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### **University Examinations 2023/2024**

#### **SECOND YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER SECURITY AND FORENSICS**

#### **CCF 3251: DATABASE SECURITY**

**DATE: APRIL 2024**

**TIME: 2 HOURS**

**INSTRUCTIONS:** *Answer question one and any other two questions*

#### **QUESTION ONE (30 MARKS)**

- a) Describe the phases within the data security lifecycle model [4 marks]
- b) Give four reasons why the above model is recommended [4 marks]
- c) Discuss the roles a DBA within an enterprise network [2 marks]
- d) Explain the concept of object permissions of MySQL users on windows [2 marks]
- e) Compare and contrast discretionary and mandatory access control [2 marks]
- f) Explain how Linux manages users, directory, and file permissions [4 marks]
- g) Compare and contrast the database security and Operating system security [2 marks]
- a) Explain the implementation of access control in a distributed database [2 marks]
- b) A senior manager is recorded as being in his office late one night. Subsequently at the time he was in his office the audit trail records several unsuccessful attempts to access database objects using a password of a member of clerical staff to objects to which the manager had



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no rights of access. What are the threats in the case below? Explain the nature of the threats [4 marks]

- c) Distinguish between the application-level security features and the operating system level security [2 marks]
- d) Describe the log-in process and its role in database security [2 marks]
- e) Explain the nature and use of surrogate information [4 marks]

## **QUESTION TWO (20 MARKS)**

- a) Explain the steps involved in an SQL injection [4 marks]
- b) Discuss four security solutions for web databases [4 marks]
- c) Explain four remedies for SQL injection [4 marks]
- d) Oracle supports 2 types of privileges. Describe each [4 marks]
- e) Privileges can be granted to users or roles. Using SQL statements, demonstrate [4 marks]

## **QUESTION THREE (20 MARKS)**

- a) Describe the three main categories of database security threats [4 marks]
- b) In order to protect against threats, discuss four kinds of countermeasures which can be implemented [4 marks]
- c) Define the following terms:
  - i. Data modeling
  - ii. Entity type
  - iii. Cardinality
  - iv. Attribute[4 marks]
- d) Explain how the following data models are used in practice [4 marks]
  - i. Conceptual



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- ii. Logical
- iii. Physical

e) The security of a DBMS is only as good as the OS. Describe any four computer-based security controls [4 marks]

#### **QUESTION FOUR (20 MARKS)**

- a) Distinguish between authorization and authentication features within Linux and Windows Operating System. Give examples [4 marks]
- b) SQL command GRANT/REVOKE are powerful tools to achieve access control. Discuss using code snippets. [4 marks]
- c) Describe the five safety practices in the design and implementation of a database [4 marks]
- d) Explain any four approaches to secure DBMS on the Web [4 marks]
- e) Discuss the importance of Database security and Operating system security [4 marks]

#### **QUESTION FIVE (20 MARKS)**

- a) Discuss any four non-computer-based security controls [4 marks]
- b) Explain the characteristics of role-based access control [4 marks]
- c) Discuss the issues within the data protection and privacy act [4 marks]
- d) Describe the security strategies used in statistical databases [4 marks]
- e) Explain four web database security issues [4 marks]



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