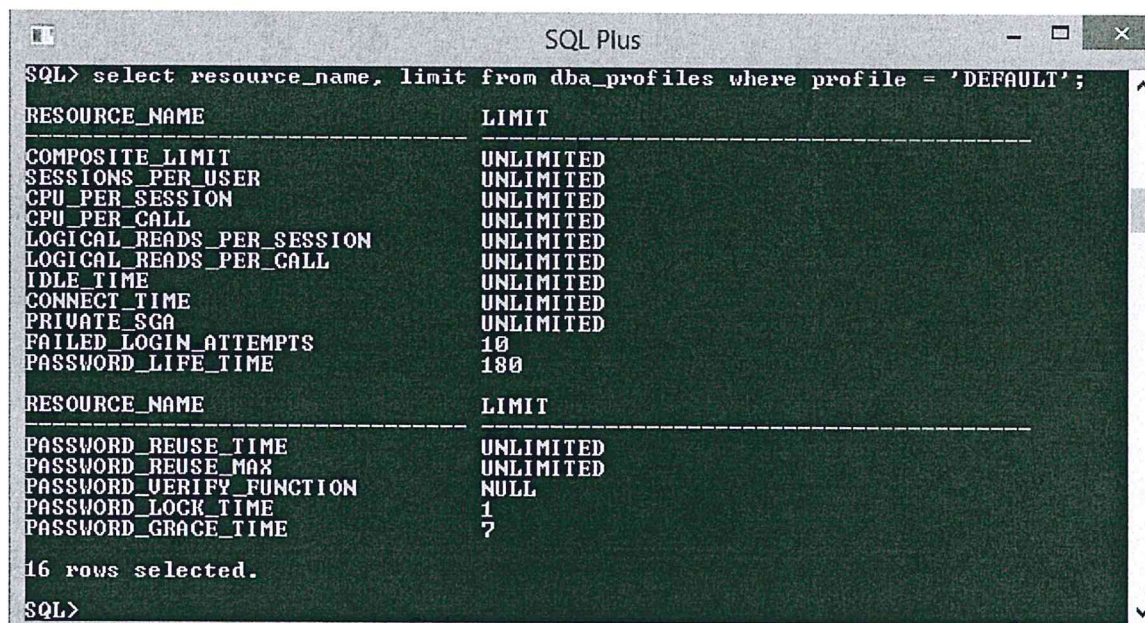
- a. Why is it important to protect the listener? [2]
- b. Describe four ways of protecting a listener. [8]

#### Question 4

As a DBA employed in a large enterprise that employs hundreds of employees you run the SQL command

```
SELECT resource_name, limit FROM dba_profiles where profile = 'DEFAULT'
```

The results of the query are shown in Figure 4.1.



```
SQL Plus
SQL> select resource_name, limit from dba_profiles where profile = 'DEFAULT';
RESOURCE_NAME          LIMIT
-----
COMPOSITE_LIMIT        UNLIMITED
SESSIONS_PER_USER      UNLIMITED
CPU_PER_SESSION        UNLIMITED
CPU_PER_CALL           UNLIMITED
LOGICAL_READS_PER_SESSION UNLIMITED
LOGICAL_READS_PER_CALL UNLIMITED
IDLE_TIME              UNLIMITED
CONNECT_TIME          UNLIMITED
PRIVATE_SGA            UNLIMITED
FAILED_LOGIN_ATTEMPTS  10
PASSWORD_LIFE_TIME     180

RESOURCE_NAME          LIMIT
-----
PASSWORD_REUSE_TIME    UNLIMITED
PASSWORD_REUSE_MAX     UNLIMITED
PASSWORD_VERIFY_FUNCTION NULL
PASSWORD_LOCK_TIME     1
PASSWORD_GRACE_TIME    7

16 rows selected.
SQL>
```

Figure 4.1

As a DBA who is concerned about the security of your organization, suggest, giving reasons, any improvements that can be effected on the DEFAULT profile to make it more secure.

[10]

#### Question 5

- One solution to the concurrency problems is locking but this produces deadlocks. What is a deadlock? [1]
- Produce a wait-for-graph for the following transaction scenario and determine whether deadlock exists. [9]

Transaction	Data item locked by transaction	Data items transaction is waiting for
T <sub>1</sub>	X <sub>2</sub>	X <sub>1</sub> , X <sub>3</sub>
T <sub>2</sub>	X <sub>3</sub> , X <sub>10</sub>	X <sub>7</sub> , X <sub>8</sub>
T <sub>3</sub>	X <sub>8</sub>	X <sub>4</sub> , X <sub>5</sub>
T <sub>4</sub>	X <sub>7</sub>	X <sub>1</sub>
T <sub>5</sub>	X <sub>1</sub> , X <sub>5</sub>	X <sub>3</sub>
T <sub>6</sub>	X <sub>4</sub> , X <sub>9</sub>	X <sub>6</sub>
T <sub>7</sub>	X <sub>6</sub>	X <sub>5</sub>

## Question 6

Study the following passage that was taken from the INFORSECURITY MAGAZINE website and answer the questions that follow below the passage.

### **Data of 92 Million Brazilians for Sale on Underground Auction Site**

- 1 The personal data of 92 million Brazilian citizens has been discovered for sale to the highest bidder  
2 on an underground forum auction.
- 3 According to BleepingComputer, the auction is present on multiple dark web marketplaces that can  
4 only be accessed by paying a fee or via an invitation from someone who is already on the inside.
- 5 The information is being sold as a 16GB database in SQL format and has a starting price of \$15,000  
6 and a step-up bid of \$1,000. According to its seller, X4Crow, the records include names, dates of birth,  
7 taxpayer IDs, and some address details.
- 8 A sample of the database, which was seen and verified as genuine by BleepingComputer, also  
9 contained information relating to gender and the names of individuals' mothers.
- 10 The origin of the database is unclear, though the inclusion of the taxpayer IDs and the seller's claims  
11 that it contains the unique information of 92 million Brazilian citizens could indicate that it's a  
12 government database of the approximately 93 million Brazilians who are currently employed.
- 13 In addition to offering the data for sale, X4Crow claims that they can retrieve data available in  
14 national identification documents, such as ID cards and driving licenses, together with phone  
15 numbers, email addresses, previous addresses, professions, education levels, and vehicles. And all  
16 they need to do it is the individual's full name, taxpayer ID, or phone number.
- 17 Under Article 18 of the Brazilian General Data Protection Law ("Lei Geral de Proteção de Dados" or  
18 "LGDP"), consumers have rights relating to their data, and organizations need to ensure personal  
19 data is anonymized, redacted, or eliminated. Unfortunately, the law does not go into effect until  
20 August 15, 2020, a six-month extension from the previous February 2020 date.
- 21 Jonathan Deveaux, head of enterprise data protection with comferte AG, believes that in the future,  
22 companies may rely more on methods like tokenization to protect valuable consumer data.
- 23 He said: "An emerging best practice among many technology leaders is to adopt a data-centric  
24 security approach, which protects personal data with anonymization technology like tokenization.
- 25 "Not only does tokenization allow organizations to meet compliance requirements and remain  
26 secure, but tokenization also allows organizations to securely embrace modern technology like  
27 hybrid or multi-cloud computing, which has been scrutinized as having major data security gaps.

