(Knowledge for Development)

KIBABII UNIVERSITY (KIBU)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

END OF SEMESTER EXAMINATION

2021/2022 ACADEMIC YEAR

THIRD YEAR FIRST SEMESTER EXAMINATION

FOR THE DEGREE OF BACHELORS OF SCIENCE IN

(INFORMATION TECHNOLOGY)

COURSE CODE: BIT 316

COURSE TITLE: DATABASE ADMINISTRATION

DATE: 23/05/2022   **TIME: 9.00 A.M. – 11.00 A.M.**   **2HRS**

INSTRUCTIONS TO CANDIDATES:

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

Paper Consists of 3 Printed Pages. Please Turn Over ▶

QUESTION ONE (COMPULSORY) [30 MARKS]

a) Explain three routine maintenance jobs that can be carried out by a database administrator in an organization [6 Marks]

b) Explain the circumstances under which a database transaction may achieve each of the following properties: [6 Marks]
   i) Atomicity
   ii) Consistency
   iii) Isolation

c) To move KES 20,000 from Alex's MPESA account to his Mshwari savings account, you need to perform at least three steps:
   - Make sure his MPESA account balance is greater than KES 20,000.
   - Subtract KES 20,000 from his MPESA account balance.
   - Add KES 20,000 to his Mshwari savings account balance.

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

d) With the aid of an example in each case distinguish between binary and shared locks in concurrent transaction management [4 Marks]

e) Distinguish between system privileges and object privileges as part of database security mechanisms [4 Marks]

f) Explain two recovery techniques that can be used in case of database failure [4 Marks]

QUESTION TWO [20 MARKS]

a) A database administrator experienced a system failure as he was using a database management system. Explain three likely causes of the failure [6 Marks]

b) Discuss how the log file (or journal) is a fundamental feature in any recovery mechanism. [2 Marks]

c) Describe four features that will enhance database integrity. [4 Marks]

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

QUESTION THREE [20 MARKS]

a) What is database security [2 Marks]

b) Discuss the difference between pessimistic and optimistic concurrency control. [4 Marks]

c) Explain two ways you as database administrator will cope with challenges that arise from database emerging technologies [4 Marks]

d) Naks a database administrator intends to perform database recovery procedures for an enterprise. State and explain three types of backups that she may use in the recovery process. [6 Marks]

e) Explain four key mechanisms you use will to ensure data availability as a database administrator [4 Marks]

QUESTION FOUR [20 MARKS]

a) Explain what is meant by Concurrency Control in database systems [2 Marks]

b) Explain what is meant by forward and backward recovery and describe how the log file is used in forward and backward recovery [6 Marks]

c) Explain the use of Grant Select on Projects to User 1 SQL statement when applied in databases [2 Marks]

d) With the aid of a diagram explain the process MySQL follows when executing queries. [8 marks]

e) Describe the role of a checkpoint facility in database recovery [2 Marks]

QUESTION FIVE [20 MARKS]

a) Explain the term data replication as used in databases [2 Marks]

b) What is the difference between a rule-based optimizer and a cost-based optimizer [4 Marks]

c) Explain the following database security features [6 Marks]
   i) authorization
   ii) backups
   iii) administrative controls

d) Briefly explain the practical significance of the write-ahead log protocol. [2 Marks]

e) Distinguish between the Grant and Revoke commands as used in database security [2 Marks]

f) What is the role of a scheduler in transaction management [4 Marks]