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(KNOWLEDGE FOR DEVELOPMENT)

**KIBABII UNIVERSITY**  
**KIBU**

**UNIVERSITY EXAMINATIONS**  
**2020/2021 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS**  
**THIRD YEAR FIRST SEMESTER EXAMINATION**

**FOR THE DEGREE IN**  
**(INFORMATION TECHNOLOGY)**

**COURSE CODE : BIT 316**

**COURSE TITLE : DATABASE ADMINISTRATION**

**DATE: 19/07/2021**

**TIME: 9.00AM-11.00AM**

**INSTRUCTIONS TO CANDIDATES**

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

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

- a) Locking is used in Concurrency Control to Guarantees exclusive use of a data item. Discuss the levels of locking. [6 Marks]
- b) Database security can be characterized based on various dimensions, explain the dimensions [5 Marks]
- c) To move KES 20,000 from Jane's checking account to her savings account, you need to perform at least three steps: [6 Marks]
- Make sure her checking account balance is greater than KES 20,000.
  - Subtract KES 20,000 from her checking account balance.
  - Add KES 20,000 to her savings account balance.

Assuming the process was successful, write a transaction for the entire process.

- d) Use an example to explain the meaning of the term "dirty read" in transaction. [3 marks]
- e) Explain each of the following terms as used in data recovery in database systems [6 Marks]
- Check point
  - Manual reprocessing
  - Immediate update
- f) Describe some bottlenecks in DBMS performance and propose some solutions used in DBMS performance tuning. [4 Marks]

### QUESTION TWO [20 MARKS]

- a) Outline three limitations Hash indexes in MySQL server. [3 Marks]
- b) Distinguish between *execution-time* and *wait analysis* as used in database profiling. [2 Marks]
- c) As a query progresses through its lifecycle, its state changes many times, explain three of the states [5 Marks]
- d) Consider a transaction in a banking database where a bank customer transfers money from a saving account #3208 to a checking account #3209, the transaction can consist of four operations
- Check balance in account #3208
  - Decrement the saving account
  - Increment the checking account
  - Record the transaction in the transaction log



- e) Write the SQL statement that would execute the four transaction [6 Marks]
- f) Briefly explain the role of a scheduler in concurrency Control [4 Marks]

### QUESTION THREE [20 MARKS]

- a) Explain the meaning of concurrency and its usefulness in DBMS. [3 Marks]
- b) With the aid of a diagram explain the process MySQL follows when executing queries. [6 marks]
- c) John an I.T graduate applied for a job at the Independent Electoral Commission to work as database administrator, outline four duties expected under the job description. [4 marks]
- d) Outline three simplest query cost metrics used in MySQL server. [3 marks]
- e) Explain two privileges used in database administration used to grant access to a named object. [4 marks]

### QUESTION FOUR [20 MARKS]

- a) The commands **COMMIT** and **ROLLBACK** are used to help maintain database consistency during transaction management. Briefly discuss each [2 Marks]
- b) Explain how each of the following mechanisms contribute to providing security for a database
- (i) Authorization [2 Marks]
  - (ii) Authentication [2 Marks]
  - (iii) Back up [2 Marks]
  - (iv) Recovery [2 Marks]
- c) For a transaction to either abort or commit there are other states that it must undergo. Briefly explain the states that a transaction must undergo [5 Marks]
- d) What are the necessary condition that necessitates a roll back or a rollforward be done on an executing transaction [5 Marks]

### QUESTION FIVE [20 MARKS]

- a) What is the difference between a rule-based optimizer and a cost-based optimizer? [4 Marks]
- b) Define the term deadlock and outline the two main methods of dealing with a deadlock problem [5 Marks]
- c) Define the term timestamp in relation to a transaction [2 Marks]

- d) With the aid of an example briefly discuss the two deadlock prevention schemes that use timestamping [5 Marks]
- e) Give the significant differences on the schemes discuss in (ii) above operate [4 Marks]