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**UNIVERSITY EXAMINATIONS  
2023/2024 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS  
YEAR FOUR SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE OF  
(COMPUTER SCIENCE)**

**COURSE CODE: CSC 461 E**

**COURSE TITLE: DATABASE ADMINISTRATION  
AND PROGRAMMING**

**DATE: 19/12/2023**

**TIME: 09:00 HRS – 11:00 HRS**

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**INSTRUCTIONS TO CANDIDATES**

**ANSWER QUESTIONS ONE AND ANY OTHER TWO.**

### QUESTION ONE (COMPULSORY) [30 MARKS]

- a. What is a database journal? [1 Mark]
- b. Given user A and user B are transacting and updating record in the same table, with the aid of a diagram, simulate a dirty read as result of concurrent execution, clearly indicating the best way to recover the transaction. [6 Marks]
- c. In a busy network operation center, there have been several cases of security breach. You have been hired as a consultant to help settle the matter. Illustrate three approaches you would use to seal the loopholes. [6 Marks]
- d. A database administrator was invited to a board of management meeting to substantiate his choice of a database management system which he had advised the organization to procure. Most of the board members had little understanding about a database system. Assume his role and negotiate with the board to convince them on why your choice of database system is the best. [8 Marks]
- e. In database administration, backup is a very critical aspect. While choosing a database management system, compare *five* aspects of the backup facilities that would guide you into making your choice of DBMS for an organization. [5 Marks]
- f. Giving examples, differentiate:
  - i. System Privileges
  - ii. Object Privileges[4 Marks]

### QUESTION TWO [20 MARKS]

- a. Differentiate between a role, a privilege and a right, clearly indicating their relationship [4 Marks]
- b. Explain four Mechanisms which may be put in place to facilitate restoration of a database quickly and accurately after loss or damage. [8 Marks]
- c. The locking-based mechanisms for concurrency control comes with its own challenges! Discuss the challenges and how the DBMS can to prevent them. [8 Marks]

### QUESTION THREE [20 MARKS]

- a. Database performance is determined by several parameters. Describe four aspects of database system that a database administrator needs to monitor. [6 Marks]
- b. With the aid of a diagram, show how roll forward database recovery works. [4 Marks]
- c. Describe giving examples the optimistic methods of concurrency control [7 Marks]
- d. Explain three routine maintenance jobs that can be carried out by a database administrator in an organization [3 Marks]

#### QUESTION FOUR [20 MARKS]

- a. Describe, with examples, the types of problem that can occur in a multi-user environment when concurrent access to the database is allowed. [6 Marks]
- b. To move KES 20,000 from Martin's current bank account to his Mpesa account, you need to perform at least three steps:
- Make sure his current bank account balance is greater than KES 20,000.
  - Subtract KES 20,000 from his Current bank account balance.
  - Add KES 20,000 to his MPESA savings account balance.

Assuming the process was successful, write a transaction for the entire process. [6 Marks]

- c. Explain the following concepts as used in database security. [8 Marks]
- i. Firewall
  - ii. Secure Socket Layer protocol
  - iii. Encryption
  - iv. Security Auditing

#### QUESTION FIVE [20 MARKS]

- a. Describe four features that will enhance database integrity. [4 Marks]
- b. Databases are bound to fail due to various factors. Analyze four options that a database administrator can choose to respond to the failure, indicating the circumstances most suitable for each. [8 Marks]
- c. Briefly explain the role of the following process in database administration [8 Marks]
- i. Listener
  - ii. Optimizer
  - iii. Scheduler
  - iv. Lock Manager